

## **Institutionalization: New Concepts and New Methods**

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The paper is currently being revised to consider other empirical methods for characterizing the empirical relationships over time, including different versions of Bayesian change point models.

## **Institutionalization: New Concepts and New Methods**

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In this paper we propose a new conceptualization of the process of institutionalization and a new empirical strategy for measuring the dynamics of institutionalization over time. The theory is general and should apply to a wide range of institutions in which social scientists are interested; however, in this paper we apply the technique to study the institutionalization of seniority systems in the legislatures of the American States from 1907 to 1999. We conceptualize an institution as a set of shared beliefs (within some relevant population) about one or more empirical relationships. Correspondingly, institutionalization (or de-institutionalization) is the homogenization (or de-homogenization) of those beliefs in the relevant population. For example, the institution of a seniority system can be understood as a set of beliefs about the correlation between a legislator's tenure and his or her influence in the legislature. If we can measure the tenure of individual legislators and also their influence (using committee chairmanships, etc.), then we can quantify the strength of this correlation in a given legislature at a given time. Further, we can repeat this for different legislatures over time and, using techniques from Bayesian statistics, quantify what the available empirical record at a given point in time should tell an observer about the correlation or correlations that define the institution. Thus, evidence of institutionalization of a seniority system would come from increasing stability (predictability) in the correlation between tenure and influence over time. Of course, this conceptualization of institutionalization means that a system could "institutionalize" (i.e., produce stable correlations and shared beliefs) a low correlation – so, in this example, we can sensibly consider an institutionalized weak seniority system, an institutionalized strong seniority system, or any other variant.

# **Institutionalization: New Concepts and New Methods**

## **1. INTRODUCTION**

In this paper, we propose an empirical method for exploring institutional change and institutionalization and apply our method to the study of seniority systems in U.S. state legislatures as they have developed over the last century. The method draws on existing work on the logic and nature of institutions (e.g., Knight 1992, Eggertsson 1990, Elster 1989), results from Bayesian statistics (and the more recent studies incorporating these insights into mainstream political science, e.g., Jackman 2000), and the large body of literature in comparative politics on historical institutionalism (e.g., Steinmo, Thelen, and Longstreth 1992.). We show that blending these three very disparate traditions in political science leads not just to a better understanding of the way our theories tend to use institutional concepts, but also a useful empirical strategy for quantifying their essential features and how these change over time.

The most important theoretical position advocated in this paper is that social institutions always generate (or are otherwise associated with) a set of empirical regularities and that change in the nature and strength of these empirical regularities are closely connected to change in the institution itself. Indeed, under some theories of institutions, empirical regularities actually define the institution directly; though there is no need to go that far to make the point. This close connection between the institutions we want to study and the empirical regularities they generate provide an opportunity to study the former by measuring the later. In this paper, we suggest a practical method for doing so, which allows one to examine the nature of institutional change and the extent of institutionalization over time, even when one has little data at the start of an observation period.

This method rests on certain broad assumptions about what institutions are, how they relate to empirical regularities, and how the shared expectations that support institutions are formed and disseminated. In the next section, we describe these assumptions and discuss how they relate to the most widely used definitions of social institutions (e.g., Knight 1992). This discussion draws our attention to several theoretical issues that have not been emphasized in the theoretical literature on institutions but which play a central role in the practical implementation of our method.

## 2. ASSUMPTIONS UNDERLYING THE METHOD

The method that we propose below depends, as we have said, on a close association between social institutions and observable empirical regularities. In this section, we argue that this association can be justified in either of the two broad conceptions of social institutions that have shaped the theoretical literature.<sup>1</sup> It is most clearly applicable to those conceptions of social institutions that equate empirical regularities with the institution itself (e.g., Schotter 1981). We argue, however, that even in those conceptions that reject this view and instead define institutions as rules of behavior that are separate from the empirical regularities they may create (e.g., Knight 1992), the empirical regularities associated with the rules are so intimately connected with maintenance and change in the institution that our method is almost as easily justified from this starting point.

These two points of view share a great deal. Both characterize institutions as guides to future behavior that “work” by creating shared expectations about future behavior among the members of some relevant population. These shared expectations allow individuals to predict how most people will behave in a given social situation (and what they can expect if they do not behave in the expected way) and can either be self-enforcing or externally enforced.<sup>2</sup> These views diverge, however, in how they think individuals form their expectations – with one view giving primacy to the rules themselves and the other to empirical regularities.

