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Innovation and Diffusion Models in Policy Research[1]

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Although most actions by governments are incremental in that they marginally modify existing programs or practices and much research about policymaking seeks to explain why it tends to be incremental, ultimately every government program can be traced back to some nonincremental *innovation*.[2] Thus, one cannot claim to understand policymaking unless one can explain the process through which governments adopt new programs. Recognizing this, public policy scholars have conducted extensive inquiry into policy innovation.

When people speak of innovation in common parlance, they usually refer to the introduction of something new. But when should a government program be termed "new"? The dominant practice in the policy innovation literature is to define an innovation as a program that is new to the government adopting it (J. Walker 1969, 881). This means that a governmental jurisdiction can innovate by adopting a program that numerous other jurisdictions established many years before. By embracing this definition, students of policy innovation explicitly choose not to study policy *invention*—the process through which original policy ideas are conceived. To flesh out the distinction via illustration, a single policy invention can prompt numerous governmental jurisdictions to innovate, some many years after others.

This chapter reviews the dominant theories of government innovation in the public policy literature. However, we will see that these theories borrow heavily from others developed to explain innovative behavior by individuals: for example, teachers using a new method of instruction (studied by education scholars), farmers adopting hybrid seeds and fertilizers (studied by rural sociologists), and consumers purchasing new products (studied by marketing

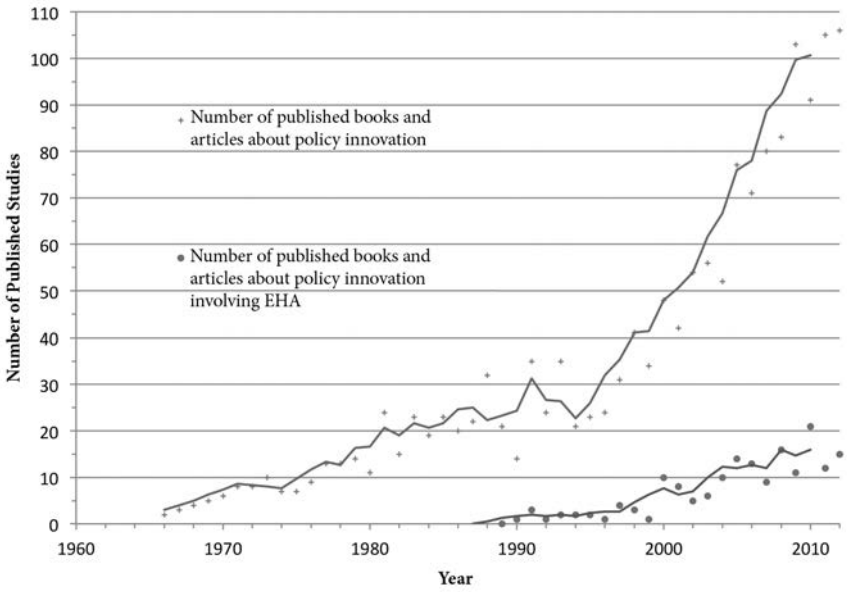
scholars).[3] We will also see that theories of government innovation share many commonalities with models that seek to explain organizational innovation.

Some studies of government innovation have been cross-national, investigating how countries develop new programs and how such programs have diffused across countries (Heclo 1974; Collier and Messick 1975; Brown et al. 1979; Tolbert and Zucker 1983; Kraemer, Gurbaxani, and King 1992; Simmons 2000; Simmons and Elkins 2004; Weyland 2004; Brooks 2005; Gilardi 2005; Meseguer 2005; Baturo and Gray 2009; Gilardi 2010; Lee, Chang, and Berry 2011; Jensen and Lindstädt 2012). Many other studies focus on American states (e.g., J. Walker 1969; Gray 1973a; Canon and Baum 1981; F. Berry and Berry 1990; Mooney and Lee 1995; Mintrom 1997; Ka and Teske 2002; W. Berry and Baybeck 2005; Volden 2006; Shipan and Volden 2008; Pacheco 2012). Still other studies have focused on innovation by local or regional governments within the United States (Crain 1966; Aiken and Alford 1970; Bingham 1977; Midlarsky 1978; Lubell et al. 2002; Moon and Norris 2005; Shipan and Volden 2006) or local or regional governments in other nations (Ito 2001; R. Walker 2006; R. Walker, Avellaneda, and F. Berry 2011).[4]

Despite the extensive number of studies of government innovation, at a general level, there are two principal explanations for the adoption of a new program by a government: *internal determinants* and *diffusion* (F. Berry and W. Berry 1990). Internal determinants explanations posit that the factors leading a jurisdiction to innovate are political, economic, or social characteristics internal to the jurisdiction. In contrast, diffusion explanations are inherently intergovernmental; they view government adoptions of policies as emulations of previous adoptions by other governments. J. Walker's (1969) seminal study of state government innovation across a wide range of policy areas introduced both types of explanations to political scientists.[5] In the years following the publication of Walker's article, the volume of research on policy innovation has grown enormously. This growth is documented in Figure 9.1, which shows the number of books and articles about policy innovation published in political science, public administration, or public policy journals in each year since 1966 (as identified with a JSTOR search).

This chapter begins with separate discussions of the central features of internal determinants and diffusion explanations for the adoption of a policy. We then turn to the methodologies that have been used to test them. Although most scholars have acknowledged that few policy adoptions can be explained purely as a function of (1) internal determinants (with no diffusion effects), or (2) policy diffusion (with no impact by internal factors), most empirical research conducted before 1990 focused on one type of process or the other. At the time of their introduction during the late 1960s and early 1970s, the "single-explanation" methodologies developed were highly creative approaches using state-of-the-art quantitative techniques. However, more recent research

FIGURE 9.1 Growth in Published Research on Policy Innovation, 1966–2012



NOTE: Each value plotted represents the numbers of books and articles about policy innovation published in political science, public administration, or public policy journals in a year (as identified with a JSTOR search in November 2013). The JSTOR search command yielding the values plotted on the top curve is: ((("policy innovation") OR ("policy diffusion"))) AND ((cty:(journal) AND ty:(fla)) OR cty:(book)) AND (year:####) AND disc:(politicalscience-discipline OR publicpolicy-discipline), where #### indicates the year being searched.

The search command yielding the values plotted on the bottom curve is: (((policy innovation) OR ("policy diffusion")) AND (("event history analysis") OR ("proportional hazards") OR ("survival analysis") OR ("Cox model") OR ("Cox proportional"))) AND ((cty:(journal) AND ty:(fla)) OR cty:(book)) AND (year:####) AND disc:(political-science-discipline OR publicpolicy-discipline)

Each fitted curve reflects a three-year moving average of plotted values.

has shown that these traditional methodologies are severely flawed (F. Berry 1994b). In 1990, F. Berry and W. Berry presented a model of American state lottery adoptions reflecting the simultaneous effects of both internal determinants and policy diffusion on state adoption behavior and employed event history analysis (EHA) to test their model. By allowing scholars to test models reflecting the effects of both internal determinants and policy diffusion, the introduction of EHA to the set of empirical techniques available to policy innovation scholars seems to have prompted a dramatic expansion in research over

the last quarter century.[6] As this expansion has occurred, the EHA approach has been extended to a highly diverse set of policy contexts. (See Box 9.1 in the appendix for a list of some of the published studies of policy innovation relying on EHA.) Moreover, as large numbers of scholars have employed EHA in policy innovation research, the methodology has been refined and improved.

Since this chapter does not do justice to the wide range of scholarship on policy innovation, Box 9.2 in the appendix provides a brief suggested reading list for those interested in exploring the literature more widely.

DIFFUSION EXPLANATIONS FOR POLICY ADOPTION

Rogers defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (1983, 5). Students of government policy innovation positing diffusion models conceive of a set of governmental jurisdictions (e.g., the fifty states in the United States or the twenty-eight countries of the European Union) as a social system and maintain that the pattern of policy adoptions by member governments results from one member emulating the behavior of other members. More generally, we can say that policy diffusion occurs if the probability of adoption of a policy by one governmental jurisdiction is influenced by the policy choices of other governments in the system. However, theorists have identified a variety of alternative mechanisms by which the policy choices in one jurisdiction can influence the choices of other governments. At least five mechanisms have been discerned: learning, imitation, normative pressure, competition, and coercion.[7]

Alternative Mechanisms for Diffusion

Learning. Learning occurs when policymakers in one jurisdiction derive information about the effectiveness (or success) of a policy from previously adopting governments (Levy 1994; Braun and Gilardi 2006). Therefore, we say that a policy diffuses as a result of learning when the probability that one government—say *A*—will adopt a policy is influenced by the perceptions of policymakers in *A* about the effectiveness of the policy in jurisdictions that have previously adopted.[8] Note that effectiveness need not be conceived narrowly; it can include success not only in meeting policy objectives but in achieving political goals like winning reelection or higher office (Shipan and Volden 2008; Gilardi 2010; Seljan and Weller 2011).

Some theories (e.g., Bayesian updating models from economics) assume that policymakers are rational and that learning is complete; each government observes all information about the effectiveness of a policy in every jurisdiction in which it has been adopted and is capable of processing all this information

(Simmons, Dobbin, and Garrett 2006). Other theories assume that gathering and processing information about policy effectively is costly, and thus policymakers are "bounded" (or constrained) in their ability to obtain and analyze information (March and Simon 1993; Meseguer 2005; Weyland 2007). These constraints lead policymakers to take shortcuts, perhaps by restricting attention to only a subset of previous adopters. Officials may be assumed to limit their attention to contiguous—or nearby—jurisdictions (W. Berry and Baybeck 2005) or to governments they perceive as "leaders" or as peers (Meseguer 2004). Moreover, all jurisdictions need not be assumed to be equally constrained; in some theories, governments vary in their capacity to learn by virtue of the types and amounts of resources they possess. For example, it has been hypothesized that the level of professionalism of a jurisdiction's legislature influences its ability to learn from the experiences of other governments (Shipan and Volden 2006).

Imitation. Government *A* imitates government *B* when *A* adopts a policy adopted by *B* simply "in order to look like [*B*]" (Shipan and Volden 2008, 842–843). Imitation occurs because policymakers in *A* perceive *B* as worthy of emulation, prompting *A* to adopt any policy that *B* adopts independently of any evaluation of the character of the policy or its effectiveness (Simmons, Dobbin, and Garrett 2006; Meseguer 2006; Karch 2007). The types of jurisdictions that a government seeks to imitate may vary. In some conceptions, policymakers look to "leader" governments; these leaders may be large or wealthy jurisdictions or jurisdictions that have earned strong reputations or high levels of credibility (J. Walker 1969; Grupp and Richards 1975). In other conceptions, the governments imitated share characteristics that make them particularly valuable role models or peers (Simmons and Elkins 2004; Weyland 2004; Brooks 2005). For example, Volden (2006; see also Grossback, Nicholson-Crotty, and Peterson 2004) finds that policymakers tend to emulate policy adoptions of jurisdictions that share similar partisan and ideological orientations. In a useful clarification of the essential differences among mechanisms, Shipan and Volden (2008, 842–843) note that the major distinction between learning and imitation "is that learning focuses on the *action* (i.e., the policy being adopted by another government), while imitation focuses on the *actor* (i.e., the other government that is adopting the policy)."[9]

Normative pressure. Government *A* succumbs to normative pressure when *A* adopts a policy not because it is imitating any particular government or learning from the experience of other adopters, but rather because it observes that the policy is being widely adopted by other governments, and because of shared norms, *A* chooses to conform (DiMaggio and Powell 1983; Sugiyama 2012). Such shared norms can emerge across societies, allowing some policies (e.g., women's suffrage) to achieve a status of "taken-for-grantedness" (Braun and Gilardi

2006, 311). Some have pointed to the role of experts (or "epistemic communities") in forging a consensus on norms (Haas 1992). For example, Simmons, Dobbin, and Garrett (2006) note that the diffusion of economic liberalization in Latin America was facilitated by the advocacy of "expert" American economists, which molded views about appropriate economic policies. For policies made by administrative agencies rather than legislatures, the shared norms that facilitate diffusion have been argued to be a product of professionalization. Agency personnel—regardless of the jurisdiction in which they serve—develop a shared understanding of "good" policy by virtue of their common professional training and accreditation (Teodoro 2009). This shared conception of good policy leads agencies to be receptive to adopting policies thought to be "best practices" adopted elsewhere (R. Walker, Avellaneda, and F. Berry 2011). Shared norms across jurisdictions are often reinforced by the participation of agency personnel in intergovernmental professional associations that constitute networks across which policies can diffuse (DiMaggio and Powell 1983; Majone 1997).

