When the Smoke Clears:
Learning, Experience, and the Diffusion of Youth Access Laws

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Abstract

In federal systems, governments have the opportunity to learn from the external policy experiments of other governments. Based on an analysis of a dataset on state-level adoptions of youth access antismoking adoptions between 1996 and 2002, we find that states are more likely to emulate other states that have demonstrated the ability to successfully limit youth smoking. Notably, however, we find that this emulation is conditioned by a state's internal experience: states with extensive local experimentation with antismoking policies aimed at youths are less likely to emulate the actions of other successful states. Our results thus show that although external learning is a significant factor in the diffusion of public policies from one state to another, this effect is conditional on internal experience.

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Each year, U.S. state legislatures pass thousands of laws governing dozens of policy areas, ranging from the prosaic (e.g., electric utility regulation, traffic congestion) to the controversial (e.g., abortion, immigration). Yet this high overall level of activity masks a great deal of variation in how states act. In any given policy area, some states move quickly to adopt laws, others move more slowly, and still others never enact legislation. What causes some states to act at some times, while others act at other times, or choose not to act at all?

Factors within a state obviously constitute one set of influences on state legislatures. Interest group pressures, demographic characteristics of citizens within the state, public opinion, laws adopted by cities within the state, the ideology and partisanship of elected officials – all of these internal factors and more can affect a legislature's actions. At the same time, a legislature also can be influenced by external factors. In particular, it can observe how other states have dealt with a policy area and whether these other states have demonstrated success in this policy area. When the legislature decides whether to act, and what sort of policy to pass, it therefore can be influenced not only by internal policy determinants, but also by what it has learned from the actions and experiences of other states.

On one hand, of course, the notion that a government can learn from other governments is not new. Indeed, learning is often posited as one of the key mechanisms through which policies can diffuse from one state (or city, or country) to another.[1] On the other hand, scholars have thus far neglected to fully consider the alternative ways in which states can learn. More specifically, state governments are well positioned to learn not only from other states but also from localities within their own states; that is, learning can be either *interstate* (i.e., external) or

[1] For recent discussions and analyses of different mechanisms of diffusion, see Weyland 2006, Braun and Gilardi 2006, and Shipan and Volden 2008.

intrastate (i.e., internal). One of the benefits of internal learning is that the population that is affected by local laws does not just look like and behave in a somewhat similar fashion to the state population (as might be the case upon imitating another state). Instead, that affected population actually *is* part of the soon-to-be-affected state population. Thus, a state may learn externally, from the experiences of other states; but to the extent that it can observe and draw upon substantial internal experience with a policy, it may have less need to rely on external sources of information.

This question of external versus internal effects is not just a point of academic interest. Rather, it has important substantive implications. Governments in federal systems are constantly assessing whether, and to what extent, to decentralize, policymaking authority. We know from the comparative politics literature that countries learn from one another; some degree of decentralization might unleash internal learning as well. Likewise, within federal systems, state or regional governments learn from one another and could perhaps benefit from further learning within their regions. Uncovering how these learning opportunities subsequently affect policymaking therefore is important in determining the costs and benefits of devolution decisions.

In this paper we utilize a comprehensive dataset on laws that aim to limit youth access to cigarettes in order to explore how learning affects the adoption of public policies. Our analysis contributes to the understanding of policy diffusion in two ways. First, we examine whether states learn from other states that have demonstrated policy success. In addition to showing that states are influenced by this type of interstate learning, we also examine whether our findings are robust to alternative measures of success. Second, and more importantly, we show that the influence of external learning is conditional on the amount of internal experience a state has had

with this policy. States that have little internal experience, due to few policy adoptions by local governments, are very likely to follow the actions of other states that are successful. But when states gain more internal experience, they are less likely to be influenced by the actions of these other states.

Diffusion, learning, and success

The literature on policy diffusion is vast and expanding rapidly. Fortunately, there are now a number of useful and recent literature reviews on this topic (e.g., Berry and Berry 1999; Karch 2007 in the American politics literature; Weyland 2005 and Meseguer and Gilardi 2005 in comparative politics; Simmons, Dobbin, and Garrett 2005 in international relations; and Graham, Shipan, and Volden 2008 across subfields). Especially to the extent that they cover the literature on diffusion across American states, these reviews identify the seminal studies in this area (e.g., Crain 1966, Walker 1969, Gray 1973), the important methodological innovations (e.g., Berry and Berry 1990, Berry and Baybeck 2005), and conceptual advances (e.g., Braun and Gilardi 2006, Shipan and Volden 2006).

Although our study draws on numerous insights from these earlier analyses, it moves beyond most of them in its focus on the role played by success and in its investigation of the relationship between internal and external learning. This is not to say that earlier studies have ignore the concept of learning – indeed, thorough consideration and discussion of what it means for one government to learn from another, and how this process occurs, can be found throughout the literature (e.g., Meseguer 2005; Grossback, Nicholson-Crotty, and Peterson 2004; Weyland 2004, 2007; Mossberger 1999; Boehmke and Witmer 2004; Berry and Baybeck 2005; Shipan and Volden 2006, 2008). But with the exception of only a handful of studies (e.g., Volden 2006;

Meseguer 2006; Gilardi, Füglister, and Luyet 2008), there have been few systematic, large-N analyses of the effect of success on diffusion. And no study has has considered the relationship between external and internal learning. Instead, scholars generally have taken one of three approaches to deal with the role that learning plays in diffusion. First, in some cases, studies simply have asserted that diffusion takes place due to some combination of mechanisms – usually learning, economic spillovers, and imitation – but have not attempted to disentangle these mechanisms (e.g., Berry and Berry 1990, Shipan and Volden 2006). Second, other studies have attempted to measure learning indirectly, either by utilizing a proxy measure designed to identify the situations in which learning is likely to take place (e.g., Boehmke and Witmer 2004; Shipan and Volden 2008) or by trying to pin down, as much as possible, other effects, such as economic spillovers, and then treating learning as the residual category (e.g., Berry and Baybeck 2005). Third, studies have relied on extensive case studies, with the corresponding strengths and weaknesses of this approach (e.g., Weyland 2004). On the one hand, case studies provide rich, nuanced analyses of how learning can occur and what sort of effect successful adoptions have on adoptions by other governments, but on the other hand, the measures of success may be open to interpretation and the generalizability of the conclusions are often open to question.