### 2.1 Institutions as Empirical Regularities

A long tradition of scholarship about the nature of social institutions concludes that the institutions we really care about are defined by empirical regularities rather than by formal rules (Rawls 1955, Menger 1963, Hayek 1978, Ullman-Margalit 1978, Taylor 1976, Nozick 1975). In this conception, expectations do not flow directly from knowledge of formal “rules” but rather from observations of empirical regularities. This point of view is most clearly distinguished from others when we observe social institutions in the absence of formal rules. For example, one of the authors of this paper spent

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<sup>1</sup> Ostrom (1986) identifies three main conceptions of the social institution that have been used in the literature: rules of behavior, empirical regularities, and political structure. We discuss two of these above, but follow Knight, and most others, in ignoring the institutions as structures views since its focus on macro-national institutions is too narrow to cover many of the institutions we might care about.

<sup>2</sup> Though externally enforced institutions rely on the expectation that the external enforcers will actually act in the expected way to enforce the institution and so in this sense may ultimately require that they be self-enforcing equilibrium.

some time at a large southern university and regularly took a bus to and from campus. From the first such ride, he observed that when all the seats on the bus were taken and a woman entered the bus, the males on the bus who were sitting close to the woman would stand and offer her their seats. This observation led him to quickly infer that a social norm existed in his new community that others would expect him to follow; with attendant social stigma should he fail to comply. In this case, there was certainly no formal rule codifying that males give up their seats (and that females accept); however, there was a strong empirical regularity between the occurrence of a triggering situation (a full bus with a woman forced to stand and a male seated) and a resulting behavior (the exchange of positions between the male and female) that shaped his expectations in this situation. In the view of Schotter and others, the fact that the empirical regularity is what shapes expectations in this case means that it defines the institution. In other words, if there were a formal rule that were at odds with the empirical regularity, it is the empirical regularity that would predict behavior and so define the relevant institution.

Clearly, then, the applicability of this view is not limited to cases in which formal rules do not exist. Schotter (1981), for example, explains that social institutions:

“are not rules of the game but rather the alternative equilibrium standards of behavior or conventions of behavior that evolve from a given game described by its rules. In other words, for us, institutions are properties of equilibrium of games and not properties of the games’ description. We care about what the agents do with the rules of the game, not what the rules are.” (Schotter 1981, p. 155 quoted in Ostrom 1986, p. 4)

The implicit contrast in this passage is between individuals whose expectations are shaped by empirical regularities directly and individuals that form their expectations about what others do by looking at the rules (or a “game”) and forecasting what how other actors will behave, given their own strategies. More specifically, this view suggests that people look at what others have done in the past in similar situations and infer what they will do in the future. Thus, the “institution” that impacts their behavior is the stable pattern of past behavior (the empirical regularity), not the “rules”.

If we think about institutional change and institutionalization in this view, it is clear that the institutional change we care about is not, for example, the changes in legislative rules of procedure (e.g., the extensive catalog of such changes in the U.S. congress), but rather changes in the patterns of behavior that individuals rely on in forming their expectations – which may or may not correspond directly to changes in the rules. Thus, when we are characterizing the nature of an institution, the goal should be to characterize the regular patterns of behavior that the relevant actors perceive and that,

consequently, shape their expectations. For example, if we are interested in characterizing the institutions which govern the process by which coalition cabinets get formed in parliamentary democracies, we might identify (for some systems) a regularity in which the largest party is chosen as the first mover (i.e., the *formateur*) in coalition negotiations and another in which these *formateur* parties usually reach out to ideologically compatible partners to join the coalition. In the view of institutions as empirical regularities, these patterns, if stable, are the relevant institutions upon which studies of coalition formation should focus.

This view leads to a number of subtle (and in our view underappreciated) implications: Once we allow that empirical regularities are institutions, we have to deal with the fact that most empirical regularities are not deterministic. For example, the relevant empirical regularity defining a seniority system might be that long-serving legislators “almost always” obtain committee chairmanships over less long-serving members; or perhaps that that “usually” do. More generally, many of the empirical regularities that might define a social institution essentially assign probabilities to a set of different behaviors. In our bus example, the social institution does not require that men give up their seats to women every time the triggering situation occurs (nor does it require that a man in this situation expects a social sanction with certainty). Instead, a stable social institution may develop in which men give up their seats 75% of the time.<sup>3</sup> What is important is not the specific distribution of probabilities over behaviors but that the empirical relationships are stable, so they can become widely shared on the relevant population and are a reliable basis for conditioning individual expectations.

As an example of how this kind of conditioning works, consider two different institutions. In one case, the institution indicates that the Prime Minister will always come from the largest party in the legislature (so in 100% of the cases the largest party has obtained the prime ministry). In another, the probability of the Prime Minister coming from particular party is proportional to the each party’s size, with larger parties more likely to be PM (so the long-term frequencies of PM selection over parties correspond closely to party sizes). Now suppose that in both situations there is one party that is certain to be the largest party and that there is a voter who has \$100 to contribute to political parties before the PM is selected. This voter wants to contribute as much as possible to the party who will become the PM, and so will behave differently in these two different institutional contexts. In the first case, the

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<sup>3</sup> If one thinks of institutions as the empirical regularities arising out of usual patterns of play in games (as Schotter seems to) then this point is simply that the equilibrium behavior that results in stable pattern of play can certainly be a set of mixed strategies – so that the long-term empirical regularity is a stable frequency distribution over observed behavioral strategies.

voter will clearly give \$100 to the party who will be largest. However, this is not the optimal allocation in the second case, in which the voter's institutionally induced expectations about which party will be PM are probabilistic. The point here is simply that it does not matter whether institutions (as empirical regularities) indicate deterministic behavioral relationships or probabilistic ones, both kinds of institutions can condition expectations and behavior.