Competition. A policy diffuses via competition when a government's decision about whether to adopt the policy is motivated by the desire of its officials to achieve an economic advantage over other jurisdictions or, equivalently, to prevent other jurisdictions from securing an advantage over it. In diffusion via learning, other governments' adoptions generate new data about the payoffs (costs and benefits) of adopting. In contrast, in diffusion via competition, other governments' adoptions actually change the payoffs of adopting (Simmons, Dobbin, and Garrett 2006). At least two distinct types of competition mechanisms have been described in the literature; we refer to them as *location-choice competition* and *spillover-induced competition*.

In location-choice competition, governments seek to influence the location choices of individuals (persons or firms) who are in position to acquire some good in more than one jurisdiction—usually their own and at least one other (Meseguer and Gilardi 2009). With this type of diffusion, jurisdiction *A* adopts a policy (e.g., a lottery or a restrictive labor immigration policy) to encourage individuals (1) to acquire within *A* a good that is beneficial for *A* to provide, or (2) to go elsewhere to obtain a good that is costly for *A* to provide. Some policies of the U.S. states that have been hypothesized to diffuse due to location-choice competition include the lottery (W. Berry and Baybeck 2005; Baybeck, Berry, and Siegel 2011), casino legalization (Calcagno, R. Walker, and Jackson 2010), restaurant smoking bans (Shipan and Volden 2008), welfare benefits (Peterson and Rom 1990; Volden 2002; W. Berry, Fording, and Hanson 2003; Bailey and Rom 2004), various business regulations (Mossberger 2000), and individual or corporate tax rates (F. Berry and W. Berry 1992) or sales tax adoptions (Burge and Piper 2012). Crossing national boundaries is certainly more costly for individuals and firms than crossing state boundaries

in the United States. Nevertheless, location-choice competition is relevant in the international setting for policies designed to influence a variety of choices of individuals or firms, including business location, individual and corporate purchasing decisions, and migration (Oates 2001; Genschel 2002).

In spillover-induced competition, an adoption by government *B* has a (positive or negative) externality effect on government *A* that changes *A*'s expected net benefit from adopting. For example, *B* might adopt a pollution-abatement project that would reduce pollution in both *B* and *A*; this positive spillover would encourage *A* to "free-ride" on *B*'s adoption, thereby lowering *A*'s incentive to adopt. Other policies that might diffuse via spillover-induced competition involve trade (Elkins, Guzman, and Simmons 2006), military mobilization or conflict (Most and Starr 1980), or commercial standards (e.g., standards trucks must meet to travel in neighboring jurisdictions).

Coercion. Government *A* is coerced into adopting a policy when a more powerful government, *B*, takes action that increases *A*'s incentive or, in the extreme case, forces *A* to adopt. Students of cross-national diffusion have identified cases of horizontal coercion, in which a powerful country encourages a weaker country to adopt a policy, sometimes by threatening action if the weaker nation does not capitulate (Simmons, Dobbin, and Garrett 2006). In other cases, one or more countries take actions that create an incentive for another country to adopt a policy. For example, Bush (2011) finds that a developing country becomes more likely to adopt a gender quota for its legislature as the country's dependence on foreign aid from developed Western countries increases or when the country is exposed to international election monitors.

Researchers studying diffusion in the American federal system are more likely to focus on vertical coercion (i.e., diffusion across levels of government). In some cases, the national government can simply mandate certain activities by states (e.g., the National Voter Registration Act, which required states to allow people to register to vote at the same time they register their motor vehicles), or the Supreme Court can make rulings that constrain state policy choices (Hoekstra 2009). In other cases, the national government uses a "carrot" rather than a "stick" by creating an incentive for a state to adopt a policy. One common vehicle for federal influence is a grant-in-aid creating a financial motivation for a state to adopt. In one example, Derthick (1970) shows how the Social Security Act of 1935 shaped state welfare programs through the Aid to Families with Dependent Children (AFDC) grant to the states (see also Welch and Thompson 1980; Soss et al. 2001; Allen, Pettus, and Haider-Markel 2004). Indeed, international organizations such as the International Monetary Fund (IMF) and the World Bank can play a similar coercive role by requiring a country to adopt some policy as a condition for financial aid (e.g., Weyland 2007; Simmons and Elkins 2004; Barrett and Tsui 1999).

Complicating matters, multiple mechanisms may underlie a policy's diffusion. For example, at the same time location-choice competition may increase a state's probability of adopting a lottery if its neighboring states adopt one, the state may learn by observing positive consequences of neighbors' lotteries, also increasing its probability of adopting. Moreover, the mechanism responsible for a policy's diffusion may vary depending on the context in a number of ways. First, the mechanism can vary with characteristics of a state. For example, Stone argues that an "economic recession or crisis, or defeat in war" makes a country more vulnerable to coercion (1999, 54). Also, Shipan and Volden (2008), in their study of the diffusion of antismoking policies, hypothesize that a city's size has a positive effect on its likelihood of learning from other cities and a negative effect on its probability of imitating or competing with other cities or being coerced by its state. Second, the mechanism underlying policy diffusion can vary over time. In one example, Gilardi, Füglister, and Luyet (2009)—who study the diffusion of hospital financing reforms across countries—find that the countries become more prone to learn over time as the quality of information available about the effects of other countries' adoptions grows. Finally, the mechanism by which a policy diffuses can be influenced by the nature of the policy. For instance, Makse and Volden (2011)—focusing on five attributes of policies identified by Rogers (1983)—posit that learning becomes more likely as a policy's relative advantage, compatibility, and observability rise and as the policy's complexity and trialability decline.

As we review various diffusion models developed in the policy innovation literature, each focusing on a different channel of communication and influence across government jurisdictions, we will see that each model relies on one or more of the five mechanisms described above to justify why governments emulate other governments when making public policy. We now turn our attention to three models that dominated early scholarship on policy innovation. One—the *national interaction model*—assumes that policy diffuses due to learning. The others—the *regional diffusion model* and the *leader-laggard model*—are consistent with multiple mechanisms for diffusion.

The National Interaction Model

This learning model was developed and formalized by communication theorists analyzing the diffusion of an innovation through a social system (assumed to be of fixed size) consisting of individuals (Rogers 1962). In equation form, the model can be expressed as follows:

$$\Delta N_t = N_t - N_{t-1} = bN_{t-1}\,[L - N_{t-1}]. \text{ [Equation 9.1]}$$

In this model, L is the proportion of individuals in the social system who are potential adopters (a value assumed to remain constant over time) and serves as

a ceiling on possible adoptions. If every person in the system is unconstrained and may adopt, L equals one. N_t is the cumulative proportion of adopters in the social system at the end of time period t, N_{t-1} is the cumulative proportion at the end of the previous period, and thus ΔN_t is the proportion of new adopters during period t.[10] With some algebraic manipulation, the terms in Equation 9.1 can be rearranged to yield the following:

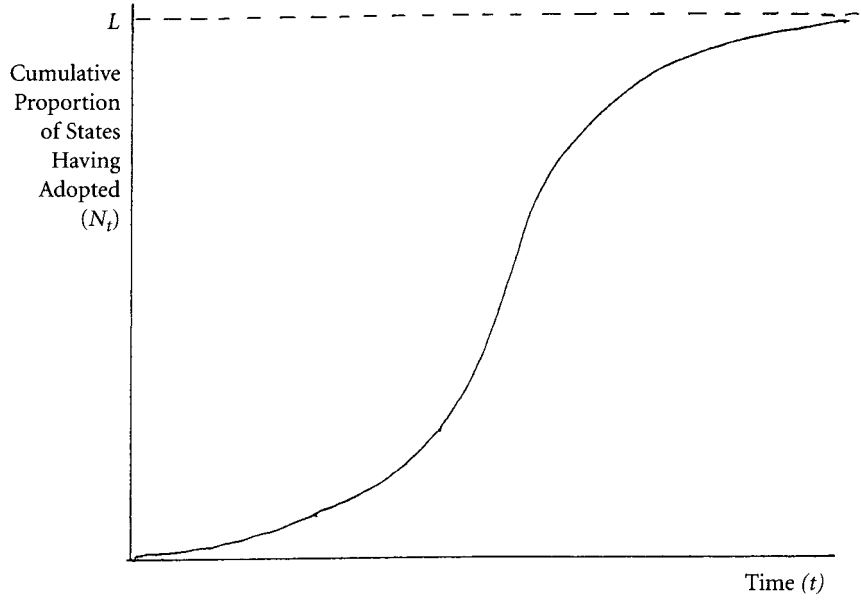
$$N_t = (bL + 1)\, N_{t-1} - bN^2{}_{t-1} \quad \text{[Equation 9.2]}$$

Then, since Equation 9.2 is linear, given data on the timing of adoptions by all potential adopters, the parameters b and L can be estimated by regressing N_t on N_{t-1} and N^2t-1.[11]

When the cumulative proportion of adopters is graphed against time, Equation 9.1 yields an S-shaped curve, like that reflected in Figure 9.2. Early in the diffusion process, adoptions occur relatively infrequently. The rate of adoptions then increases dramatically but begins to taper off again as the pool of potential adopters becomes small.

In an important early effort to enhance the theoretical precision of policy innovation research, Virginia Gray (1973a; see also Menzel and Feller 1977; Glick and Hays 1991; Boushey 2012) employs Equation 9.2, setting the time period as the calendar year and assuming that (1) the social system is the

FIGURE 9.2 S-Shaped Curve Consistent with National Interaction Model (Equation 9.1)



community of American states, and (2) the innovation diffusing is one of several state policies—including AFDC, education policies, and civil rights laws. Gray's model assumes a national communication network among state officials in which officials learn about programs from their peers in other states. The model presumes that officials from states that have already adopted a program interact freely and mix thoroughly with officials from states that have not yet adopted it and that each contact by a not-yet-adopting state with a previous adopter provides an additional stimulus for the former to adopt. There are indeed formal institutional arrangements that encourage the thorough mixing of states. Chief among these are various associations of state officials that allow individuals with similar positions across the fifty states to meet periodically in national conferences. These include associations of elected "generalist" officials such as the National Governors' Association and the National Conference of State Legislatures, each of which have numerous committees on specific policy areas, as well as organizations of functionalist officials such as the National Association of General Service Administrators.

But several factors limit the utility of the national interaction model—as traditionally conceived in Equations 9.1 and 9.2—for students of government innovation. First, the model assumes that, during any time period, all potential adopters that have not yet adopted are equally likely to do so; the only variable influencing the probability that a potential adopter will adopt during any time period is the cumulative number of adopters prior to that period. Indeed, the model treats all potential adopters as totally undifferentiated actors who interact "randomly"—that is, who are equally likely to have contact with the members of the social system. Thus, the theory is well suited for when the social system is a large society of individuals and the scholarly interest is in a macro-level description of the diffusion process. While certainly in any society friendships and work and family relations guarantee that an individual's interactions with other members of the society are nonrandom, when studying the diffusion of a new consumer product through a large society, for instance, it may suffice to employ a model assuming random interaction. But when studying the diffusion of a policy through the fifty states, it seems less reasonable to treat the states as undifferentiated units; we know that Mississippi differs in many ways from New York, and our theory should probably take some of these differences into account. It is also likely that contacts between officials from different states are patterned rather than random.[12] It makes sense, for example, that politicians and bureaucrats in New York will have more contact with their counterparts in New Jersey than with officials in Mississippi.