Given that most scholarship on diffusion has either explicitly or implicitly identified learning as a central component of diffusion, why have so few studies attempted either to pin down the exact relationship between success and diffusion or to isolate internal learning from external learning? One problem is that in order to conduct a large N-study of whether the success of policies affects their diffusion, three conditions must be met. First, there needs to be a generally agreed upon and objective measure of what constitutes policy success. Although in some areas success may be easy to define, in others it ends up being a more nebulous concept.

For example, what constitutes success when a state adopts a lottery – the number of people who play and win, or the amount of money the lottery brings in to the state's coffers, or the overall effect on the state economy? Second, the information about the measures of success needs to be publicly available, in order to facilitate the ability of one state to learn from another. If a state can easily find out whether another state has had success in dealing with some policy area, it is much more likely to use that information in its own decision making. Third, it must be plausible that the adoption of some set of policies will help the state to achieve success.

Moreover, to study whether external learning is conditional on internal experience, two additional features must be met. First, in the U.S. context, both cities and states must have jurisdiction over the policy in question and can adopt laws. Second, data on both internal and external policies must be available to decision makers and researchers alike. Although these considerations have limited the amount of scholarship that assesses learning-based policy diffusion, these conditions do not substantially diminish the breadth of real-world examples of the phenomena we are interested in studying. Environmental policies, education policies, crime policies, labor policies, and numerous others are adopted at multiple levels of government in the U.S. and are ripe settings for internal experience and external learning.

Hypotheses

We start with the classic external learning idea, which holds that a state can learn from other states. While a state can learn any of a number of things from another state, here we focus on one central feature of learning: a state is more likely to adopt policies found in other states that have demonstrated success. We then suggest that reliance on such success-based external learning will be diminished when states have internal experience with a policy. In all cases, we

control for a variety of other factors (which we discuss below) that may affect whether one state follows the lead of another state.

Evidence of external learning arises when a successful government's policies spread more quickly and more completely to other governments. Consider first the easiest hypothetical case, one with a single outcome and a single policy: State A is trying to decide whether or not to adopt a specific policy, X, in order to improve some policy condition, Y. If State A observes that State B has a value of Y that is desirable by some objective measure, and furthermore knows that State B has adopted X, then this will increase the likelihood that State A will also adopt X. State A has, in effect, learned from State B's successful adoption of X, and based on this learning has decided to adopt the same policy that the other state has already implemented. Likewise, states are less likely to adopt a policy found in an unsuccessful state.

Most public policies, however, are not so simple. In most cases, there is a set, or range, of policies – a *policy profile* – that in combination determine overall effectiveness. The logic of success-based learning, however, is the same. If State A observes a particularly effective outcome in State B, and further sees that this other state has adopted a set of policies that are likely to have contributed to this better outcome, then it will adopt a similar policy profile by attempting to mimic much, if not all, of State B's policy profile. Our first hypothesis spells out this relationship:

External Learning Hypothesis: *States are more likely to emulate states that have demonstrated policy success.*

The External Learning Hypothesis posits a very direct, simple set of relationships between two governments, where one government learns from other governments that are successful. At the same time, though, each government has other potential sources of

information. In particular, in a federal system, state policymakers can draw on experiences with policy adoptions *within* the state by focusing on policy adoptions at the local (i.e., city) level. When states have a large base of knowledge drawn from local experiments within the state, external learning will be less valuable. Such states are less likely to rely on the earlier policy adoptions of successful states and consequently are less likely to emulate the approaches taken by other states that have demonstrated policy success.[2] Our second hypothesis spells out the idea that the influence of external learning will diminish as states gain more internal experience with a policy.

Learning Substitution Hypothesis: *States with a greater degree of internal experience with a policy are less likely to rely on external learning.*

Youth Access Laws

To examine our two hypotheses, we draw upon data about a type of antismoking restriction known as *youth access* laws. These laws tend to have two related goals. First, most such laws are geared toward making it more difficult for children to purchase cigarettes. Along these lines, for example, states have enacted minimum age requirements for the purchase of cigarettes, restrictions on the location of vending machines, and penalties for establishments that sell cigarettes to those under the age requirements. Second, states also have passed laws that more directly attempt to reduce youth smoking rates. Most specifically, many states have laws

[2] We do not take a strong position on whether states with more local adoptions are more likely to adopt statewide policies based on that internal learning. Consistent with Shipan and Volden (2006), we acknowledge that local adoptions could either stimulate statewide adoptions or take the pressure to act off of state policymakers. Rather, we are here focused on whether local policy experiences affect external learning from other states.

that create education and awareness programs aimed at teenagers and other children. Overall, then, youth access laws are designed to both directly and indirectly reduce youth smoking rates.

Youth access laws provide an ideal venue for tests of our hypotheses because data are available on which states and localities adopted these laws in which years, and because the success of these policies at the state level have been assessed in multiple ways. Regarding availability, state youth access adoptions are available from the National Cancer Institute's State Cancer Legislative Database and local youth access adoptions are available from the American Nonsmokers' Rights Foundation Local Tobacco Control Ordinance Database.[3] Regarding success, state-level data are available for both the frequency with which teens are able to illegally purchase cigarettes and the overall rate of smoking among teens. First, with the passage of the Synar Amendment in 1992, Congress required all states to monitor and reduce youth access rates over time. Under this program, which is administered by the Substance Abuse and Mental Health Services Administration (SAMHSA), a division of Health and Human Services, states must actively participate in order to qualify for federal funds under the Substance Abuse Prevention and Treatment (SAPT) block grant program.[4] In effect, states must conduct sting operations (or other similar approaches), organized according to specific protocols, to determine the rate at which teens are able to purchase cigarettes. Beginning in 1996 or 1997, depending on the state, all were required to report the results of these sting operations to SAMHSA. Since the SAPT funds from the federal government have totaled between $1.5 and $2 billion per year in recent years, states have a strong financial incentive to participate, and all states have reported the findings of their investigations on a yearly basis.

[3] We discuss both sources of data in more detail below.
[4] For information about this program see http://prevention.samhsa.gov/tobacco/default.aspx.

Second, since 1991 the Centers for Disease Control and Prevention (CDC) has completed and maintained the Youth Behavioral Risk Surveillance System (YBRSS). As part of this system, the CDC conducts the Youth Behavior Risk Survey on a variety of teenagers' activities, including smoking.[5] Furthermore, the data from this survey is amassed at the state level. The YBRSS data, therefore, provides state-level information on smoking rates among teenagers.