Given that institutions (or empirical regularities) can be thought of as stable probability distributions over behaviors, we need to make explicit a distinction that is often obscured in the literature. Specifically, we need to distinguish the uncertainty that comes from a probabilistic view of empirical regularities and the uncertainty that may come from the both the individual's need to make an inference about the nature of the empirical regularity (and therefore, in this view, the institution itself) and to update that view over time. Consider again the example of seniority norms in legislatures. In a given case, at a specific point in time, we have a probabilistic social institution in which there is a long-term correlation of .8 between years of service in the legislature and the chance of obtaining a leadership position. Thus, this society has a strong (but not perfect) seniority norm as evaluated at this point in time. We can, however, imagine two very different ways in which a society gets to this point. In the first, imagine that there are fairly large swings from session to session in the extent to which seniority predicts position - with one session in which leadership is determined strictly by seniority (correlation 100%) followed by another in which the correlation is weak (but big enough that one ends up with a long-term average of .8). In contrast, imagine a second case in which seniority predicts position about the same in each session (averaging to .8). In the first case, despite the fact that at the specific point in time examined it has the same long-term correlation between seniority and position as the other case, this correlation is not stable and so the first case can hardly be called an institution in the same way as the other. The problem is that the empirical record from the past (summarized at this point in time by long-term correlation of .8 between seniority and position) provides only a weak guide to what will happen in the future. Of course, the individual forced to make a choice would do better to condition her expectations on this correlation than on anything else, but they are fairly likely to be wrong. This situation is, of course, exactly one in which Schotter (and just about everyone else) would say that this correlation does not meet the requirements for stability and reliability that are part of the definition of a social institution as an empirical regularity. Put another way, this is an example of a weak institution - where the long-term average behavior is not a very good guide to future behavior.

More concretely, we think that this is an example of a weakly *institutionalized* social institution. Thus, we would define institutionalization in this view (i.e., the institutions are empirical regularities) as the extent to which relevant long-term average behavioral relationships (the relevant empirical regularities) are stable over time. Since whenever we think of the empirical regularities that define (or are associated with) institutions, we think of the “data” that make up these empirical regularities as accruing over time, this lack of stability in the relationships over time corresponds directly to the *empirical variance* in the long-term average regularity. Where this variance is higher, the empirical regularities (defined by the long-term average) will be less stable over time and where it is smaller they are more stable over time. Further, as empirical regularities become more stable over time, we can think of this as a process of institutionalization (with de-institutionalization defined analogously).

In the method we advocate below, we use data over time to characterize both the empirical regularities (the average correlations up to a point in time) and how these change by explicitly modeling how beliefs about these correlations should respond to new information (e.g., a new legislative session in our example). Thus, we can determine both the size of relevant correlations (the nature of the probabilistic institution) and track how stable they are over time.<sup>4</sup>

## 2.2 Institutions as Rules of Behavior

Political scientists working in the rational choice tradition have tended toward a view of institutions as sets of rules rather than as the empirical regularities they create (e.g., Riker 1980). Jack Knight (1992) makes the case for this view most comprehensively, emphasizing that rules are forward looking guides to behavior that can impact expectations quite apart from the empirical regularities they produce. So, for example, he points out that a rule can guide behavior in a new situation where empirical regularities are not relevant.<sup>5</sup>

While there are important differences in these views; for our purposes, the distinction is not so consequential that one must entirely reject the “institutions are rules” view in order to use our empirical method consistently. Specifically, we argue that despite their rejection of the idea that empirical

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<sup>4</sup> The empirical method will produce a third datum – the estimation uncertainty of a correlation at a given point in time. This captures both the extent to which the correlation is changing and the amount of information that has gone in to estimating it over time and in the current situation.

<sup>5</sup> The distinction he makes is reminiscent of the long debate in economics between rational and adaptive expectation formation. It is clear that if a rational agent has a “model” of the economy (i.e., a set of rules about how the economy works) and uses current information to apply that model to the current situation, her expectations about the state of the future economy will reflect the rules rather than any observations.



regularities *define* social institutions; Knight (and others) recognize that successful social institutions will necessarily give rise to stable empirical regularities, which will, just as in the other view, have a large role in creating the reliable expectations that give rules their behavioral power. This strong association is, by itself, probably enough to justify the use of empirical regularities as a proxy for rules in empirical work, but there are other, more theoretically grounded, reasons as well.