Recently, the logic underlying the national interaction model has been modified to reflect a recognition that the professional associations encouraging interaction among state officials involve some states more than others, thereby prompting probabilities of policy adoption that vary across states. For example,

Balla (2001) hypothesizes that states whose insurance commissioners sat on a committee of the National Association of Insurance Commissioners with jurisdiction over the regulation of health maintenance organizations (HMOs) were more likely than others to adopt model legislation proposed by the committee due to the greater centrality of commissioners in the informational networks surrounding the proposed legislation.

The Regional Diffusion Model

The regional diffusion model posits that governments are influenced primarily by other governments that are geographically proximate. Most of these models assume that governments are influenced exclusively by those jurisdictions with which they share a border; as such, we call them *neighbor models*. Specifically, these models hypothesize that the probability that a government will adopt a policy is positively related to the number (or proportion) of jurisdictions bordering it that have already adopted it (e.g., F. Berry and W. Berry 1990; Mintrom 1997; Balla 2001). Other models, which we term *fixed-region models*, assume that some collectivity of jurisdictions (e.g., the states in the United States, the countries in Latin America) is divided into multiple regions and that governments within the same region tend to emulate each other's policies (e.g., Mooney and Lee 1995).

Although fixed-region and neighbor models are similar in that they emphasize the emulation of nearby jurisdictions, the models are subtly different in their specified channels of influence. Fixed-region models presume (if only implicitly) that all governments within the same region experience the same channels of influence. In contrast, neighbor models—by avoiding fixed regional groupings of jurisdictions and instead pointing to the influence of all bordering jurisdictions—assume that each government has a unique set of reference jurisdictions for cues on public-sector innovations. Although one can discern policies where a neighbor model makes more sense than a fixed-region formulation (e.g., in the case of lottery adoptions), and vice versa, neither pure model is entirely realistic. Fixed-region models imply, implausibly, that some jurisdictions—those bordering another region—are completely unaffected by some of their neighbors. Neighbor models assume that jurisdictions that are close but share no border (e.g., Vermont and Maine) have no influence on one another. A more realistic regional diffusion model might assume that jurisdictions are influenced most by their neighbors but also by other jurisdictions that are nearby. One simple specification consistent with this assumption is that the level of influence of one jurisdiction over another is inversely related to the distance between the two.

There is strong theoretical justification for expecting that some policy diffusion is regional, and there is much empirical evidence of regional diffusion across jurisdictions (F. Berry and W. Berry 1990; Boehmke and Witmer 2004). However, a weakness of the regional diffusion model is that multiple

mechanisms for diffusion can be the basis for an expectation that diffusion channels are regional. For example, governments may be more likely to learn from nearby jurisdictions than from those far away because governments can more easily "analogize" to proximate jurisdictions, which tend to share economic and social problems and have environments similar enough so that policy actions may have similar effects (Mooney and Lee 1995; Elazar 1972). Also, because of constraints on the mobility of most individuals and firms, governments are more likely to engage in location-choice competition with nearby jurisdictions than with those far away. For example, U.S. states worried about losing revenue—especially those with large population centers near a border—are likely to be very concerned about whether their immediate neighbors have lotteries but unconcerned about remote states. Similarly, a state fearful of becoming a "welfare magnet" may match reductions in welfare benefits by neighboring states with large concentrations of poor people near its border, but it may be unresponsive to benefit adjustments in far-away states (W. Berry and Baybeck 2005).[13]

Leader-Laggard Model

The leader-laggard model assumes that certain jurisdictions are pioneers in the adoption of a policy and that other jurisdictions emulate these leaders (J. Walker 1969, 893). Most often, scholars presume that leadership is regional, with states taking cues from one or more pioneer jurisdictions within their geographical region (J. Walker 1969, 1973; Grupp and Richards 1975; Foster 1978). This model can be modified easily, however, to reflect the notion of a national leader among U.S. states or an international leader among countries: a jurisdiction that, when it adopts a new program, increases the likelihood that other jurisdictions, regardless of their geographical location, will adopt.

Like the regional diffusion model, the leader-laggard model can be motivated by multiple mechanisms for diffusion. For instance, the leader-laggard model is compatible with learning. Policymakers in some governments may be more risk acceptant than officials in other jurisdictions, making the former governments most likely to be "leaders" who are willing to adopt a new untested policy. Jurisdictions in which policymakers are more risk averse may prefer not to adopt until they are able to observe the degree of success of the policy in jurisdictions that adopted early. However, the leader-laggard model is also compatible with imitation. For example, in some issue areas, officials in one jurisdiction may be more highly regarded by their peers than other jurisdictions' officials, making policymakers more likely to turn to that jurisdiction for cues.[14]

Although there are certainly strong reasons to expect leader jurisdictions to emerge, thereby forming the groundwork for leader-laggard diffusion, such models are often flawed by their failure to identify a priori (1) the jurisdictions (or even types of jurisdictions) that are expected to be pioneers, and (2) the

predicted order of adoption of the governments expected to follow. Indeed, without an a priori theoretical prediction of which jurisdiction(s) will lead and the order in which the remaining jurisdictions will follow, a leader-laggard model is virtually nontestable; any adoption pattern will involve one jurisdiction (which ex post facto could be designated the pioneer) adopting a policy first and other governments adopting afterward.

One leader-laggard model that clearly specifies the channels of diffusion is the *hierarchical model* developed by Collier and Messick (1975). Studying the pattern of social security adoptions by nations around the world, these authors hypothesize that the pioneers in social security were highly (economically) developed nations and that social security programs diffused down a hierarchy of nations from most to least developed.[15] Such a hypothesis specifies (in a testable fashion) the characteristics of leaders (high economic development) and a clear ordering of successive adoptions (from most- to least-developed countries). But note that, although the hierarchical model specifically posits diffusion of a policy across jurisdictions, its empirical prediction of a strong relationship between economic development and earliness of adoption is indistinguishable from that of an internal determinants model, which assumes no influence of jurisdictions on one another and instead posits that the sole determinant of the propensity of a government to adopt is its level of development. We turn now to consider internal determinants explanations for policy adoption.

INTERNAL DETERMINANTS EXPLANATIONS FOR POLICY ADOPTION

Internal determinants models presume that the factors causing a government to adopt a new program or policy are political, economic, and social characteristics of the jurisdiction. Thus, in their pure form, these models preclude diffusion effects in which a government is influenced by the actions of other governments. Certainly, once a policy is adopted by one jurisdiction, it is extremely unlikely that another jurisdiction's adoption would be completely independent from the previous one. Unless the two governments arrived at the same (or very similar) policy via a highly improbable coincidence, at a minimum there must have been diffusion from one government to the other of the idea for the policy. Thus, we believe that internal determinants models must acknowledge that when a government adopts a policy new to the world, media coverage and institutionalized channels of communication among governments make it likely that knowledge of the policy spreads to other jurisdictions.[16] However, internal determinants models assume that once a jurisdiction's policymakers are aware of a new policy, the jurisdiction's internal characteristics, rather than pressure created by other governments' adoptions or explicit evaluations of the impacts of the policy in earlier-adopting jurisdictions, determine its probability of adoption.

The Choice of a Dependent Variable

One important theoretical issue in the construction of internal determinants models is how the dependent variable—the propensity of a government to adopt a policy or a set of policies—is defined. In research prior to the 1990s, most internal determinants models made the American state the unit of analysis and employed a dependent variable that assumed that the earlier a state adopted, the greater its "innovativeness." Empirical analysis was cross-sectional, and the dependent variable was generally measured at the interval level by the year of adoption (or some linear transformation thereof) or at the ordinal level by the rank of a state when states were ordered by their time of adoption (Canon and Baum 1981; Glick 1981; Gray 1973a; J. Walker 1969). However, a dichotomous version of this variable, which indicated whether a state had adopted a policy by a specified date, was also used (Filer, Moak, and Uze 1988; Glick 1981; Regens 1980).

More recent research generally conceptualizes the propensity of a jurisdiction to adopt a policy differently. The unit of analysis is now the jurisdiction *in a particular year*. More precisely, the unit of analysis is the jurisdiction in a year in which it has not previously adopted the policy and, thus, is still eligible to adopt in a particular year.[17] The dependent variable is the probability that a jurisdiction eligible to adopt will do so during that year (e.g., F. Berry and W. Berry 1990, 1992; Hays and Glick 1997; Mintrom 1997). Empirical analysis is pooled (cross-sectional/time series), where a set of jurisdictions is observed over multiple years.

One important distinction between the two dependent variables is that the *probability of adoption* is a concept that is (1) defined for each jurisdiction at any point in time, and (2) free to change over time, whereas the *earliness of adoption* takes on a single fixed value for each jurisdiction, determined by the year it adopts. A second distinction is that while the timing of a government's adoption relative to other governments is fundamental to its score on the earliness-of-adoption variable, relative timing is not necessarily relevant to a determination of a jurisdiction's propensity to adopt when a probability-of-adoption conception is utilized. A jurisdiction adopting a policy decades later than most other jurisdictions is not necessarily deemed as having had a (stable) low propensity to adopt; it is possible that the jurisdiction had a low probability for many years but that changing conditions led to an increased probability of adoption.

Although we are reluctant to declare either of these dependent variables—earliness of adoption or probability of adoption—as unambiguously the best one for internal determinants models, we believe that greater advances have come from models using the latter dependent variable, a position on which we elaborate below. Furthermore, our discussion of the theory underlying internal

determinants models in this section emphasizes conceptualizations in which the dependent variable is the probability of adoption.

When propensity to adopt is conceived of as the probability of adoption, the focus of research must be a single policy.[18] However, in the study of the innovativeness of jurisdictions as reflected by their earliness of adoption, attention can focus on either one policy or a set of policies. At one extreme are studies designed to explain jurisdictions' adoptions of a single policy or program (e.g., Hays and Glick's [1997] research on state living wills). Other internal determinants models have focused on multiple policy instruments in a single issue area (e.g., Sigelman and Smith's [1980] research on consumer protection, covering twenty-eight different kinds of consumer legislation). At the other extreme is J. Walker's (1969; see also Savage 1978) analysis of the innovativeness of American states using an index reflecting the earliness of adoption of a set of eighty-eight policies spanning a wide range of economic and social issue areas. Boehmke and Skinner (2012) recently constructed a new measure of state innovativeness that seeks to overcome methodological shortcomings of Walker's measure.

Implicit in the Walker measure of innovativeness is that it is reasonable to conceive of a general proclivity of a government to innovate across a wide range of issue areas. Some are skeptical of this claim; in a classic exchange with Walker, Gray (1973a, 1973b) claims that governments can be highly innovative in one program area but less so in others, rendering any general innovativeness score useless. Of course, whether governments are innovative generally and across a range of policy areas is an empirical question, and if the evidence is supportive, it is useful to develop models explaining generic innovativeness.

But even the variation already documented in state innovativeness across issue areas makes it obvious that, for any individual policy, the propensity of states to adopt the policy cannot be explained fully by a general proclivity to innovate (Gray 1973a). For this reason, even if generic innovativeness is a useful concept, we still ought not treat it as the ultimate dependent variable. A good alternative is to take the course of Mooney and Lee (1995), Hays and Glick (1997), and Soule and Earl (2001), who conceive of a jurisdiction's general proclivity to innovate as just one of a set of independent variables that influence the probability that a jurisdiction will adopt a particular policy. The idea is that governments vary in their general receptivity to new ideas and that this is one factor that accounts for their differential probabilities of adopting any specific program. The strength of the role played by general receptivity relative to other specific determinants of the probability of adoption is assessed empirically.