These two measures – compliance with the Synar Amendment and the YBRSS data on smoking rates – thus give us two separate, but related, indications of state policy success. Reducing the rates at which teens are able to purchase cigarettes and lowering the rates of smoking among teens are clearly the goal of these programs; hence, we have clear, objective measures of success in each state, meeting the first requirement for an analysis of the diffusion of successful policies. The second requirement is also clearly met: this information is easily available to states, with the federal government posting the data online to facilitate easy access.

The third requirement is that there needs to be a clear link between enactment of these policies and success. In other words, can a plausible case be made that the enactment of laws that aim to limit the ability of youths to purchase cigarettes have actually made it more difficult for youths to do so? To begin with, laws that require people purchasing cigarettes to show identification, that assess fines on stores that are caught selling cigarettes to minors, and that restrict the placement of vending machines to establishments that minors do not frequent (e.g., bars) are all likely to reduce youth access. In addition, the evidence suggests that these sorts of laws – particularly when they are coupled with strong enforcement – can change the behavior of

[5] The specific question from the survey that we draw upon asks teenagers whether they have smoked a cigarette within the past thirty days. The data can be accessed at: http://apps.nccd.cdc.gov/yrbss/SelectLocyear.asp?cat=2&Quest=Q30.

retailers, making it less likely that they will sell cigarettes to people who are younger than the legal age (e.g., Forster and Wolfson 1998).

Although few studies have examined the link between youth access laws and the rates of illegal purchases by minors, public health scholars have conducted numerous studies of the relationship between youth access laws and smoking rates among teens. Although some of these studies remain skeptical about the existence of a relationship (see the overviews in Lantz et al. 2006 and Levy et al. 2006), others have found strong evidence that tobacco control policies aimed at teenagers do reduce rates of smoking in this age group (e.g., Ross and Chaloupka 2004; Luke et al. 2000) and that lowering the rate of sales to minors also lowers the prevalence of youth smoking (Dent and Biglan 2004). Given the plausible case that youth access laws are effective (and indeed that some types of restrictions may work better than others), given the ability of states to discern which laws worked best elsewhere, and given data about policy adoptions at both the state and local levels, we are well positioned to test our hypotheses.

Before proceeding to the analysis, we should be clear about what we mean when we say that states learn from the successes of other states. As just noted, our measures of success are objective, available, and plausibly linked to the set of policies that states can adopt in order to limit youth access to cigarettes. What states observe from each other, however, is *not* that one specific policy produced a certain level of success; there are simply too many confounding variables for states to make those kinds of distinctions.[6] But a state *can* observe that another state has achieved a high level of success in reducing youth access and youth smoking, and also that this other state has a certain policy profile. Because the policies of the second state can

[6] We can report, however, that simple tests show that for the majority of the youth access laws that we include in our analysis, the presence of a youth access law at time *t* is correlated with better success at time *t+1*, even when controlling for the presence of other youth access laws.

plausibly be linked to its successes, the first state has an incentive to learn from this second state and emulate its actions by adopting a similar set of policies.

Methods and Data

As we discussed earlier, very few studies of diffusion consist of large-N studies of the role that success can play in the diffusion of public policies. Here we draw on a major exception, Volden's (2006) pioneering study of the Children's Health Insurance Program.[7] Building on Berry and Berry's (1990) introduction of event history analysis as a way to study diffusion, and drawing also on studies from international relations that examine dyadic relationships between countries, Volden's approach is to construct a series of state-level yearly dyads. Thus, each year of the dataset contains observations corresponding to each state (State A) paired with every other state (State B).[8] The benefit of this approach is that it allows for the possibility that each state can learn from every other state in the political system. Hence, we can examine not only whether a state learns from its geographic neighbors, but also whether it learns from those states that are similar in other ways, or that have exhibited particular success in the area of youth access laws.

We follow Volden's technique with one alteration. In a recent study, Boehmke (forthcoming) has demonstrated that under certain conditions, the dyadic approach can produce estimates that lead to spurious evidence of policy diffusion. More specifically, he shows that failure to control for the *opportunity* to emulate another state's policy can lead to these

[7] Volden and Cohen (2006) apply this approach to welfare politics following the 1996 welfare reforms. Meseguer (2006) uses an alternative and complementary approach.

[8] In 2000, for example, there are forty-nine observations for potential learning by Alabama – one observation in which Alabama is paired with Alaska, one in which it is paired with Arizona, one with Arkansas, and so on – forty-nine observations for learning by Alaska, and so on. Overall, then, there are 50 × 49 state-level observations for each year.

misleading estimates. Fortunately, he also identifies a straightforward remedy for this potential problem: conditioning on the opportunity to emulate. In our analysis, therefore, we eliminate all observations in which State A does not have the opportunity to adopt State B's policies, which occurs when State A has already adopted all of the youth access provisions found in State B.

Dependent variable

To assess what states have done in the area of youth access laws, we identified sixteen different laws that states have enacted, ranging from restrictions on the locations of vending machines to delivery restrictions to requirements that all young purchasers show identification as proof of age.[9] For our dependent variable, we want a measure of the extent to which each state moves toward each other state's policy profile – that is, toward the set of policies that the other state has adopted – in any given year. To determine the comprehensive list of youth access policies that each state has adopted, as well as the year in which it was adopted, we relied on the State Cancer Legislative Database (SCLD), which is a compilation of all state-level antismoking laws.[10] We collected this information for all states over the entire period of our study, which ends in 2002; the starting point is dependent on the state-level success measures, which we discuss below.

Next, in each of the sixteen categories of laws, we determine whether State A adopts a policy change in a given year and, if so, whether that change moves State A toward State B or

[9] The sixteen aspects of youth access policy that we examine are: age requirements, youth penalties, free distribution restrictions, vending machine restrictions, out-of-package sales restrictions, ID requirements, sign posting requirements, vendor licensing requirements, vendor penalties, location restrictions, education and awareness activities, behind-the-counter sales requirements, delivery and shipping restrictions, task force authorization, random inspections, and bidi restrictions.

[10] SCLD data can be accessed at http://www.scld-nci.net/.

away from State B. We then sum the number of categories in which State A moves toward State B and also the number of times it moves away from State B.[11] For example, consider a dyad that consists of Missouri and Iowa in 2001. In that year, Missouri passed a comprehensive youth access law that included seven new policy components of the sixteen we study. Compared to the policies that Iowa had at the start of 2001, five of Missouri's adoptions moved it toward policies in Iowa (youth penalties, vending machine restrictions, location restrictions, behind-the-counter-sales requirements, and random inspections) and two moved it away (out-of-package sales restrictions and delivery/shipping restrictions).