We argue that even when the rules conception of social institutions predicts different behavior than the “empirical regularities” view, these predictions ignore two limitations of the rules view that bring empirical regularities back to the fore. Specifically, we argue that in many cases individuals have no knowledge of rules separate from empirical regularities because their only access to the rule is to *infer* the rule from the observed empirical regularities. Further, we also point out that in many cases when individuals could theoretically have independent knowledge of a rule (and the mental model to give it application) they will lack the cognitive ability and/or the incentives to form expectations in this way and will simply use the past as an inexpensive substitute.

### 2.2.1 The Prominent Role of Empirical Regularities in the Conception as Institutions as Rules

Despite the emphasis that Knight and others place on distinguishing the rules conception from the empirical regularities conception, they ultimately cannot (and do not want or try to) avoid giving a prominent role to empirical regularities. To see this consider Jack Knight’s (1992) widely used definition of a social institution:<sup>6</sup>

*“First, an institution is a set of rules that structure social interaction in particular ways. Second, for a set of rules to be an institution, knowledge of the rules must be shared among the members of the community or society.”* (p. 2-3, italics in original)

A rule, in turn, is a “guide to future courses of action” (p. 67), the knowledge and applicability of which “is shared by the members of the relevant group or community” (p.68).

For rules to be useful guides to future action, they must reliably predict what others will do in a given situation and so create reliable expectations. In his words, “successful social institutions produce reliable expectations about the future behavior of others” (p. 75). It is in creating these reliable expectations that Knight sees past empirical regularities as important, suggesting that “If the proper

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<sup>6</sup> We are not concerned with Knight’s distributive theory of institutional creation and change, though that theory could certainly be explored empirically with our method. Instead, we focus only on his conceptual definition of a social institution.

connections can be made between the past empirical regularity and the present actors, then, all things being equal, reliability should be quite high.” (p. 81)

More specifically, he distinguishes between expectations concerning existing rules and new rules and suggests that “For an existing rule, the reliability should be enhanced if the assertion is consistent with the past pattern of behavior”. For new rules, however, past patterns of behavior may not be helpful and other factors (like whether it will be externally enforced) will determine expectations in a more rational framework (i.e., the individual will have to consider the rule, its enforcement mechanism, and any other relevant factors and predict the behavior that it will likely produce). However, Knight argues that if the rule persists and is to become part of a successful social institution it will ultimately produce a set of empirical regularities that cannot consistently be at odds with the predictions of such rational calculations if they are to contribute to reliable expectation formation. Indeed, a plausible reading of Knight’s argument is that if expectations formed from reliable empirical regularities were at odds with rational expectations based on projecting behavior from the rule, the empirically based expectations would ultimately be a better guide to behavior.<sup>7</sup> For example, Knight implies this conclusion in his discussion of how a promise of future behavior (a new rule) becomes a social institution. Specifically, he points to the example of collective bargaining in Sweden following the *Saltsjobads* agreement in 1938 and suggests that the agreement made “a set of assertions about future behavior that, *once they had been confirmed by consistent patterns of behavior*, became part of the informal institutional framework for subsequent rounds of negotiations.” (pp. 78-79, italics added).

We do not want to push this argument too far. Knight is clearly arguing that there is more going on in the way social institutions condition expectations than is implied by a simple reliance on past patterns. Our only point is that the argument does not simply exclude these patterns from the story but weaves them into a more subtle account in which expectations may be a mix between rational elements and inferences from past patterns of behavior – with the weight of each determined by the circumstances surrounding the particular rule under consideration.<sup>8</sup> However, this leaves empirical regularities, in our view, with enough explanatory weight in the argument to merit an empirical analysis that uses them as a proxy for rules (and the un-measurable mental models that animate them).

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<sup>7</sup> And so come to characterize the “real” institution in the view of scholars like Schotter; though Knight would be unlikely to go so far and, in any case, does not address the case directly.

<sup>8</sup> Indeed, we suspect that the popularity of Knight’s account may stem in part from the fact that he did not argue for a model of expectation formation that was strictly rational – excluding past patterns in favor models in which expectations are formed purely prospectively by gaming out how the rules should impact the rational behavior of others and what the optimal responses to this would be.

### 2.2.2 When Empirical Regularities may be More Important than Rules

Where we depart somewhat from Knight is in his insistence of the separate *a priori* nature of rules as compared to empirical regularities. We do not see these as so distinct. Specifically, Knight insists that for a set of rules to be a social institution, knowledge of these rules must be shared in a population. However, how do the members of that population come to know that a set of rules is shared widely? Do they do a survey? Do they ask each person they talk to which rules he or she follows? Our proposition is that for many of the rules that constitute social institutions, knowledge of the rule is never communicated directly to the relevant population, but instead the members *infer* the existence of the rule and the extent to which it is shared (so the extent to which it will be a reliable predictor of others expectations) when they observe the empirical regularities that they associate with the rule (or from which they conclude a rule must exist).