Hypotheses from Internal Determinants Models

Much of the theory underlying internal determinants models of government innovation can be traced to research about the causes of innovativeness at the

individual level. For example, a tremendous level of support has been generated for the proposition that persons with greater socioeconomic status—higher levels of education, income, and wealth—are more likely to innovate than persons with less status.[19] A high level of education provides individuals access to knowledge about innovative practices and an openness to new ideas. Many innovations cost money or involve financial risks for those who adopt them; greater income and wealth provide people the resources necessary to absorb these costs. Similar hypotheses have been developed about innovation in organizations. Organizations of greater size and with greater levels of "slack resources" are assumed to be more innovative than smaller organizations and those with fewer resources (Cyert and March 1963; Rogers 1983; F. Berry 1994a; Ma 2013). In turn, J. Walker (1969, 883–884) explicitly draws on these organizational-level propositions to support the hypothesis that larger, wealthier, and more economically developed American states are more innovative.

Indeed, we can turn to the literature on organizational innovation for a framework useful for assessing the variety of internal determinants likely to influence the probability that a government will innovate. Lawrence Mohr (1969, 114) proposes that the probability that an organization will innovate is inversely related to the strength of obstacles to innovation and directly related to (1) the motivation to innovate, and (2) the availability of resources for overcoming obstacles. This proposition suggests a valuable organizational device, since among the hypotheses frequently reflected in internal determinants models are those concerning the motivation to innovate, as well as the obstacles to innovation and the resources available to surmount them.

We will review these hypotheses, emphasizing those that seem applicable to a wide range of policies. However, we recognize that explaining the adoption of any specific policy is likely to require attention to a set of variables that are ad hoc from the point of view of innovation theory but critical given the character of the politics surrounding the issue area in question. For example, U.S. states with strong teacher unions are less likely to adopt school-choice reforms (Mintrom 1997), and states with large fundamentalist populations are less likely to adopt several policies considered immoral by many fundamentalists: state reforms (in the pre-Roe period) making abortions more accessible and state lotteries (F. Berry and Berry 1990; Mooney and Lee 1995; Roh and F. Berry 2008). A strong presence of religious fundamentalists in a state does not diminish the likelihood of adoptions of every policy, just those raising moral issues central to this group's religious beliefs.

An explanation of the adoption of any specific policy also is likely to require independent variables that are relevant not because they are determinants of the propensity of a government to adopt a new policy but because they influence the preferences of policymakers concerning the substantive issues raised by the new policy. For instance, a state legislator's response to a proposal for a new welfare program should be driven partially by the same factors determining the

legislator's reaction to a proposal for an incremental change in existing welfare programs, such as increasing benefit levels. In another example, research by F. Berry and W. Berry (1992, 1994) on state tax policy finds that the factors explaining states' adoptions of new tax instruments are virtually identical to the variables accounting for decisions to increase the rates in existing taxes—despite the fact that the imposition of a tax new to a state can unambiguously be termed a policy innovation, whereas an increase in the rate for an existing tax would probably be viewed as an incremental policy choice. The unpopularity of taxes seems to drive the politics of taxation in the American states, and this unpopularity affects both tax adoptions and tax increases.[20]

Our review of hypotheses from internal determinants theories of government innovation emphasizes variables that seem especially relevant for explaining the adoption of new programs. This means that we do not discuss a wide range of factors widely believed to influence both innovative and routine policymaking. For example, citizen and elite ideologies are frequently hypothesized to influence the adoption of many programs that reflect traditional liberal-conservative cleavages (e.g., Mooney and Lee 1995; F. Berry and W. Berry 1992; Sapat 2004; Doan and McFarlane 2012). But their influence is not relevant to an understanding of policy innovation per se, because ideology is widely perceived to influence routine or incremental policy choices as well (K. Hill, Leighly, and Hinton-Andersson 1995; Clingermayer and Wood 1995).[21]

Factors reflecting the motivation to innovate. Numerous scholars have hypothesized that problem severity is an important determinant of the motivation to innovate. Problem severity can influence the motivation of government officials to adopt a policy directly by clarifying the need for the policy or indirectly by stimulating demand for the policy by societal groups. For instance, Allard maintains that poor economic conditions contributed to the adoption of Mothers' Aid programs by increasing "demand and need for assistance" (2004, 529). Similarly, Stream (1999) proposes that the rate of uninsurance among a state's population influences the likelihood that the state will adopt a set of health insurance reforms. Also, Mintrom and Vergari argue that the greater the ratio of state education funding to local funding, the more likely that a state legislature will consider "systemic reform like school choice" (1998, 135).

Social scientists often assume that the principal goal of elected officials is to win reelection (e.g., Mayhew 1974; Kiewiet and McCubbins 1985). Although this assumption suggests that elected officials should be responsive to public opinion when deciding whether to adopt a new policy, the response should vary with the level of electoral security of government officials: the more insecure they feel, (1) the more likely they will be to adopt new policies that are popular with the electorate, and (2) the less likely they will be to adopt new policies that are widely unpopular, or at least sufficiently unpopular with some segment of the electorate to be deemed controversial. Two corollaries of this proposition

have frequently been introduced in the literature. One relates to interparty competition. J. Walker (1969) argues that politicians anticipating closely contested elections are especially likely to embrace new programs to try to broaden their electoral support. Implicit in this hypothesis is that the new programs are popular with the public. In the case of unpopular programs (like the imposition of a new tax), electoral competition is likely to reduce the probability that politicians will support the program.

Politicians' levels of electoral security also vary with the amount of time until the next election. Reasoning similar to the above suggests that the closer the next election, the more likely a government is to adopt a new popular program and the less likely it is to adopt an unpopular or highly controversial new policy. This proposition has received support in the case of highly popular state lotteries (F. Berry and W. Berry 1990), very unpopular mandatory taxes (Mikesell 1978; F. Berry and W. Berry 1992), and controversial school-choice initiatives (Mintrom 1997).

Obstacles to innovation and the resources available to overcome them. Theories of individual and organizational innovation have stressed the importance of financial resources (i.e., wealth and income levels for individuals and "slack resources" for organizations) and other characteristics (e.g., a high level of education for an individual and large size for an organization) reflecting the capability of the potential adopter to innovate. Similar kinds of resources are often held to be critical for government innovation.

Some new government programs require major expenditures, and therefore the availability of financial resources is a prerequisite for adoption. Thus, one can hypothesize that the fiscal health of a government often has a positive impact on its propensity to adopt a new policy (Allard 2004; Lowry 2005; Aidt and Jensen 2009).[22] Analogous to the notion of highly capable individuals or organizations is the concept of governments with strong capacity. J. Walker (1969), Sigelman and Smith (1980), Andrews (2000), and McLendon, Heller, and Young (2005) maintain that American states with legislatures that give their members generous staff support and extensive research facilities should be more likely to adopt new policies than states with less professionalized legislatures, and Brooks (2005) posits that the level of party fragmentation in a country is inversely related to the country's likelihood of innovation.[23] Alternatively, it can be argued that the capacity of a jurisdiction's economy to finance extensive public services is the ultimate determinant of the jurisdiction's propensity to innovate (Daley and Garand 2005). Such capacity is reflected by several measures of economic development common in the literature, including per capita income, gross domestic product, and level of urbanization.

J. Walker (1969, 884) suggests that jurisdictions with high levels of economic development have a greater probability of adopting even those policies that

do not require large budgets (e.g., enabling legislation for zoning in cities or a state council on the arts), partly due to their greater adaptivity and tolerance for change. Furthermore, Wagner (1877; see also Mann 1980; W. Berry and Lowery 1987) hypothesizes that economic development prompts increased demand for government services. Greater personal income among a jurisdiction's citizens leads them to demand governmental services that might be considered luxuries when personal income is low. Similarly, greater urbanization and industrialization lead to social problems that often require "collective" governmental solutions (Hofferbert 1966).

Others have argued that, although adequate financial resources are a prerequisite for government innovation, individuals who advocate policy ideas and are willing to devote their energies to pushing these ideas can be critical to the adoption of a new policy. Most of the scholarly attention to the importance of so-called policy entrepreneurs, both inside and outside government, has focused on their role in agenda setting (Kingdon 1984; Baumgartner and Jones 1993; Schneider, Teske, and Mintrom 1995). However, Mintrom (1997; see also Mintrom and Vergari 1996) offers evidence of the importance of policy entrepreneurs in facilitating the adoption of school-choice initiatives in the American states.[24] Similarly, Sabatier and Jenkins-Smith (1999) argue that *advocacy coalitions*—coordinated groups of governmental officials, activists, journalists, researchers, and policy analysts—can be crucial in paving the way for policy adoptions.[25]

Indeed, several theorists, recognizing the rarity of government innovation, have argued that innovation can be expected to occur only in the unusual case wherein various independent conditions happen to occur simultaneously. Kingdon (1984, ch. 8) speaks of policy windows—rare periods of opportunity for innovation—that are created when a new political executive takes office, an important congressional committee chair changes hands, and/or some event or crisis generates an unusual level of public attention to some problem. He argues that policy entrepreneurs consciously wait for such windows of opportunity to press their policy demands. In their study of tax adoptions, F. Berry and W. Berry (1992; see also Hansen 1983) argue that taxes tend to be adopted when several political and fiscal conditions converge to create a rare "political opportunity"—for example, a fiscal crisis in government occurring when the next election is not near and when one or more neighboring jurisdictions have recently adopted a new tax.

A UNIFIED MODEL OF GOVERNMENT INNOVATION REFLECTING BOTH INTERNAL DETERMINANTS AND DIFFUSION

We propose that models of government innovation should take the following general form:

$$ADOPT_{i,t} = f(MOTIVATION_{i,t}, RESOURCES/OBSTACLES_{i,t}, OTHERPOLICIES_{i,t}, EXTERNAL_{i,t})$$ [Equation 9.3]

The unit of analysis for this equation is the jurisdiction, *i*, eligible to adopt a policy (i.e., the jurisdiction that has not yet adopted the policy) in a particular year, *t*. The dependent variable—$ADOPT_{i,t}$—is the probability that jurisdiction *i* will adopt the policy in year *t*. $EXTERNAL_{i,t}$ denotes variables reflecting diffusion effects on jurisdiction *i* at time *t*; thus, these variables would measure the behavior of other jurisdictions at time *t* or in the recent past.

The remainder of the terms in the function *f* are internal determinants. $MOTIVATION_{i,t}$ represents variables indicating the motivation of public officials in jurisdiction *i* at time *t* to adopt the policy; these variables would include the severity of the problem motivating consideration of the policy, the character of public opinion and electoral competition in the jurisdiction, and other ad hoc motivation factors. $RESOURCES/OBSTACLES_{i,t}$ denotes variables reflecting obstacles to innovation and the resources available for overcoming them. For many policies, the government's level of economic development and the professionalism of its legislature would be among the variables included. Factors indicating the presence (and skill) of interested policy entrepreneurs or the strength of advocacy coalitions in a jurisdiction could also be included.[26] Finally, $OTHERPOLICIES_{i,t}$ is a set of variables indicating the presence or absence in jurisdiction *i* of other policies that have implications for the likelihood that the jurisdiction will adopt the new policy.

The impacts of previous policy choices on the probability of adopting a new policy have all but been ignored in the empirical literature on government innovation, but we contend that models of policy innovation must recognize the effects of one policy choice on another. Mahajan and Peterson (1985, 39–40) identify four types of "innovation interrelationships": innovations may be (1) independent, (2) complementary, (3) contingent, or (4) substitutes. This typology has relevance for explaining policy adoptions.