In the initial tests that we report, we create a simple, dichotomous measure that accounts for whether State A in the dyad has moved *toward* State B on more policy dimensions than it has moved *away* from State B. In our example above, the dependent variable, *Movement Toward State B*, takes a value of one for the 2001 Missouri-Iowa dyad. More generally, whenever the movement toward State B exceeds the movement away from State B, this dependent variable takes on a value of 1; otherwise (including when State A adopts no policy change at all) the dependent variable takes a value of 0.

We also code a second dependent variable using this same information. Instead of treating the dependent variable as a dichotomous measure, where we simply look to see whether the overall movement is toward or away from the second state, for this measure we look at the *amount* of movement. In the example given above, for example, where Missouri moves toward Iowa in five categories and away from it in two, this variable, *Amount of Movement Toward State B*, takes a value of three (five minus two). This more nuanced measure thus captures not

[11] This approach captures the idea that the adoption by State A of a policy that State B has already adopted moves A toward B, while the adoption by A of a policy that B does *not* have moves A away from B.

only the direction of movement, but also the extent to which State A follows (or retreats from) State B.

Independent variables: State B characteristics

Because of the nature of our hypotheses, our primary independent variables are measures of success in State B – namely, its success in reducing youth access and smoking. In this section we discuss our measures of success, as well as two additional characteristics of State B that increase the probability that State A will emulate its policy profile. In the following sections we then discuss control variables including characteristics of State A and relational interstate characteristics.

Of the variables characterizing conditions in State B, those most crucial to testing our hypotheses are measures of success. The first of these success variables measures whether states have prevented minors from purchasing cigarettes, a goal that the Synar Amendment imposed on the states. To create *Synar Compliance*, we take the percentage of minors who were able to purchase cigarettes during compliance tests, and subtract this percentage from 100. Thus, higher values for this variable indicate greater success at keeping tobacco out of the hands of children. In 2005, for example, minors in Connecticut were able to overcome legal obstacles and purchase cigarettes 18.0% of the time, while minors in New Jersey obtained cigarettes 12.6% of the time. The *Synar Compliance* value for Connecticut in 2005 is thus 82.0 (100 – 18.0), while the value for New Jersey is 87.4 (100 – 12.6), indicating that New Jersey was more successful than Connecticut in limiting the ability of minors to purchase cigarettes. The data for *Synar Compliance* are available starting in 1997.

Our second measure of success is *Youth Nonsmoking Rate*, which is the percentage of high schoolers who report that they did *not* smoke within the past thirty days and for which we have data beginning in 1991. In Michigan in 1999, for example, 34.1% of high school students reported having smoked within the past thirty days, compared to 40.3% of students in Ohio. Thus, the values of *Youth Nonsmoking Rate* are 65.9 for Michigan and 59.7 in Ohio, with the higher value indicating that Michigan has had better success in limiting the rate of smoking among teens. Because these surveys are not conducted in each year in each state, we interpolated the missing values. We do so by inserting the most recent survey results for each year and for each state, as these would be the best data available to policymakers in other states at the times of their decisions.[12]

In addition to these two measures of success, we also include two other measures for State B. Because larger and wealthier states are more likely to be seen as leaders in policy adoption (Walker 1969; Grupp and Richards 1975), these governments are more likely to be imitated than are smaller and poorer states. Hence, we include *Population in State B* and *Per Capita Income in State B* (in thousands of dollars), with the expectation that since their policies are more likely to be imitated, these variables will yield positive coefficients.

Independent Variables: Internal Determinants (State A characteristics)

Our second hypothesis, the Conditional Learning Hypothesis, holds that the effect of external learning should be conditional on the degree of internal experience. Ideally, we would have a measure of policy success at the local level that is directly comparable to our external

[12] Because policymakers cannot predict future smoking rates, it is unsurprising that a linear interpolation between each over-time observation in each state performs worse than the measure reported here.

measure of policy success, but such measures that are equivalent to *Synar Compliance* or *Youth Non-Smoking Rate* do not exist at the urban level. This does not mean, however, that states cannot learn from internal experience, only that we need to draw on another measure that contributes to learning. The most obvious and relevant source of internal information is contained in the record of local laws within a state, which we defined earlier. Thus, we treat the level of *Local Adoptions* as a measure of internal success. As a first step toward testing our hypothesis, we generate *Local Adoptions*, measured as the population in cities within the state that are covered by local youth access laws, divided by the population in all cities within the state, using a minimum cutoff of a city population of 50,000.[13] Our expectation, as spelled out in our hypothesis, is that as values of *Local Adoptions* increase, indicating greater internal experience with youth access laws, the effect of external measures of success will decrease in importance.

States also will be influenced by political and policy-related factors internal to the state. These internal determinants have been taken into account along with external diffusion pressures in scholarly works on diffusion for some time (Berry and Berry 1990). To identify the relevant internal factors that influence the adoption of youth access laws, we draw on Shipan and Volden (2006). *Health Organization Lobbyists* measures the number of lobbyists from various health-related organizations as a proportion of all registered lobbyists in the state, while *Tobacco Lobbyists* does the same for lobbyists for the tobacco industry. *Percent Smokers* measures the percentage of adult smokers within the state. *Tobacco Production* measures the amount of tobacco produced in the state in each year, in billions of pounds. To measure ideology, we include *Government Ideology*, which was developed by Berry, Ringquist, Fording, and Hansen

[13] We obtained the data on local antismoking laws from the American Nonsmokers' Rights Foundation.

(1998) and which assigns higher values to more liberal state governments. We also control for whether the state has a *Unified Democratic Government* or a *Unified Republican Government*. *Proportion Spent on Health* captures the budgetary concerns in State A that might drive youth access policy adoptions. *Real Legislative Salary*, which measures the yearly salary paid to members of the state legislature in thousands of 2005 dollars, captures the level of professionalism for the state legislature. *State Population* and *Real Per Capita Income* (in thousands of dollars) are included because larger and wealthier states are more likely to have the capacity to learn from others. All variables, their sources, definitions, and summary statistics are detailed in the appendix.