A good example of this kind of inference is our previous example of rules of behavior on public transportation. The seat surrendering norm was never written down or codified in any way. Instead, it could only exist as a “rule” in Knight’s sense if it could be *inferred* from the empirical observation of behavior (and was similarly inferred by most individuals in the relevant population). Thus the very existence of the rule depends on the empirical regularity. As in our previous discussion, the empirical regularity is central to the story, but in this case we think of it informing the inferred “rule”. Versions of all our other conclusions about stability and institutionalization follow from this. If, in a given community, some men do and some men do not surrender their seats (and some women take them and some do not) then one makes a corresponding inference about the strength of the norm (or the size of the correlation between the triggering event and specific behaviors). To the extent that over time the empirical regularities one observes are the same (the same percentage of seats get surrendered) the individual’s beliefs about the norm become hard to change and deviations (a day in which no one surrenders their seats) become identified as deviations to be discounted relative to the stock of knowledge behind the existing norm. If this hardening of expectations happens across many individuals, we can think of the norm as becoming institutionalized.

This, of course, is not to deny that formal rules exist. In our view, however, they do not in and of themselves create a social norm. So, for example, a formal rule can exist but be ignored and so never create the expectation of some specific behavior (never create a social institution). What creates that

expectation (and the fact that it is shared) is that the rule produces some set of empirical regularities from which individuals can infer back to the rule. In cases of very strong often externally enforced rules, this connection between the rule and the associated empirical regularities can be so tight that it is hard to think of them as separate – so, for example, an electoral rule that allocates votes to seats is essentially deterministic (and enforced by courts) so that the rule (say a PR rule) produces such a stable regularity (that the parties with a certain proportion of votes will get a certain proportion of seats) that is very reliable. The philosophical questions boil down to whether the rule is the social institution (Knight), the empirical regularity is the social institution (Schotter 1981) or the inference about the rule, based on the empirical regularity, is the social institution (closer to our view)? In the electoral rule example, the answer hardly matters since, due to the close connection between the rule and the empirical regularity, they all amount to the same thing.<sup>9</sup>

Finally, we can raise one more qualification to the “rules” conception. In Knight’s view rules are known *a priori* and so can shape expectations independent of the empirical regularities they create. This is plausible in a variety of situations when the population of interest can be expected to know the rule and have the necessary cognitive ability, mental models, and auxiliary information to apply it to form a (regularity free) expectation. So, for example, professional legislators and commentators can certainly apply a D’Hondt formula to come up with expectations about what the seat distribution will be for any particular distribution of the vote and this expectation is likely to be exactly shared by others armed with the rule. Our point is not that this is not possible, but only that in a large variety of situations the target population cannot be reasonably expected to know the formal rules that may produce the relevant empirical regularities and so the rules they infer may not match the formal rules exactly. So in this example, we would bet most people if asked to articulate the electoral rule would answer that it is a proportional – a statement about the empirical regularity, not an accurate statement of the formal rule.

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<sup>9</sup> Even here, however, there is some difference – so for example, if one is concerned about the social norm in the general population (more below about defining the population for which a social norm applies) then in our view the empirical regularities governing how votes get translated into seats would certainly allow an inference like the following “there is a social institution by which parties’ shares of seats are proportional to their share of the votes”. However, there is no information available to the population that would let them make a more subtle inference than that. So for example, they could never use the information about how votes are empirically correlated with seats to infer that “there is a social institution by which parties’ shares of seats will reflect D’Hondt allocation formula”.

Clearly, however, the extent to which one versus the other conception (*a priori* rules generate expectations, versus inferred rules generate expectations) depends critically on the target population one cares about.

### 2.3. Final Thoughts on the Relationship between Empirical Regularities and Social Intuitions

Thus, the critical distinction between using rules to form expectations and using the empirical regularities that flow from those rules is that in some cases, when the rule itself is known (not inferred from the empirical regularity) and the individual has a mental model capable of predicting optimal behavior given the rule, the extent of compliance to the rule, and the optimal behavior of everyone else, they may predict behavior that is different from the empirical regularities created by past applications of the rule. Thus, behavior in this case is being guided by the rule itself not the empirical regularities associated with past operation of the rule and so the social institution is rightly the rule not the regularity. Above, however, we have suggested three qualifications to this that lead us to think that in the vast majority of situations, an empirical focus on empirical regularities will be fruitful.