If we are seeking to explain the adoption of policy *B*, and policy *A* is largely independent of *B* (in the sense that a jurisdiction's probability of adopting *B* is unaffected by whether it has already adopted *A*), obviously we need not concern ourselves at all with policy *A*. But policies of the other three types are not so safely ignored. Sometimes two policies are complementary: the adoption of policy *A* increases the probability that a government will adopt policy *B*. For example, a U.S. state that has previously chosen to license one type of auxiliary medical practitioner (e.g., physician assistants) may have created a precedent that makes it more likely that advocates of licensing other auxiliary personnel (e.g., nurse practitioners) will be successful.

Note that a positive relationship between the probability of adoption of policy *B* and the presence of policy *A* can exist without *A* and *B* being complementary

if the relationship is spurious—resulting from both policies' adoptions being influenced by a common set of variables. For example, if the probability that an American state will adopt one type of welfare reform is positively related to the presence of another similar type of reform, yet that relationship is exclusively due to the fact that the same kinds of causal forces are at work in the adoption of both policies, the two welfare reforms should not be viewed as complementary. Only when the adoption of one policy changes conditions in a jurisdiction so as to make the jurisdiction more receptive to the other policy would we term the two policies complementary.

Another possibility is that policy *B*'s adoption is contingent on the previous adoption of policy *A*, in which case the probability that a jurisdiction will adopt *B* is zero until the jurisdiction adopts *A*. Brace and Barrilleaux (1995) present a theory of state policy reform designed to explain changes in existing programs in a variety of policy areas. The adoption of many of these policy changes is contingent on a state's previous adoption of the program being reformed.

A final alternative is that policy *A* is a substitute for policy *B*. When *A* is an exact substitute for *B*, *A*'s adoption completely precludes the possibility of adopting *B*. However, exact policy substitutes are rare; partial substitutes are more likely. In the case of partial substitutes, the adoption of *A* does not preclude the adoption of *B*; it only reduces its likelihood. For instance, it may be that different "school-choice" plans considered by U.S. states are partial substitutes. One possibility is that states create charter schools in an attempt to diminish the prospects that a more "radical" program—such as school vouchers—will be adopted. In this case, a state's previous adoption of a charter school program would lower the probability that the state would establish a voucher program.[27] In all these instances—in which policy *B* is complementary to, contingent on, or a substitute for policy *A*—a variable indicating whether a jurisdiction has adopted policy *A* should be included in the model explaining jurisdictions' adoptions of policy *B*.

EARLY APPROACHES TO TESTING INTERNAL DETERMINANTS AND DIFFUSION MODELS

Prior to 1990, the literature on government innovation was dominated by empirical research testing (1) internal determinants explanations that assume no diffusion occurs, or (2) diffusion models that assume no effects of internal determinants. F. Berry (1994b) argues that each of three models of government innovation discussed above—internal determinants, national interaction, and regional diffusion—is associated with a distinct methodology for empirical testing and explores the ability of these techniques to detect the true innovation process underlying policy adoptions. She does this by applying the methodologies to data generated from simulated innovation processes with known

characteristics. Berry's results, which we summarize here, paint a very pessimistic picture of the ability of the traditional methodologies to help us understand government innovation.[28]

Testing Internal Determinants Models

Internal determinants models were traditionally tested with cross-sectional regression (or probit or discriminant) analysis (e.g., Regens 1980; Glick 1981; Canon and Baum 1981; Filer, Moak, and Uze 1988). The dependent variable was a measure of how early a government adopted one or more policies (or whether or not some policy had been adopted by a certain date), whereas the independent variables were political and socioeconomic characteristics of jurisdictions.

Several problems with this cross-sectional regression strategy are immediately apparent. The first pertains to the year for observing independent variables. If one measures the independent variables in a year that is later than some jurisdictions' adoptions, one winds up attempting to account for the behaviors of these jurisdictions with variables measured after the behavior has occurred. Thus, the only logical alternative is to measure the independent variables in the year that the first jurisdiction adopts (or some earlier year). But when adoptions of the policy are spread over many years, this approach requires an implausible assumption that late-adopting governments' behavior can be explained by the characteristics of those jurisdictions many years prior. Moreover, the cross-sectional approach to testing an internal determinants model does not permit an assessment of the effects of variables that change substantially over time; each jurisdiction is a single case in the analysis, having a fixed value for each independent variable. Finally, although the cross-sectional approach is suitable for testing an internal determinants model in which the propensity to adopt is defined as the "earliness of adoption," a cross-sectional model cannot be used if the dependent variable is conceptualized as the probability of adoption in a particular year.

In addition to these limitations, Berry finds that the cross-sectional approach to testing internal determinants models cannot be trusted to discern whether the adoptions of a policy by governments are actually generated by internal determinants. She finds, for example, that simulated policy adoptions generated out of a pure regional diffusion process—with no impact at all by internal characteristics of a jurisdiction—tend to exhibit evidence of internal determinants when a traditional cross-sectional model containing independent variables frequently used in the literature is estimated. The empirical problem is that jurisdictions near each other tend to have similar values on many political and socioeconomic characteristics. Thus, policies that diffuse regionally—say, by being passed to bordering jurisdictions—tend to yield an order of adoption by jurisdictions that correlates highly with these internal characteristics.

Testing the National Interaction Model

As noted earlier, the national interaction model was traditionally tested using time series regression to estimate a model in the form of Equation 9.2. However, Berry finds that this regression approach cannot reliably discern whether a policy's adoptions are the result of national interaction. In particular, when data for simulated policy adoptions generated either by a pure regional diffusion process or solely as a result of internal determinants are used to estimate Equation 9.2, the results often support the hypothesis that the policies spread via a national interaction process.

The empirical problem here is that, for any policy for which a graph of the cumulative proportion of states having adopted against time approximates an S-shape similar to that shown in Figure 9.2, the regression approach will generate support for the national interaction model. Unfortunately, this S-shape will result from any process that produces a period of infrequent adoptions followed by a period of more frequent adoptions (which is inevitably followed by a tapering off in the rate of adoptions as the number of remaining potential adopters declines). Policies that diffuse regionally can produce this adoption pattern. Even policies that are adopted as independent responses to internal state conditions can. Consider, for example, a policy that is most likely to be adopted by states with healthy economies; if a national economic boom cycle lifts the economies of all states, adoptions by many states may be clumped together to produce a period of frequent adoptions sandwiched by periods with less frequent adoptions.

Testing Regional Diffusion Models

The classic approach to testing regional diffusion models was J. Walker's (1969; see also Canon and Baum 1981) factor analytic technique. Walker used factor analysis to isolate groupings of American states with similar orders of adoption for eighty-eight policies. He then observed that the groupings coincided with regional clusters of states, which he interpreted as empirical evidence for regional diffusion.

Berry simulates state adoptions of 144 policies, each diffusing regionally based on a pure neighbor model. When the data for these 144 policies are factor-analyzed according to Walker's procedure, there is strong support for the regional diffusion proposition. Thus, Berry finds evidence that Walker's methodology correctly identifies neighbor-to-neighbor diffusion when it exists. Our hunch is that the methodology also successfully shows support for the regional diffusion hypothesis when employed with policies that diffuse via fixed-region diffusion. If we are correct, the good news would be that factor analysis reliably detects diffusion when it exists in either of two prototypic forms: neighbor to

neighbor or fixed regions. But the bad news would be that the technique is not able to distinguish the two similar—but still distinct—types of regional diffusion. Even more disconcertingly, Berry finds that Walker's methodology yields support for the regional diffusion hypothesis when applied to simulated policies known to diffuse via a pure national interaction model with no regional element whatsoever. She also finds evidence that policy adoptions generated purely as a result of internal determinants can indicate the presence of regional diffusion when an alternative "single-explanation methodology" is used[29] (see also Volden, Ting, and Carpenter 2008).

TESTING THE UNIFIED MODEL OF GOVERNMENT INNOVATION USING EHA

As we have seen, F. Berry's (1994b) simulation results show that the early compartmentalized approach to testing the various explanations of government innovation calls into question the empirical evidence for these explanations from this era. Berry finds no evidence of "false negatives," that is, no reason to believe that the early tests for the presence of regional diffusion, national interaction, and the impact of internal determinants fail to discern these processes when they are present. But she does find a disturbing pattern of "false positives"—a tendency for the methodologies to find regional diffusion, national interaction, or the effect of internal determinants when no such influence actually exists. In 1990, F. Berry and W. Berry developed a model of the adoption of lotteries by U.S. states taking the form of Equation 9.3, positing that a state's propensity to adopt a lottery is influenced by forces both internal and external to the state, and they tested it using EHA. In the next section, we summarize their EHA model. Then we examine a variety of important refinements that other scholars have introduced as the literature has developed. Since 1990—but especially since the turn of the century—EHA has been employed across a wide variety of policy arenas to test models of government innovation reflecting both internal determinants and intergovernmental diffusion; Box 9.1 in this chapter's appendix lists some of these studies.

Berry and Berry's (1990) Event History Analysis Model

EHA is an ideal methodology for estimating the coefficients of an innovation model taking the form of Equation 9.3 (Box-Steffensmeier and Jones 2004). In EHA, we conceive of a risk set, the jurisdictions that (at any point) are at risk of adopting the policy in question. In a discrete-time model, the period of analysis is divided into a set of discrete periods, typically years. The dependent variable—the probability that a jurisdiction in the risk set will adopt during year t—is not directly observable. However, we can observe for each jurisdiction in

the risk set whether the jurisdiction adopts the policy (typically coded 1) or not (scored 0). It is assumed that once a jurisdiction adopts a policy, it falls out of the risk set; thus, for each jurisdiction that adopts during the period of analysis, the time series for the dependent variable is a string of zeros followed by a single 1 in the year of adoption. Given data for the jurisdictions in the risk set over a period of years, the EHA model, having a dichotomous observed variable, can be estimated using logit or probit maximum likelihood techniques.[30]

The maximum likelihood estimates of the coefficients for the independent variables in the EHA model offer information on the predicted impacts of these variables on the propensity of jurisdictions in the risk set to adopt the policy. Using procedures common in the analysis of probit and logit results, the coefficient estimates can in turn be used to generate predictions of the probability that a jurisdiction with any specified combination of values on the independent variables will adopt the policy in a given year. Furthermore, one can estimate the change in the probability of adoption associated with a specified increase in the value of any independent variable when the remaining independent variables are held constant at specified values (Tomz, Wittenberg, and King 2003). Such estimated changes in probability yield easily interpretable estimates of the magnitude of the effect of the independent variable.

F. Berry and W. Berry (1990) employ EHA to test a model of state lottery adoptions. Their model includes internal determinants reflecting the motivation of politicians to adopt a lottery (e.g., the proximity to elections), the obstacles to innovation (e.g., the presence of a sizable population of religious fundamentalists), and the presence of resources for overcoming obstacles (e.g., whether there is unified political party control of government), as well as a variable specifying interstate diffusion—the number of previously adopting neighboring states.

Recent Refinements to Event History Modeling of Government Policy Innovation

F. Berry and W. Berry's (1990) initial application of EHA to the study of policy innovation assumed that the probability of adoption is constant over time. Yet it is unlikely that the true policy process conforms to this assumption. For instance, the pressure to adopt a new policy—hence the probability of adoption—can increase gradually over time as coalitions designed to promote the policy are built. Similarly, when intense efforts to secure adoption of a policy fail in a year, the probability of adoption may be reduced the year following as advocates of the policy tire of the battle and decide to marshal their resources for the future. More recent studies have allowed the probability of adoption to vary over time (i.e., have allowed for "duration dependence") using strategies suggested by Beck, Katz, and Tucker (1998) and Buckley and Westerland (2004);

these include using dummy variables for time periods or a time counter (or some transformation of time, such as the natural logarithm or cubic smoothing splines) among the independent variables.