Our baseline expectations for all State A variables are somewhat confounded by the nature of the dyad-based event history framework that we employ here.[14] On the one hand, because our dependent variables take a value of zero when State A does not adopt a youth access law and a positive value when State A adopts a law moving its policy toward State B, conditions in State A leading to youth access policy adoption may yield positive coefficients. This view, however, ignores two potential problems with these variables. First, our dependent variable is not simply whether a state adopts a law, but rather whether it moves toward the policy profile of another state. Thus, factors that increase the likelihood of adoption might be associated with higher values of the dependent variable, if a state moves toward another state; but they could also be associated with *lower* values of the dependent variables, if a state is moving away from another state.

Second, consider a scenario in which ten states adopt a particular policy in 1998, another ten adopt that policy in 1999, and another ten adopt the policy in 2003. Given the dyadic

[14] Volden (2006) offers a discussion of some of the tradeoffs of including or excluding State A variables.

framework, the ten fairly early adopters in 1999 are seen as imitating ten other states, producing ten observations apiece with positive dependent variables. The laggards who adopt the policy in 2003, however, are seen as imitating twenty different states, and are thus given twenty positive observations for their dependent variables. The concern, then, is in interpreting the coefficients on State A variables without disentangling these two effects. Because of these potential problems, the coefficients on these variable should be taken with a grain of salt. Still, we include them to avoid potential omitted variable biases, thought to be common in diffusion studies (Franzese and Hays 2007, forthcoming). It is worth noting that we obtain very similar results if we exclude these results from our estimations.

Independent Variables: Interstate Relational Characteristics

Beyond the conditions in State B that might entice State A to imitate its policies, and the conditions in State A that lead to youth access adoptions. We also control for the relationship between states. The classic diffusion story is about geographical proximity, with policies spreading from one neighbor to the next (Walker 1969). We capture this relationship through the variable *Neighbors*, which takes a value of 1 if the two states in the dyad share a common border, and 0 otherwise.[15]

Ready access to information about the policies (and their implications) in neighboring states makes geographic learning an easy point of external policy focus. Indeed, following the seminal work of Berry and Berry (1990), geographic neighbor adoption was practically synonymous with policy diffusion. More recently, however, scholars have moved beyond

[15] Common borders and geographical proximity are often used to assess the role of economic competition in diffusion processes. In this policy area, however, economic competition plays little or no role. Hence, any effect for *Neighbors* is likely due to common media markets and other sources of information flow and learning.

geographic diffusion to explore whether ideological, demographic, or other similarities have contributed to the spread of policies (Case, Hines, and Rosen 1993; Grossback, Nicholson-Crotty, and Peterson 2004; Volden 2006). While some of the adoption of similar policies by similar states may be independent of policy diffusion (Volden, Ting, and Carpenter forthcoming), or may be due to other mechanisms of diffusion such as economic competition (Berry and Baybeck 2005), similar state adoption is at least consistent with learning-based diffusion.

To capture political similarity, we create *Same Unified Government*, which takes on a value of 1 if both states have unified Republican government *or* both states have unified Democratic government, and *Ideological Difference*, which is the absolute value of the difference in each state's *Government Ideology*. In addition, we create two measures of similarity, *Difference in Percent Smokers* and *Similar Production*, where the former is the absolute value of the difference in *Percent Smokers* across the two states, and the latter is a dichotomous variable that takes a value of 1 when both states are tobacco producers or neither are tobacco producers. To the extent that similarity should increase the likelihood that State A will follow the lead of State B and adopt its policies, we expect *Neighbors, Same Unified Government*, and *Similar Production* to have positive coefficients, while *Ideological Difference* and *Difference in Percent Smokers* should have negative coefficients.

Results

Initial tests of the External Learning Hypothesis are reported in Table 1. Within the dyad-year event history analysis approach, we use *Movement Toward State B* as our dependent variable in Model 1. Since this is a dichotomous variable, we use logit to estimate the equation.

In addition, to control for possible lack of independence across observations (e.g., we are focusing on the same states making decisions over time and across other states) we cluster by State A, an approach that adjusts the standard errors to account for any discerned non-independence and to account for possible heteroskedasticity concerns.[16] To control for further possible temporal dependence in the hazard rates of adoption of State B's policies, we include *Year* and *Year Squared* (Beck, Katz, and Tucker 1998).[17] Finally, as mentioned above, we limit the dataset to observations in which State B has already adopted youth access policies not found in State A, thus presenting an opportunity for imitation (Boehmke forthcoming).

[Insert Table 1 about here]

Model 1 of Table 1 presents the results of our basic model. The key variables of interest in testing the External Learning Hypothesis are the success in State B measures (*Synar Compliance* and *Youth Nonsmoking Rates*). These baseline results for State B considerations provide little evidence that states are more likely to copy successful policies found elsewhere. Although both *Synar Compliance* and *Youth Nonsmoking Rates* in State B have the predicted positive sign, the coefficients are small and neither attains statistical significance. The rest of the model fares little better; with only a handful of exceptions, the variables are not statistically significant. And even some of the results that do attain significance are puzzling, showing, for example, that states are more likely to adopt policies found in other states that have greater ideological differences than in those that are ideologically similar.

[16] Clustering by State A-year or State B yields substantively similar results to those reported here.

[17] Including individual year dummies yields substantively similar results to those reported here. Similar, adding a cubed version of the year variable (see Carter and Signorino 2007) does not affect our results or conclusions.

Why might these results be weak? Two features of the data provide possible answers. First, we currently include all observations in which State A has the opportunity to emulate State B. In the vast majority of our observations, however, State A took no action at all, and thus could not imitate State B. A better test of our hypotheses would be limit the analysis to instances in which State A passed any laws. Thus, the appropriate question becomes: conditional upon having passed a law, did State A move toward State B?[18] Model 2 of Table 1 presents the results of this analysis. In contrast to the results in Model 1, we now find strong support for our first hypothesis, with both *Synar Compliance* and *Youth Smoking Rates* achieving high levels of statistical significance ($p<.01$). Furthermore, both also are substantively important. The size of these effects can be interpreted by their effects on the odds of State A adopting policies moving its policy profile toward State B. These odds increase by about 1.9 percent for each additional percent of undercover youths denied cigarettes in *Synar Compliance* tests in State B, and increase by about 2.2 percent for each additional percent of youths in State B who are nonsmokers. Thus, we find strong support for the idea that states do learn from the successes of other states and are more likely to adopt the policy profile found in those successful states.