1. In many situations, the average member of the relevant population will infer the rule from the regularity, so the regularity must change before the inferred rule can change. Thus, changes in the empirical regularity will indicate changes in the rule (and the changes in the social institution regardless of whether it is defined as the rule or the regularity)

2. Even if the rule is accessible to the average member of the relevant population (independent of the associated empirical regularities), for many populations and situations, the average member will lack the cognitive ability and/or incentive to work out the behavioral predictions of the rule independent of the empirical regularities and so the empirical regularity will continue to define the rule (and the social institution) regardless of the theoretical accessibility of the rule itself. Thus, change in the empirical regularity will be required to induce change in the social institution.

3. Even if the qualifications above are not applicable, a rule that generates reliable expectations that are shared by the relevant population will necessarily generate associated reliable empirical regularities. Thus, consequential changes in the rules will generate corresponding changes in the relevant empirical regularities. Thus, we should be able to use these changes as reasonable proxies for the rule changes themselves.

Given the centrality of empirical regularities to the definition or functioning of social institutions, our empirical method for studying them focuses on tracking these empirical regularities. As we have emphasized, this necessarily involved measuring both the nature of these empirical regularities and how they change over time. Before describing the details of the method, however, we need to clarify the answers to three questions that we have not yet emphasized, but that are important to our method: (1) What are the kinds of “empirical regularities” define (or are otherwise associated with) social institutions? (2) What is the “relevant population” who must share expectations in a successful social institution? (3) How exactly are these expectations formed and how do they depend on past empirical regularities?

### 2.3.1. What kinds of “empirical regularities” define social institutions or do rules create?

When Schotter writes about social institutions being the “equilibrium standards of behavior or conventions of behavior” and says that we do not care about the rules of the game but what agents “do with the rules of the game” he is arguing for a definition of social institutions in which the institution consists of regular patterns in behavior or a *set of behavioral relationships*. That is, we infer that a social institution exists when we can reliably predict some behavior from our knowledge of the values of a set of situational variables or triggering events. Thus, we conclude that a social norm of giving up one’s seat on the bus exists when we can predict, upon observing a full bus, that the males on the bus will surrender their seats to the next female that enters the bus. Likewise, we conclude a seniority norm exists in a legislature when we observe that the relevant decision makers (perhaps legislators themselves or a leadership group) granting leadership positions to members in accordance with their length of service. Finally, the same logic applies (perhaps trivially and, because of that, less obviously) when we observe a distribution of seats for parties after the election and we can reliably predict the seat distributions of the parties in the legislature (that is the behavior of the relevant authorities allocating seats and enforcing that allocation). The point here is that when we seek to characterize the empirical regularities that either define or are closely associated with a social institution, then we are looking for behavioral relationships. Practically, what this means is that we do not actually observe a behavioral relationship – it must always be inferred (or estimated) from a correlation between the occurrence of some set of situational factors and some set of behaviors. Thus, recognizing empirical regularities, for individuals as much as researchers, requires that we collect data on relevant independent (situational) and dependent (behaviors) variables that can be used to estimate the strength of the empirical regularity and its reliability over time.

### 2.3.2. What is the relevant population?

Given that recognition of a behavioral regularity requires some inference by the average member of the relevant population; the question naturally arises, which population? This is a more subtle question than it may at first appear. To see why, consider the example of a seniority norm in a legislature. This social institution is clearly defined by (or at least strongly associated with) an empirical regularity between legislators' lengths of legislative service and their chance of obtaining leadership positions. However, the population of individuals whose beliefs about this institution matter depends on what we are studying. For example, in a study of legislative behavior, we care about how the behaviors of legislators are conditioned on their understanding of the seniority system; whereas, in a study of voting behavior we may care about voters understanding of this system. These need not be the same – despite the fact that the underlying system is the same. Specifically, the problem arises when we consider the issue of how a given observer – a legislator or a voter – will condition her beliefs about the empirical regularities on a set of “control variables”. For example, we might expect that any legislator will understand that a seniority norm only applies conditionally on whether a legislator is in the majority or minority party. The observers would expect to see seniority norms operating within but not across majority status and so we might assume that their estimate of the correlation between seniority and position (and its stability over time) is conditional on majority status.

In contrast, we might not think the average voter capable of making this distinction and, if that is true, the relevant empirical regularity conditioning voters' expectations is the unconditional correlation.<sup>10</sup> One way to think about this is simply that the relevant institution is really different in the two cases: in the first it is a “legislative seniority among party members” norm and in the second it is a “legislative seniority among the whole legislature” norm. The point is that in any study that depends on defining (and measuring) empirical regularities as a way to study institutions, one must think carefully about the population that is relevant to the question one is studying and define the institution (or conditioning variables) appropriately.<sup>11</sup>

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<sup>10</sup> We actually think voters can make this specific distinction, but the point here is that different populations may make different distinctions about what kinds of conditioning variables are relevant.

<sup>11</sup> This focus on the population of interest also emphasizes that fact that the population whose inference about the nature and strength of a social institution is relevant for a given study need not be the population whose behaviors generate that relationship.