However, the most important refinements of Berry and Berry's EHA approach over the last two decades have been modifications to accommodate a variety of different forms of diffusion. Recall that, to specify diffusion, Berry and Berry include among the independent variables in their model the number of contiguous jurisdictions that have previously adopted. Although including the number (or percentage) of contiguous jurisdictions that have previously adopted remains the most common specification of diffusion to this day (e.g., Mintrom 1997; T. Hill 2000; Balla 2001; Allard 2004; Chamberlain and Haider-Markel 2005; Langer and Brace 2005; Allen 2005), some EHA studies have introduced alternative diffusion specifications. Mooney and Lee (1995), Andrews (2000), and Allen, Pettus, and Haider-Markel (2004) have modeled fixed-region diffusion in the United States by defining regions of the country and including a measure of the percentage (or number) of states from a state's region that have previously adopted. Balla (2001) includes a measure of whether a state's insurance commissioner sat on a committee with jurisdiction over the regulation of HMOs in a model predicting the adoption of model legislation proposed by the committee. Allen, Pettus, and Haider-Markel's (2004) study of the adoption of truth-in-sentencing laws in the United States specifies vertical influence, with a variable indicating whether the national government had passed legislation in 1994 creating financial incentives for states to adopt.

Indeed, EHA is flexible enough to model other forms of policy diffusion as well. Our earlier suggestion to assume that a jurisdiction, *i*, is influenced most by its neighbors, yet is subject to some influence by more distant jurisdictions (an effect that diminishes with the distance from *i*), can be operationalized by constructing a dummy variable for each jurisdiction (1 if a jurisdiction has adopted the policy, 0 if not) and taking a weighted average of these dummies across jurisdictions, where the weights are proportional to the distance from jurisdiction *i*. Leader-laggard diffusion can be modeled with a dummy variable indicating whether jurisdiction *i*'s presumed "leader" has already adopted the policy. Even the thorough mixing of U.S. states assumed by the national interaction model can be specified in an EHA model; the independent variables would include the percentage of the fifty states that have previously adopted the policy. However, we do not recommend this approach, preferring that scholars develop more realistic formulations of national interaction.

The "unified" model of government innovation—Equation 9.3—includes a set of variables ($OTHERPOLICIES_{i,t}$) indicating the presence or absence of other policies that influence the likelihood that a government will adopt a new policy. The earliest applications of EHA did not incorporate this aspect of Equation 9.3. However, some more recent studies have tested models incorporating

the impacts of other policies. Baturo and Gray (2009) test whether the probability that a country will adopt a flat tax is influenced by whether the country has previously adopted other economic reforms. Similarly, Balla's (2001) analysis of the adoption of the Health Maintenance Organization Model Act by U.S. states includes a variable indicating whether a state had previously adopted another model act assumed complementary to the HMO legislation.

Berry and Berry (1990) introduce a regional diffusion hypothesis predicting that the probability that an American state without a lottery will adopt one is positively related to the number of contiguous states that have already adopted. They defend this expectation by arguing both that lotteries in nearby states provide information about the consequences of adopting a lottery and that when the residents of a state without a lottery can easily cross the border and play other states' lotteries, the state fears losing revenue to these other states. As such, Berry and Berry justify their regional diffusion hypothesis by arguing both that states learn from one another and that they engage in location-choice competition for lottery sales to individuals living near a common border. Although this indicates the authors' recognition that policies can diffuse via multiple mechanisms, their empirical analysis was designed to answer the question, Does a policy diffuse? but not the question, By what mechanism does the policy diffuse? This inattention to isolating the mechanism underlying a policy's diffusion also characterizes the many other empirical studies of policy diffusion relying on EHA in the fifteen years after the publication of Berry and Berry's 1990 paper.

We believe that the most important development in the study of policy innovation in the last decade is the shift in focus to the mechanism for diffusion and the corresponding development of theories about alternative mechanisms. The question, By what mechanism does a policy diffuse? is much more interesting to those seeking to understand the policymaking process than the question, Does a policy diffuse? Accordingly, we applaud the shift in research focus to identifying the mechanism for diffusion and believe that developing methods for detecting the presence of specific mechanisms—thereby allowing our tools for empirical analysis to catch up with advances in theory—is the most important task on the agenda of scholars of policy innovation and diffusion.

Assume that an analyst has competing plausible theories about the mechanism by which a policy diffuses (e.g., it diffuses via learning or via competition). She should evaluate each theory with as strong a test as possible by deriving from each as many observable implications as possible, then conducting empirical analysis to determine whether each predicted implication holds. Most importantly, some of the identified observable implications should allow for a critical test of the competing theories: if the policy diffuses via learning, implication *A* will occur, and *B* will not; if the policy diffuses via competition, *B* will occur, and *A* will not.

W. Berry and Baybeck (2005) try to determine if the diffusion of the lottery across American states detected by F. Berry and W. Berry (1990) was due to learning or location-choice competition. W. Berry and Baybeck argue that if the lottery diffuses due to competition (i.e., a state adopts a lottery to prevent a loss of revenues when its residents cross state borders to play other states' lotteries), a state's response to neighboring states' adoptions would vary depending on the distance of its residents from other states with lotteries (and thus the ease with which residents can travel to the other states). In contrast, if the lottery diffuses due to learning from neighboring states, a state's response to contiguous states' adoptions would be the same regardless of the distance of its residents to other states with lotteries.

W. Berry and Baybeck use geographic information systems software to calculate for each state, *s*, in each year, *t*, the population in state *s* living near another state with a lottery relative to the total population of state *s*—a quantity that measures *s*'s concern that residents will play other states' lotteries.[31] They contend that if the lottery diffuses due to location-choice competition among states, for any state, *s*, without a lottery, *s*'s concern that residents will play other states' lotteries should have a positive effect on *s*'s probability of adopting a lottery; but if the lottery diffuses due to learning, there should be no relationship between *s*'s fear that residents will play other states' lotteries and *s*'s probability of adopting. The authors further maintain that if the lottery diffuses due to learning from neighboring states, the number of states bordering *s* that have previously adopted a lottery should have a positive effect on the probability that *s* will adopt a lottery; if the lottery diffuses due to competition, however, there should be no relationship between number of previously adopting neighboring states and a state's probability of adopting (after statistically controlling for a state's fear that residents will play other states' lotteries).

W. Berry and Baybeck estimate an EHA model that includes as independent variables both the number of previously adopting neighboring states and a measure of a state's degree of concern that its residents will play other states' lotteries. Their results indicate that concern that residents will play other states' lotteries has a positive effect on the probability of a lottery adoption, whereas the number of previously adopting neighbors has little impact on the probability of adoption. This leads W. Berry and Baybeck to conclude that "there is compelling evidence that the interstate influence leading to the diffusion of the lottery results from competition—fear by state officials of losing revenues to neighboring states—rather than policy learning" (2005, 515).

Readers can judge for themselves whether W. Berry and Baybeck's empirical analysis constitutes a strong critical test of their competing competition and learning hypotheses. Two points, however, seem clear. First, the variable W. Berry and Baybeck construct to tap location-choice competition (based on counting population living near a state's border and therefore having easy

access to another state's lottery) is more directly tied to the mechanism being operationalized than the variable they use to tap learning from neighboring states: the number of previously adopting neighboring states. The number of *s*'s neighbors that have previously adopted a lottery does measure *s*'s opportunity to learn from its neighbors' experiences with a lottery, which makes the variable a plausible proxy for tapping learning from neighbors. But constructing a variable taking into account the consequences of a lottery adoption in previously adopting neighboring states would constitute a more direct and more valid way to tap learning from neighbors.[32] Second, it is clear that W. Berry and Baybeck's lack of empirical evidence of learning from neighboring states is insufficient to rule out the presence of either other forms of learning in which states obtain information about the consequences of adopting a lottery from states that are not contiguous or some mechanism not involving learning, such as imitation.[33] Additional empirical analysis would be needed to eliminate the possibility that these other mechanisms are at work.

Probably the most systematic effort to test for the presence of competing mechanisms for diffusion is Shipan and Volden's (2008) study of U.S. local governments' adoptions of antismoking policies. The authors rely on EHA and include independent variables chosen to identify (1) whether a local government learns from other cities in a state (the proportion of one's state's population that lives in a city that has previously adopted smoking restrictions), (2) whether a city competes based on a fear that its smoking residents will abandon local businesses and patronize businesses in nearby cities without smoking restrictions (the total population in nearby cities that do not have restrictions relative to a city's own population), (3) whether a city imitates larger cities (a dummy variable measuring whether the nearest larger city has adopted), and (4) whether a city is coerced by its state to adopt (dummy variables measuring whether one's state has adopted a smoking restriction, reducing the city's incentive to act, and whether one's state explicitly prohibits one from adopting).

There is insufficient space for us to provide lengthy descriptions of the large number of studies of policy diffusion over the last decade that have sought to develop tests of competing theories about the mechanisms underlying diffusion. These studies include some research on interstate diffusion in the United States: Boehmke and Witmer's (2004) study of Indian gaming policy; Bavbeck, Berry, and Siegel's (2011) analysis of lottery adoptions. But there has been even more cross-national research in this vein, including Henisz, Zelner, and Guillén's (2005) study of market-oriented reforms; Elkins, Guzman, and Simmons's (2006) study of bilateral investment treaties; Cao's (2010) and Jensen and Lindstädt's (2012) analyses of corporate tax rates; Sugiyama's (2012) study of conditional cash transfer programs; and Lee, Chang, and Berry's (2011) research on e-government and e-democracy. A key challenge for researchers in the decade ahead is to continue to conduct empirical research seeking to

identify the mechanism(s) underlying policy diffusion but to focus attention on developing better empirical indicators for the presence of specific mechanisms. For each diffusion mechanism—learning, imitation, competition, coercion, and normative pressure—the goal should be to construct indicators for the presence of the mechanism that not only can successfully detect this mechanism when it is present (avoiding "false negatives") but also fail to detect the mechanism when it is not present (avoiding "false positives").

RESEARCH BEYOND THE BOUNDS OF THE "UNIFIED" MODEL

Although the "unified" model (Equation 9.3) is sufficiently flexible to serve as a framework for studies of numerous aspects of policy diffusion, some interesting and important avenues for research require modifying or even abandoning the unified model. The unit of analysis for the unified model is a jurisdiction that has not yet adopted some policy, the conceptual dependent variable is the probability that the jurisdiction will adopt the policy in a year, and the observed dependent variable is whether the jurisdiction adopts in the year. However, sometimes a policy adoption is a repeatable event, so that a jurisdiction stays at risk of adopting a policy even in a year after it has previously adopted. F. Berry and W. Berry (1992) offer an example of this situation in their study of tax innovation by American states, in which the dependent variable is the probability that a state will adopt any new tax in a year, making it so that each state is eligible to adopt in each year, regardless of how many taxes it has previously adopted.[34]

In other situations, it is useful to abandon the unified model's binary observed dependent variable—adopt or not in a year—in favor of an alternative dependent variable. Often, policies can be conceived as having multiple components, and a jurisdiction can choose to adopt none, one, or multiple components; moreover, the jurisdiction may adopt all the components it desires in a single year or stretch adoptions over a longer period. For example, in studying the diffusion of antismoking policies across U.S. cities, Shipan and Volden (2006) identify three distinct components of such policies: limitations on (1) smoking in government buildings, (2) smoking in restaurants, and (3) out-of-package sales. Boehmke (2009a) reviews a variety of options for studying innovation and diffusion of policies with multiple components, discussing the strengths and weaknesses of each. Some of these approaches (e.g., a separate analysis of each component or pooled analysis of all components) are compatible with EHA. But it is also possible to treat the number of components a jurisdiction adopts as the dependent variable of interest and to use an event count model for estimation.