Turning to our other results, we find that a higher value of *Population in State B* does increase the likelihood that State A will imitate State B; but *Real Per Capita Income in State B* has the opposite sign from what we expected. Further, in looking at the results for interstate relational considerations, we find that states are more likely to follow the lead of other states that have a similar production status and that have similar rates of smoking. Finally, although we do not want to make too much of the State A coefficients, for the reasons outlined above, several are statistically significant. While some of these coefficients are in the expected direction – a

[18] For similar tests, see Volden 2006 and Gilardi, Füglister, and Luyet forthcoming.

positive coefficient on *Health Organization Lobbyists*, for example, is consistent with health group advocating for policy changes that move State A toward more restrictive youth access policies found elsewhere – others (e.g., *Tobacco Production*) produce findings at odds with what we might expect.

There is a second reason why the results in Model 1 might be expected to be weak. [19] Recall that the dependent variable in that model is a dichotomous variable, taking on a value of 1 is a state moves toward another state's policy profile more than it moves away. Although this provides an accurate picture of the relationship between two states, and although it follows the approach used in other dyadic studies (e.g., Volden 2006), it ignores relevant information. Suppose, for example, that Indiana and Iowa had no youth access laws at all at in a given year, and Illinois had eight different laws at that time. Now suppose that in the next year, Indiana adopts one law that is found in Illinois, while Iowa adopts six of the eight laws that are already in effect in Illinois. Clearly, Iowa has moved more toward Illinois than has Indiana; yet the dependent variable we use in Equation 1 treats Iowa and Indiana as being equivalent. More generally, because there are more than a dozen different youth access policies that states can adopt, one state could move only slightly toward another, or could take much greater steps toward that other state.

Equation 3 of Table 2 makes use of this additional information by utilizing *Amount of Movement Toward State B* as the dependent variable. Because it is no longer a dichotomous

[19] There is also a third potential problem with the analysis in Model 1. Because *Synar Compliance* and *Youth Nonsmoking Rates* are moderately correlated (r=0.32) and represent separate measures of success, we arguably should test them in separate equations. When we re-run Model 1 including the success measures one at a time, we find that the two measures of success are indeed significant – *Youth Nonsmoking Rates* is significant at p<.01 (one-tailed) with a substantive impact of a 1.1% increase in the odds of moving toward State B for every 1% increase in State B's success, and *Synar Compliance* is significant at p<.10 with a substantive impact of a 0.6%.

variable, but rather can take a range of values, we use ordinary least squares for our analysis.[20] Once again, to control for spatial and temporal dependence, respectively, we cluster by State A and include *Year* and *Year Squared*.

[Insert Table 2 about here]

The results again show strong support for the External Learning Hypothesis. Both *Synar Compliance* and *Youth Nonsmoking Rates* are positive and strongly significant ($p < 0.01$, one-tailed test).[21] In addition, we again see that two of our control variables for similarities between the states have the expected effects. Based on the *Difference in Percent Smokers*, we see that states differing in the size of their smoking populations are less likely to imitate one another's policies. Additionally, similar production status is associated with an increase in the odds of policy emulation. Even with this more fine-tuned dependent variable, however, we see no evidence of states imitating one another based on similar partisan control of government or similar ideologies.[22]

Finally, although we do not report them here, we have conducted tests of alternative versions of our success measures. Our current measures, *Synar Noncompliance* and *Youth Nonsmoking Rates*, represent current levels of a state's success in the policy area of youth

[20] Theoretically, this dependent variable can take values ranging from -16 to 16. In reality, it actually takes values from -5 to 9 during our time period.(*Note: got this running" table dvdiff if opportunities>0 & year > 1996 & year<2003 & anyaction==1"*) An alternative way to analyze the data would be to run an ordered logit. Using such an approach yields identical conclusions about our hypotheses and variables, but comes at the cost of producing results that are much more complex to interpret. Hence, we report OLS estimates in our tables. The ordered logit results are available upon request.

[21] In addition, we find similar effects for these two success variables when we include all observations, and not only those in which State A took some action.

[22] We also investigated whether there might be an interactive effect between the success variables and the similarity variables. Although there is some evidence of such an interactive effect (e.g., between *Synar Noncompliance* and *Difference in Percent Smokers*), such evidence is limited to only certain ranges of certain similarity variables. Overall, there is no systematic pattern of such an interactive effect.

smoking. We also investigated whether a state might be affected by how they are doing relative to how the other state in the dyad is doing – that is, by the ratio of the values these variables take in State A and State B – and by trends in these variables. In terms of ratios, we found that states were indeed more likely to imitate another state when their own rate of Synar Compliance rate was low, relative to the other state; and less likely to do so when their compliance with Synar was better than the other state's. We did not, however, find such an effect for youth smoking rates. In terms of trends, we found some evidence that a state looks at the long term trends in youth smoking rates in another state, and not just that other state's current level of youth smoking. Yet we did not find evidence that states take short-term trends into account. Overall, using the measures of success that rely on levels, as reported in Tables 1 and 2, provide results that are stronger, more consistent, and more robust than other measures.

Internal Learning and Substitution

The results in the previous section demonstrate that successful states are more likely to be emulated than states that have demonstrated little policy success. A state is much more likely to move toward the policy profile of another state if that other state has low rates of youth smoking or high rates of compliance with the goals of the Synar amendment. These findings contribute to the small but growing set of studies that have investigated whether policies in successful states are more likely to diffuse. We turn now to a test of our second, and more novel, hypothesis.

The Learning Substitution Hypothesis suggests that the effects of learning from successful states are likely to be reduced for states with significant internal experience. To explore the possibility of states substituting internal learning for external learning, we interact our variable measuring *Local Adoptions* in State A with the State B success variables and with

the interstate relational variables. Doing so in a single model presents multicollinearity problems, so we conduct this analysis in subsets.

Model 4 in Table 2 shows the results for the interaction of *Local Adoptions* in State A with *Youth Nonsmoking Rates* in State B, while Model 5 shows the results for the interaction of *Local Adoptions* in State A with *Synar Noncompliance* in State B. In both models 4 and 5, the measures of success are, as expected, positive and highly significant. The results for the interaction terms, however, appear to vary across these two questions – in Equation 4, the interaction, although having the expected sign, is not significant, while in Equation 4, the interaction term is both negative and significant. Of course, one must look at the combined effect of these variables in order to ascertain the overall significance of the interaction between these two variables (Kam and Franzese 2007). The easiest way to do this is graphically.[23] Figures 1 and 2 present plots of these two equations, with the first figure corresponding to Model 4 and the second figure corresponding to Model 5.

[Insert Table 2 about here]

In both cases, we find strong support for the Learning Substitution Effect. In Figure 1, for example, we see that in states that have no internal experience – that is, states in which there are no local-level youth access laws – there is a heavy reliance on external learning. In these cases, the marginal effect of external learning from the success of other states is strong, significant, and positive. But as states start to gain internal experience, with more localities starting to pass youth access laws, these states become less likely to draw upon external evidence of success in complying with the Synar amendment. Thus, we see that the marginal effect of external learning decreases as the proportion of the state covered by local laws increases. The

[23] These graphs are drawn using the *grinter* command developed by Fred Boehmke for Stata.

effect of external learning continues to be positive, however, until just under 40% of the state's population is covered by local laws; after that point, states appear to pay little attention to the actions and successes of other states.[24] The graph for *Youth Nonsmoking Rates* shows effectively the same relationship. States do draw on external sources of information, as they learn from the successes of other states. Again, however, this effect is conditional: as states gain more internal experience, they are less likely to look outward for information and less likely to emulate states that have demonstrated success.

[Insert Figure 1 and 2 about here]

Conclusion

States face a multitude of policy decisions every year. When deciding whether to adopt a policy, they are undoubtedly influenced by internal factors. But an important question concerns how they learn from the actions of other governments. More specifically, do they learn from the successes of other governments? And if so, do they learn from experiences within the state, or from experiences in other states?

Our analysis shows that states do indeed learn from other states. If a state observes that another state has had success in dealing with a policy area, then it is more likely to move toward that state, to adopt a similar policy profile. More specifically, we found that states that are more successful in reducing youth access to cigarettes and youth smoking rates are more likely to be emulated than are other states.

The finding that successful states are more likely to be emulated is interesting in its own right, but it also provides a baseline for a more intriguing and novel finding. We find that

[24] For the observations we include in our analysis, the mean for the *Local Adoption* variable is 0.23, the median is 0, and the 75th percentile is .37.

although states learn from other, successful states, they are less likely to do so when they have a great deal of experience on their own. In effect, then, states can substitute internal learning for external learning.

Taken together, then, these findings portray a complex relationship among states and localities, with states learning both horizontally (i.e., from other states) and vertically (i.e., from policy adoptions within their state), and with the exact nature of learning dependent on political features within the state and similarities across states. These findings also suggest other questions. For example, do successful policies diffuse more rapidly than policies that are less successful? Are there characteristics of the state being emulated that influence the nature of diffusion? How can we more accurately assess the effects of internal characteristics on the likelihood that a state will follow other states? These questions, along with many others, promise to be fruitful avenues of research on the role that learning and success play in the diffusion of public policies.

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Appendix: Variable Descriptions, Summary Statistics, Sources

Variable	Description	Mean	St. Dev.
Movement Toward State B[a]	Dependent variable = 1 if State A in dyad moves toward State B in more categories than it moves away.	.09	.28
Amount of Movement Toward State B[a]	Dependent variable = Number of categories in which State A moves toward State B minus number of categories in which State A moves away from State B	.04	.81
Synar Compliance[b]	Percentage of time minors were unsuccessful in attempts to purchase cigarettes	80.51	11.62
Youth Nonsmoking Rate[c]	Percentage of high school students who have not smoked within the past thirty days	69.72	7.42
Local Adoptions[b, d]	Proportion of state population living in localities with youth smoking restrictions at start of the year.	.20	.31
Tobacco Lobbyists[e]	Proportion of lobbyists in the state working for tobacco industry, based on 1994 snapshot.	.02	.01
Health Organization Lobbyists[e]	Proportion of lobbyists in the state working for health organizations, based on 1994 snapshot.	.08	.06
Percent Smokers[f]	Percent of adults in state who smoke.	24.03	3.35
Tobacco Production[g]	Amount of tobacco produced in state, in billions of pounds	.03	.10
Government Ideology[h]	Ideology score for state government.	49.39	24.20
Unified Democratic Government[i]	Dummy = 1 for Democrats controlling state legislature and governor	.28	.45
Unified Republican Government[i]	Dummy = 1 for Republicans controlling state legislature and governor	.16	.36
Proportion Spent on Health[g]	Proportion of state expenditures spent on health	.04	.01
Real Legislative Salary[i]	Annual salary paid to members of the lower house, in thousands of year 2000 dollars	21.80	20.97
State Population[i]	State population (millions)	4.91	5.02
Real Per Capita Income[i]	Average income per resident ($000s).	27.60	51.65
Population (Second State)[i]	State population (millions) in second state in dyad	5.69	6.30
Real Per Capita Income (Second State)[i]	Average income per resident ($000s) in second state in dyad	27.81	5.04
Neighbors	Dummy = 1 if two states in dyad share border	.08	.28
Same Unified Government[i]	Dummy = 1 if both states in dyad have unified Democratic or unified Republican government	.11	.32
Ideological Difference[h]	Absolute value of difference between *State Government Ideology* for two states in dyad	27.12	19.76
Difference in Percent Smokers[f]	Absolute value of difference between *Percent Smokers* for two states in dyad	3.37	2.77
Similar Production[g]	Dummy = 1 if both states or neither states in dyad produce tobacco	.56	.50

Data sources:

[a]Constructed based on National Cancer Institute, State Cancer Legislative Database Program, Bethesda, MD: SCLD.

[b]Constructed by authors based SAMHSA data.

[c]Constructed by authors based on data from the CDC.

[d]Constructed by authors based on American Nonsmokers' Rights Foundation Local Tobacco Control Ordinance Database©.

[e]Constructed by authors based on Goldstein and Bearman (1996).

[f]Centers for Disease Control and Prevention website (www2.cdc.gov/nccdphp/osh/state/report_index.asp).

[g]Constructed by authors based on U.S. Department of Agriculture data.

[h]Berry, Ringquist, Fording, and Hanson (1998) data on ICPSR website.