Sometimes it might be best to conceive of a government's policy choice not as involving a binary choice (adopt or not) or a set of binary choices regarding

multiple components of a policy and instead to view the choice as among three or more distinct alternatives. For example, F. Berry and W. Berry (1992) studied the adoption of sales and income taxes separately, assuming for each that states without the tax might choose to adopt or not in any year. But it may more accurately reflect the process of decision-making to conceptualize states that have neither tax in any year as having four choices: adopt a sales tax, adopt an income tax, adopt neither, or adopt both.[35]

Another limitation of the unified model's conception of the policy choice confronting a government as binary is that the model ignores potential variation among adopters in the "depth" or "extent" of innovation. Glick and Hays (1991, 836; see also Downs and Mohr 1976) distinguish between "superficial" and "deep" adoption. For example, two governments might adopt an antidiscrimination program (in housing or the workplace); yet one adoption may be largely symbolic, whereas the other may involve an extensive commitment of resources through investigatory and enforcement actions. Calling them both antidiscrimination programs and treating them as functionally equivalent may mask variation essential to understanding the innovation process at work. Boehmke and Witmer (2004) specify an innovation model in which multiple events—a state signing an Indian gaming compact—may occur in the same year, and the number of adoptions by a state in a year yields information about the depth of innovation. Boehmke and Witmer estimate their model with generalized event count regression.

Some of the variation in the "depth" of a policy adoption may be due to what Glick and Hays (1991; see also J. Clark 1985) call policy *reinvention*. Implicit in the notion of reinvention is an assumption that learning is the mechanism for diffusion. This learning model assumes that governments use information about the impacts of a policy in other jurisdictions not only to assist them in deciding whether to adopt the policy but to help them refine the policy in light of the other governments' experiences. In turn, early adopters can reform their policies to take advantage of the experiences of late adopters who passed a modified version of the initial policy.

It can also be useful to move away from the unified model's focus on the adoption stage of the policymaking process and to turn attention to explaining how new policies make their way onto a government's agenda for consideration. Specifically, researchers can develop innovation/diffusion models that explain whether a policy is on the legislative agenda in a jurisdiction (i.e., given serious consideration by its legislature) in a year. The most obvious empirical indicator of whether a policy is on the legislative agenda is whether it is introduced as legislation. However, "introduction" is not a perfect indicator of "serious consideration" as some bill introductions in a legislature are symbolic acts, with a given bill's sponsors having no expectation that the legislation will pass or even be assigned to committee for consideration. Mintrom (1997) illustrates

the potential value of a focus on agenda setting in his study of education reform by American states. He conducts EHA with a model predicting the probability that a state's legislature will consider a school-choice proposal in a year.[36]

One final important avenue for research incompatible with the unified model is shifting the unit of analysis from a government jurisdiction—as in the unified model—to a pair of jurisdictions. Volden (2006; see also Gilardi 2010) recently introduced *directed-dyad event history analysis* into the study of government policy innovation. In traditional EHA, the unit of analysis is the jurisdiction-year, and each jurisdiction is included in the dataset during each year it is at risk of adopting the policy. With directed-dyad EHA, the unit of analysis is the dyad-year—where a dyad refers to a pair of jurisdictions—and the dependent variable measures whether one jurisdiction in the pair emulates the policy of the other. Gilardi and Füglister (2008) and Boehmke (2009b) help refine Volden's dyadic approach by investigating a variety of modeling issues one faces when conducting dyadic analysis. At this point, there is insufficient research relying on directed-dyad EHA to fairly evaluate the technique's contribution to research on policy innovation. However, the potential for directed-dyad EHA is great, since the technique would seem to be enormously valuable in tracing the way a policy diffuses from one jurisdiction to another. For example, Volden's (2006) research finds that a state having a successful policy has a higher probability of being emulated than a state with a failing policy.

APPENDIX

BOX 9.1 A Selection of Published Studies Using Event History Analysis to Study Government Policy Innovation

Berry, F., and W. Berry (1990): lotteries
Berry, F., and W. Berry (1992): taxes
Alm, McKee, and Skidmore (1993): lotteries
Berry, F., and W. Berry (1994): tax-rate increases
Berry (1994a): strategic planning by agencies
Caudill et al. (1995): lotteries
Mooney and Lee (1995): abortion
Hays and Glick (1997): living-will laws
Mintrom (1997): school choice
Grattet, Jenness, and Curry (1998): state hate-crime laws
Mintrom and Vergari (1998): school choice
Brace, Hall, and Langer (1999): whether state supreme court hears a challenge to a state statute on abortion access or funding
Erekson et al. (1999): lotteries
Pierce and Miller (1999): lotteries
Andrews (2000): electricity-sector regulatory reforms
Hill (2000): grandparent visitation rights statutes
Mooney and Lee (2000): death-penalty reform
Simmons (2000)*: acceptance of International Monetary Fund rules (Article VIII)
Balla (2001): Health Maintenance Organization Model Act
Haider-Markel (2001): bans on same-sex marriage
Mooney (2001): lotteries and tax adoptions
Soule and Earl (2001): hate-crime laws
Ito (2001)+: various laws enacted by Japanese prefectural governments relating to the environment, freedom of information, and citizens with disabilities
Hill, K., and Klarner (2002): direct democracy reforms
Ka and Teske (2002): electricity deregulation
Satterthwaite (2002): managed care in Medicaid programs
Wong and Shen (2002): charter schools
Lubell et al. (2002)*: local watershed partnerships
Rosenson (2003): authorization of independent state legislative ethics commissions
Allard (2004): mothers' aid programs
Allen, Pettus, and Haider-Markel (2004): truth-in-sentencing laws
Boehmke and Witmer (2004): the signing of Indian gaming compacts
Buckley and Westerland (2004): lotteries
Grossback, Nicholson-Crotty, and Peterson (2004): lotteries, academic bankruptcy laws, sentencing guidelines
Nicholson-Crotty (2004): corrections privatization
Sapat (2004): environmental policy innovations by agencies
Meseguer (2004)*: privatization in Latin America
Simmons and Elkins (2004)*: adoption of economic liberalization policies
Allen (2005): animal cruelty

continues

BOX 9.1 *continued*

Berry, W., and Baybeck (2005): lotteries
Chamberlain and Haider-Markel (2005): laws against the use of frivolous liens
Jones and Branton (2005): restrictive abortion laws and obscenity laws
Kim, J., and Gerber (2005): telephone regulation reform
Langer and Brace (2005): restrictive abortion laws and death penalty
McLendon, Heller, and Young (2005): higher education reforms
Preuhs (2005): English-only laws
Brooks (2005)*: pension privatization
Gilardi (2005)*: creation of independent regulatory agencies in western Europe
Jordana and Levi-Faur (2005)*: creation of regulatory agencies in Latin America
Way (2005)*: financial-system liberalization by nations
Bali and Silver (2006): electoral reform
Karch (2006): human services policy (individual development accounts, family caps, and medical savings accounts)
McLendon, Hearn, and Deaton (2006): performance accountability policies for public higher education
Volden (2006): Children's Health Insurance Program
Hoyman and Weinberg (2006)+: prison sitings in rural North Carolina
Jeong (2006)+: local development impact fees
Chen (2007): fair employment practice
Daley (2007): voluntary remediation programs for hazardous-waste sites
Kane (2007): sodomy decriminalization
McLendon, Deaton, and Hearn (2007): governance of higher education
Patton (2007): abortion
Turner and Cassell (2007): enterprise zones
Hearn, McLendon, and Mokher (2008): comprehensive state-level student unit-record systems
Howell-Maroney (2008): growth management
Imhof and Kaskie (2008): pain management policies
Matisoff (2008): climate change
Sugiyama (2008)*: social programs concerning education and family health
Shipan and Volden (2008)+: antismoking policies
Chandler (2009): sustainable energy portfolio standards
Hoekstra (2009): minimum wage
Lawrence, Donovan, and Bowler (2009): direct democracy
Levy, T. (2009): home schooling
Mokher and McLendon (2009): dual-enrollment policies (taking college-credit courses during high school)
Aidt and Jensen (2009)*: income tax adoption
Clark, B. (2009)+: HIV/AIDS programs
Kim, D., Bae, and Eger (2009)+: local discretionary sales tax
Kwon, Berry, and Feiock (2009)+: economic development
Miller and Wang (2009a): Medicare nursing-facility reimbursement
Miller and Wang (2009b): Medicaid provider taxes
Doyle, McLendon, and Hearn (2010): Prepaid college tuition and savings plans

continues

BOX 9.1 *continued*

Meltzer and Schuetz (2010): inclusionary zoning programs for mixed-income housing
Mokher (2010): creating P-16 education-reform councils
McGlynn (2010)*: mayoral control of urban public schools
Bussell (2010)+: policies that promote computer-enabled public services
Richard (2010)+: casino gambling
Hageman and Robb (2011): prohibition of the deduction of intercompany interest or royalties
Hume (2011): state constitutional amendments to prohibit same-sex marriage
Lewis (2011): same-sex marriage bans
McLendon, Mokher, and Flores (2011): in-state resident tuition policies
Medoff and Dennis (2011): targeted regulation of abortion providers
Medoff, Dennis, and Stephens (2011): parental-involvement laws regarding abortion
Jun and Weare (2011)*: e-government motivations
Bhatti, Olsen, and Pedersen (2011)+: adoption of integrated citizen service centers
Creek and Yoder (2012): immigration enforcement agreements with the national government
Doan and McFarlane (2012): rejection of federal funds for abstinence-only education
Dolšak and Sampson (2012): market-based instruments for reducing air pollution
Medoff (2012): targeted regulation of abortion providers (TRAP laws)
Scally (2012): housing trust funds
Taylor et al. (2012): sexual orientation and gender identity nondiscrimination
Whitaker et al. (2012): minimum wage legislation
Yi and Feiock (2012): renewable portfolio standards for electric utilities
Burge and Piper (2012)*: local option sales tax
Wang (2012)*: climate protection
De Francesco (2012)+: regulatory impact analysis
Delaney and Yu (2012)+: tertiary education graduation policies
Skidmore, Cotti, and Alm (2013): ethanol subsidies
Clark, B. (2013)+: HIV/AIDS legislation
Dolšak (2013)+: climate change policies (ratification of the Kyoto Protocol)
Toshkov (2013)+: smoking bans

NOTE: Unless otherwise indicated, a study analyzes the adoption of a policy or program by American states. Studies denoted with an asterisk (*) analyze adoptions of policies by countries. Studies denoted with a plus sign (+) denote adoptions of policies by subnational governments other than American states.