[i]Constructed by authors, based on The Book of the States

Table 1: State Youth Access Adoptions and Movement Toward State B

	Model 1	Model 2
State B Considerations		
Success: Synar Compliance	0.004	0.018***
	(0.005)	(0.006)
Success: Youth Nonsmoking Rates	0.006	0.022***
	(0.007)	(0.008)
Population in State B	0.010*	0.012
	(0.007)	(0.012)
Real Per Capita Income in State B ($1000s)	-0.012**	-0.019**
	(0.006)	(0.009)
State A Considerations		
Local Adoptions	0.45	0.57
	(0.35)	(0.46)
Tobacco Lobbyists	15.02	0.07
	(19.35)	(24.56)
Health Organization Lobbyists	1.07	7.03**
	(3.30)	(3.69)
Percent Smokers	-0.06	-0.007
	(0.05)	(0.059)
Tobacco Production	2.11**	1.63**
	(1.02)	(0.71)
Government Ideology	-0.01	0.005
	(0.01)	(0.013)
Unified Democratic Government	-0.54	-0.60
	(0.65)	(0.89)
Unified Republican Government	-0.61	-0.24
	(0.63)	(0.63)
Proportion Spent on Health	-20.98**	16.39
	(10.75)	(14.42)
Real Legislative Salary	0.01	-0.014*
	(0.01)	(0.011)
State Population	0.02	0.042*
	(0.02)	(0.027)
Real Per Capita Income ($1000s)	-0.13***	-0.15***
	(0.04)	(0.06)
Interstate Relational Considerations		
Neighbors	-0.003	-0.13
	(0.10)	(0.15)
Same Unified Government	-0.06	-0.31*
	(0.16)	(0.23)
Ideological Difference	0.005*	0.003
	(0.003)	(0.004)
Difference in Percent Smokers	-0.01	-0.05***
	(0.02)	(0.02)
Similar Production	0.11	0.26**
	(0.14)	(0.16)
Wald χ^2	185.78***	143.52***
N	7633	1820

Robust standard errors in parentheses, clustered by state. Results for constant and time trends omitted.
Models utilize logit; the dependent variable is *Movement Toward State B*.
****p < 0.01*, ***p < 0.05*, **p < 0.1* (one-tailed tests).

Table 2: State Youth Access Adoptions and Amount of Movement Toward State B

	Model 3	Model 4	Model 5
State B Considerations			
Success: Synar Compliance	0.011***	0.018***	--
	(0.004)	(0.005)	
Success: Youth Nonsmoking Rates	0.017***	--	0.029***
	(0.005)		(0.006)
Population in State B	0.011**	0.017**	0.019***
	(0.006)	(0.004)	(0.006)
Real Per Capita Income in State B	-0.012***	-0.016***	-0.028***
	(0.005)	(0.005)	(0.006)
State A Considerations			
Local Adoptions	0.48*	0.93*	1.33**
	(0.30)	(0.59)	(0.57)
State Population	0.032*	0.04*	0.025*
	(0.023)	(0.03)	(0.016)
Health Organization Lobbyists	5.73**	4.31**	3.25*
	(2.48)	(2.52)	(2.06)
Tobacco Production	1.40**	1.13**	1.45***
	(0.61)	(0.65)	(0.42)
Real Legislative Salary	-0.010*	-0.008	-0.011**
	(0.007)	(0.007)	(0.005)
Real Per Capita Income	-0.09**	-0.092**	-0.029
	(0.04)	(0.040)	(0.030)
Interstate Relational Considerations			
Neighbors	-0.042	-0.032	-0.09
	(0.104)	(0.090)	(0.12)
Same Unified Government	-0.179*	-0.37***	-0.005
	(0.125)	(0.12)	(0.129)
Ideological Difference	0.001	0.0004	0.002
	(0.002)	(0.002)	(0.002)
Difference in Percent Smokers	-0.026**	-0.02*	-0.023*
	(0.013)	(0.01)	(0.015)
Similar Production	0.201**	0.26**	0.27***
	(0.119)	(0.11)	(0.10)
Local Adoptions (State A) ×	--	-0.022	---
Synar Compliance (State B)		(0.024)	
Local Adoptions (State A) ×	--	--	-0.047**
Youth Nonsmoking Rate (State B)			(0.025)
R^2	0.13	0.14	0.08
N	1820	2508	2916

Models run using OLS regression, with robust standard errors in parentheses, clustered by state. Results for constant and time trends omitted. Results for State A variables with insignificant coefficients omitted for space considerations.

****p < 0.01*, ***p < 0.05*, **p < 0.1* (one-tailed tests).

Figure 1: The Conditional Effect of Synar Success

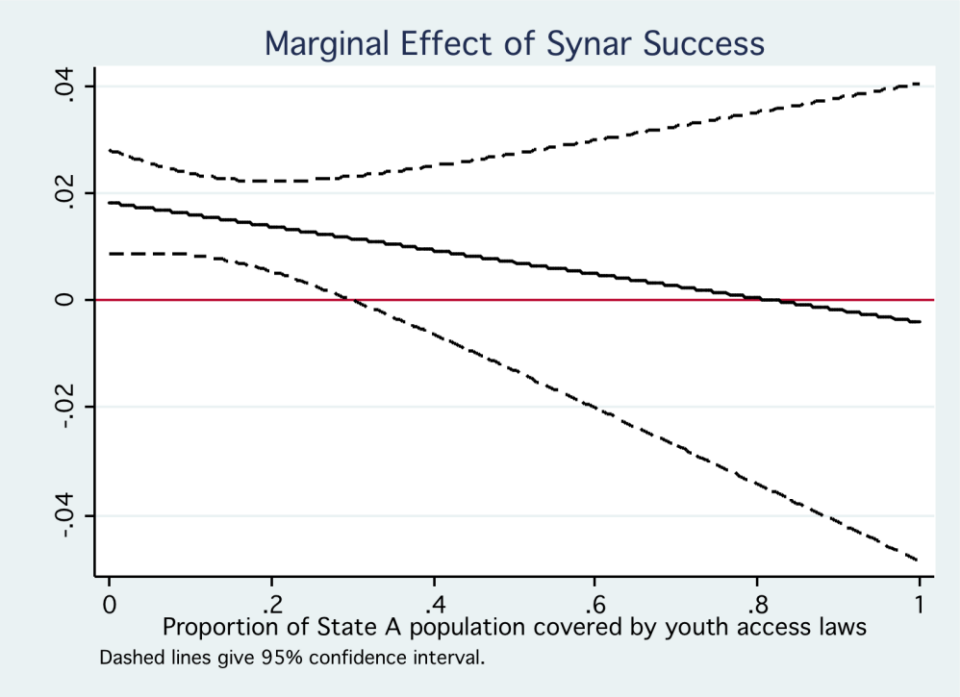

Figure 2: The Conditional Effect of Youth Smoking Rate Success