BOX 9.2 Suggestions for Further Reading on Policy Innovation

Rogers, Everett M. 1962. *Diffusion of Innovations*. New York: Free Press.
Walker, Jack L. 1969. "The Diffusion of Innovations Among the American States." *American Political Science Review* 63: 880–899.
Gray, Virginia. 1973. "Innovation in the States: A Diffusion Study." *American Political Science Review* 67: 1174–1185.
Collier, David, and Richard E. Messick. 1975. "Prerequisites Versus Diffusion: Testing Explanations of Social Security Adoption." *American Political Science Review* 69: 1299–1315.
Grupp, Fred W., Jr., and Alan R. Richards. 1975. "Variations in Elite Perceptions of American States as Referents for Public Policy Making." *American Political Science Review* 69: 850–858.
Downs, George W., Jr., and Lawrence B. Mohr. 1976. "Conceptual Issues in the Study of Innovation." *Administrative Science Quarterly* 21: 700–713.
Canon, Bradley C., and Lawrence Baum. 1981. "Patterns of Adoption of Tort Law Innovations." *American Political Science Review* 75: 975–987.
Berry, Frances Stokes, and William D. Berry. 1990. "State Lottery Adoptions as Policy Innovations: An Event History Analysis." *American Political Science Review* 84: 395–415.
Peterson, Paul E., and Mark C. Rom. 1990. *Welfare Magnets*. Washington, DC: Brookings.
Bennett, Colin J. 1991. "What Is Policy Convergence and What Causes It?" *British Journal of Political Science* 21: 215–233.
Starr, Harvey. 1991. "Democratic Dominoes: Diffusion Approaches to the Spread of Democracy in the International System." *Journal of Conflict Resolution* 35: 356–381.
Haas, Peter M. 1992. "Knowledge, Power, and International Policy Coordination." *International Organization* 46: 1–35.
Berry, Frances Stokes. 1994. "Sizing Up State Policy Innovation Research." *Policy Studies Journal* 22: 442–456.
Mooney, Christopher Z., and Mei-Hsien Lee. 1995. "Legislating Morality in the American States: The Case of Pre-Roe Abortion Regulation Reform." *American Journal of Political Science* 39: 599–627.
Mintrom, Michael. 1997. "Policy Entrepreneurs and the Diffusion of Innovation." *American Journal of Political Science* 41: 738–770.
Simmons, Beth A. 2000. "International Law and State Behavior: Commitment and Compliance in International Monetary Affairs." *American Political Science Review* 94: 819–835.
Volden, Craig. 2002. "The Politics of Competitive Federalism: A Race to the Bottom in Welfare Benefits?" *American Journal of Political Science* 46: 352–363.
Rogers, Everett M. 2003. *Diffusion of Innovations*. 5th ed. New York: Free Press.
Boehmke, Frederick J., and Richard Witmer. 2004. "Disentangling Diffusion: The Effects of Social Learning and Economic Competition on State Policy Innovation and Expansion." *Political Research Quarterly* 57: 39–51.
Buckley, Jack, and Chad Westerland. 2004. "Duration Dependence, Functional Form, and Correct Standard Errors: Improving EHA Models of State Policy Diffusion." *State Politics and Policy Quarterly* 4: 94–114.

continues

BOX 9.2 *continued*

Meseguer, Covadonga. 2004. "What Role for Learning? The Diffusion of Privatisation in OECD and Latin American Countries." *Journal of Public Policy* 24: 299–325.
Simmons, Beth A., and Zachary Elkins. 2004. "The Globalization of Liberalization: Policy Diffusion in the International Political Economy." *American Political Science Review* 98: 171–189.
Berry, William D., and Brady Baybeck. 2005. "Using Geographic Information Systems to Study Interstate Competition." *American Political Science Review* 99: 505–519.
Jones, Bradford S., and Regina P. Branton. 2005. "Beyond Logit and Probit: Cox Duration Models of Single, Repeating and Competing Events for State Policy Adoption." *State Politics and Policy Quarterly* 5: 420–443.
Elkins, Zachary, Andrew T. Guzman, and Beth A. Simmons. 2006. "Competing for Capital: The Diffusion of Bilateral Investment Treaties, 1960–2000." *International Organization* 60: 811–846.
Shipan, Charles, and Craig Volden. 2006. "Bottom-Up Federalism: The Diffusion of Antismoking Policies from U.S. Cities to States." *American Journal of Political Science* 50: 825–843.
Volden, Craig. 2006. "States as Policy Laboratories: Emulating Success in the Children's Health Insurance Program." *American Journal of Political Science* 50: 294–312.
Volden, Craig, Michael M. Ting, and Daniel P. Carpenter. 2008. "A Formal Model of Learning and Policy Diffusion." *American Political Science Review* 102: 319–332.
Boehmke, Frederick J. 2009. "Approaches to Modeling the Adoption and Diffusion of Policies with Multiple Components." *State Politics and Policy Quarterly* 9: 229–252.
Boehmke, Frederick J. 2009. "Policy Emulation or Policy Convergence? Potential Ambiguities in the Dyadic Event History Approach to State Policy Emulation." *Journal of Politics* 71: 1125–1140.
Gilardi, Fabrizio. 2010. "Who Learns from What in Policy Diffusion Processes?" *American Journal of Political Science* 5: 650–666.
Baybeck, Brady, William D. Berry, and David Siegel. 2011. "A Strategic Theory of Policy Diffusion via Intergovernmental Competition." *Journal of Politics* 73: 232–247.
Pacheco, Julianna. 2012. "The Social Contagion Model: Exploring the Role of Public Opinion on the Diffusion of Antismoking Legislation Across the American States." *Journal of Politics* 74: 187–202.

NOTES

1. We are grateful to Jorge Mendoza and Kevin Dyrland for their assistance in preparing the appendix and other portions of this chapter. Note that some sections of this chapter are drawn from the version published in the second edition (2007) of this volume.

2. For a review of the literature on incremental decision-making, see W. Berry (1990).

3. Rogers (1983, ch. 2) discusses numerous examples of research on innovation at the individual level.

4. Graham, Shipan, and Volden (2013) note that research on policy diffusion is done within each major subfield of political science—American politics, comparative politics, and international relations—and persuasively argue that scholarship on diffusion would benefit from researchers in each subfield paying more attention to diffusion research done in other subfields.

5. Walker calls what we term his "internal determinants" explanation an analysis of the "correlates of innovation."

6. As Figure 9.1 shows, there was a sudden and dramatic increase in the frequency of published research in the mid-1990s—as evidenced by the abrupt change at this time in the slope of the (top) curve for the number of published studies of policy innovation in a year. This change occurred just a few years after EHA's introduction in 1990 and about the same time as a substantial increase in the frequency of research relying on EHA (see the bottom fitted curve).

7. For other lists of alternative mechanisms of diffusion, see DiMaggio and Powell (1983), Simmons, Dobbin, and Garrett (2006), Karch (2007), Shipan and Volden (2008), Meseguer and Gilardi (2009), and R. Walker, Avellaneda, and Berry (2011).

8. Pacheco (2012) posits a "social contagion model" in which the public in one state, *A*, learns about a policy when it is adopted by a neighboring state, *B*, and then the public in *A* presses its own officials to adopt the policy.

9. Alternatively, one might conceive of imitation not as a mechanism distinct from learning but as a form of bounded learning in which policymakers lacking comprehensive information about the effectiveness of a policy rationally choose to emulate its adoption by a jurisdiction regarded as worthy of emulation based on a track record of effectiveness.

10. Since ΔNt denotes the proportion of new adopters during time period t, and $L–Nt_{-1}$ is the proportion of potential adopters who have not adopted by the beginning of time period t, then bNt_{-1} must represent the proportion of remaining potential adopters that actually adopt in time period t. Alternatively, bNt_{-1} can be viewed as the probability that an individual who has not yet adopted prior to time period t will do so during t. Those familiar with calculus should note that Equation 9.1 can be cast in continuous terms by defining $N(t)$ as the cumulative number of adopters at time t, defining L as the total number of potential adopters, and specifying (see Mahajan and Peterson 1985) that $dN(t)/dt = bN(t–1)\ [L–N(t)]$.

11. Since there is no "constant" term in Equation 9.2, the model predicts that the regression intercept is zero.

12. Gray (1973b) recognizes that the national interaction model's assumption of a thorough mixing of states is unrealistic, but she adopts a position of methodological nominalism (Friedman 1953), arguing that the essential issue is not whether the assumption is realistic but whether it sufficiently approximates reality to be useful for explanation.

13. Regional diffusion may also be due to spillover-induced competition—when the externalities of a policy accrue primarily to nearby jurisdictions—or to governments coercing geographically proximate jurisdictions to adopt.

14. This "inequality of esteem" across states was observed by Grupp and Richards (1975) in their survey of upper-level administrators in U.S. states. The leader-laggard model is certainly also compatible with a normative pressure mechanism in that laggards may be states that delay adopting a policy until it has been widely adopted by other governments.

15. Similarly, B. Clark (2013) hypothesizes that developed countries tended to pass legislation responding to the HIV/AIDS epidemic earlier than developing nations. Hierarchical models—based on population rather than economic development—originated in geographers' theories of the diffusion of product and cultural innovations among individuals. The models predicted that such innovations tend to flow from more populated cities to less populated rural areas (Hagerstrand 1967; Blaikie 1978).

16. Rogers (1983, 20) views knowledge as the first stage in the "innovation decision process."

17. Using the traditional terminology of EHA, the unit of analysis is the jurisdiction at risk of adopting.

18. This is also true of diffusion models, which by their very nature focus on the spread of a single policy.

19. For a review of the research on the determinants of individual innovativeness, see Rogers (1983, 251–263).

20. Taxation may be unique in this regard. Adopting a new tax instrument may be closer to routine policymaking than adopting most other major new policies, since most proposals for new policies face the difficult task of finding a spot on a crowded governmental agenda; governments' need for revenue gives the issue of tax policy a permanent place on the agenda.

21. Moreover, the effect of ideology on innovation varies across policies. For example, a high level of liberalism should promote the adoption of new social welfare initiatives but impede the adoption of conservative criminal justice programs inconsistent with liberal ideology.

22. Brooks (2005) advances a similar proposition in a cross-national study of pension privatization. Yet, for some policies, it is actually poor fiscal health that contributes to an increase in the likelihood of adoption. Such situations have occurred with state taxes (F. Berry and Berry 1992) and industrial policies designed to attract new business to a state (Gray and Lowery 1990). For conceptual and operational definitions of "fiscal health," see Reeves (1986), Ladd and Yinger (1989), and F. Berry and W. Berry (1990).

23. Similarly, Sapat (2004) hypothesizes that a state agency's level of administrative professionalism influences its probability of adopting environmental policy innovations, and Kim and Gerber (2005) propose that the capacity of a state public utility commission—as reflected by the amount of discretion granted to the commission—influences its probability of adopting regulatory reforms.

24. Note also Soule and Earl's (2001) research on the impact of the presence of the Anti-Defamation League in a U.S. state on the prospects for adoption of hate crime legislation, Allard's (2004) analysis of the impact of women's group activities on the

adoption of state Mothers' Aid programs in the United States in the early 1900s, Toshkov's (2013) study of the impact of the tobacco industry on adoption of smoking bans in Europe, and Dolšak's (2013) study of the role of domestic nongovernmental organizations on countries' adoption of the Kyoto Protocol.

25. In the United States, the character and activities of advocacy coalitions—which are presumed to consist of numerous individuals across the American states—might be conceived as factors influencing state government innovation that are neither purely "internal" nor "external" to states.

26. Some might argue that it is not feasible to measure accurately the presence or strength of entrepreneurs and advocacy coalitions when doing a fifty-state analysis. But Mintrom (1997) develops such measures for school-choice entrepreneurs in the American states.

27. An alternative proposition is that a charter school program and a school voucher policy are complementary: when a state adopts one type of school-choice reform, the political environment is changed, and the state becomes more amenable to other school-choice initiatives. Presumably, empirical analysis could resolve these competing hypotheses.

28. The rest of this section draws extensively from F. Berry's (1994b) results.

29. The method is an EHA model (like those described in the next section of this chapter) with a single independent variable: the number of bordering states that have previously adopted.

30. For a more detailed discussion of EHA, see Box-Steffensmeier and Jones (2004), Allison (1984), or Buckley and Westerland (2004).

31. This description oversimplifies W. Berry and Baybeck's measure; the actual measure weights individuals by their distance from a state that has a lottery.

32. One other weakness of using the number of previously adopting states to tap the opportunity to learn from other states is that this variable could also plausibly be conceived as reflecting the opportunity of a state to imitate other states, the potential for a state to experience normative pressure to adopt, or the incentive of a state to compete with other states.

33. Indeed, Grossback, Nicholson-Crotty, and Peterson (2004) contend that the lottery diffuses via a mechanism in which states learn from ideologically similar states, which may or may not be contiguous. Moreover, it seems plausible that a state may imitate lottery adoptions by other states because its officials perceive those other states as reliable role models, independently of any information about the consequences of these states' adoptions.

34. EHA can be modified to allow for the analysis of a repeatable event (Jones and Branton 2005; Box-Steffensmeier, De Boef, and Joyce 2007).

35. Innovation processes that allow for a choice among three or more policies can be specified using a multinomial logit model (Greene 1993) or a variant of a Cox duration model (Jones and Branton 2005).

36. Mintrom's model includes a second equation predicting the probability that a state considering the proposal will actually adopt it. In essence, Mintrom assumes that policy adoption is contingent on preliminary policy consideration.

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