### 2.3.3. How are expectations formed?

The question of how individuals form expectations is, at one level, central to the debate between institutions as empirical regularities or rules, and has, at another level, been ignored by both sides. At a high level of abstraction the “rules” camp argues that expectations are sometimes formed rationally from information about the rules and the optimal behavior implied by them, while the empirical regularities camp clearly suggests that expectations are formed directly from observation of the empirical regularities themselves. This is fine as far as it goes; however, as a practical matter, it stops far short of telling us – in either case – how we should translate a measured set of empirical regularities into an inference about individuals’ beliefs about expected behavior (i.e., about those regularities). On one hand the studies that equate beliefs with the empirical regularity do not tell us how individuals update their beliefs as they receive new information. That is, if the empirical regularity is not stable – one observes, for example, a general decline over time in the reliability with which men give up their bus seats to women; does one adopt the view of the regularity consistent with the latest observation? the average of the last few? the average of all of them you have ever observed?

In the empirical method we adopt below, we simply assume that when individuals observe new information relevant to an empirical regularity, they update their beliefs about the empirical regularity via Bayes’ Rule. We recognize, however, that there is a large, relevant, literature on how individuals make just such inferences that suggest many alternatives to simple Bayesian updating and point out that there is no reason, in principal, such alternatives could not be incorporated into the general empirical strategy we advocate here.

### **3. AN EMPIRICAL STRATEGY FOR MEASURING INSTITUTIONAL CHANGE AND INSTITUTIONALIZATION OVER TIME**

We begin from the assumption that a researcher is interested in empirically characterizing institutional change for a theoretical reason – that is, he or she want to use the institution as a dependent or independent variable (or both) in some social explanation. So, for example, we may be interested in explaining how the institutions and norms governing the process of coalition formation in parliamentary democracies impact which coalitions form (e.g., Laver and Strom 1990, Stevenson 2008). Alternatively, we might be interested in explaining how and why different countries adopted different rules governing the process of coalition formation and how these have evolved over time. Thus, our

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method asks the researcher to think about the population whose expectations are relevant to the question being asked and to identify the set of behavioral relationships that constitute the relevant empirical regularities that define (or are associated with) the social institution of interest. Having done this, one must then operationalize the components of those behavioral relationships into measurable variables and collect the relevant data on them over time. With data in hand we then show how one can use simple Bayesian statistical methods to mimic the process by which individuals should update their beliefs about the nature of the institutions as they receive new data over time.

Bayesian estimation methods which are well described in a number of accessible texts (e.g., Gill 2007), were introduced to political scientists by Simon Jackman (2000) and others, and are now in widespread use in the discipline. For our purposes, the main use of these methods is that they allow one to characterize how, when confronted with data relevant to some correlation between variables, one should update one's prior beliefs about the correlation after having seen the data (i.e., how to produce a "posterior distribution"). The critical idea is that given some observed data on Y and X (where these are measures of the concepts in the behavioral relationship under concern), and a set of "prior beliefs" about the size and direction of the correlation (summarized by a probability distribution defined over the range of the correlation), then one can use Bayes' rule to define the "posterior" distribution of the correlation, after having seen the data on Y and X. Further, when one observes additional data (say from the next year) then one can update the posterior by applying Bayes' rule again, this time using the previous posterior distribution of the correlation as the new prior distribution for it. In what follows, we summarize the posterior distribution by its mean and so we are interested in how the mean of this posterior distribution moves over time. The pattern of such movements will, we argue below, reveal much about the extent and kind of institutionalization that is indicated by the data. Before looking at the types of patterns we expect, however, it will be helpful to briefly review the whole methodological strategy we are advocating:

The method that we propose has the following steps:

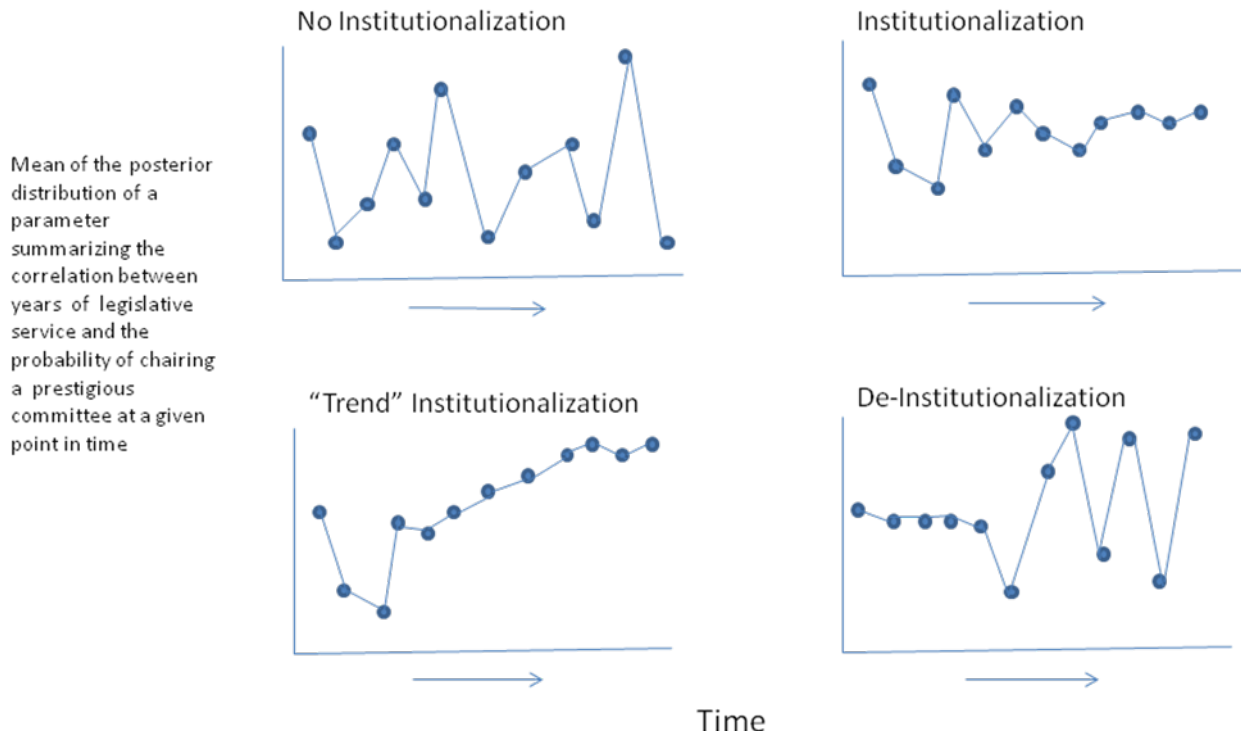
1. Define (relative to the theory in which one is using an institutional concept) the population whose beliefs are relevant to defining the institution (e.g., in a theory about how seniority systems impact voting behavior the relevant population is voters; and in a theory about how seniority systems impact legislative behavior the relevant population is legislators; in a theory explaining why seniority systems change, the relevant population could be either).

2. Identify a set of behavioral relationships that are “associated” with the institution of interest (e.g., the largest party becomes the PM and partners are ideologically close to the PM; seats are distributed proportionally to votes, men surrender their seats on the bus to women when the bus is full, members of the legislature are more likely to obtain leadership positions the longer they serve).
3. Collect data over time on the variables that define these behavioral relationships and that are theoretically observable by the relevant population (e.g., party sizes and ideologies and coalition membership; votes and seats; instances of women entering a full bus and men giving up or not giving up a seat; tenure and leadership positions of legislatures).
4. Collect data on any other variables that the relevant population may use to condition the behavioral relationship in question (e.g., legislators may well condition their assessment of the strength of the behavioral relationship between experience and leadership positions on majority status; voters may not condition their beliefs on this, but this is a call the researcher makes).
5. Choose a probability distribution that represents the beliefs of the relevant population about the strength of the behavioral relationships associated with the institution at the start of the observation period (the period for which one has data).
6. Estimate the posterior distribution of beliefs about the strength of the behavioral relationships associated with the institution given the first period of data, controlling for any relevant conditioning variables. If we assume the relevant population updates their beliefs via Bayes’ Rule, this represents the strength of the behavioral relationships as updated by observable data.
7. Repeat step 6 for each period of data using the posterior distribution from the previous period as the prior distribution in the current period and updating it with the new data.

The results from this will be a set of estimates of the direction and stability of the behavioral relationships associated with the institution. This is illustrated for hypothetical cases in Figure 1. In this figure we illustrate some of the patterns our method can reveal in how empirical regularities change over time and relate them to the notions of institutionalization that we have discussed above. The dots in the figures are hypothetical correlations between years of legislative service and the probability of chairing a prestigious legislative committee. Thus, they are meant to illustrate the way seniority norms might develop over time.

Figure 1

### Hypothetical Patterns of Institutional Change and Institutionalization over time



The upper-left panel is the pattern we would expect to see when a given social institution has failed to develop. In this case, the correlations from year to year are a “random walk” with the past providing no guide to future behavior. Substantively, a picture like this would mean that from session to session in a legislature, seniority sometimes predicts leadership positions and sometimes not, with relevant actors not able to predict which it will be in the current situation (at least based on the past). In contrast, the upper-right panel illustrates a clear case of institutionalization occurring. In this case, the relevant empirical regularity - the correlation between legislative service and position – starts unpredictable but then settles onto a stable, predictable level. The bottom-left panel is also, in our view, a case of institutionalization, even though the pattern of correlations over time does not reach a stable level. Instead, the trend is stable (or to put it differently the change in the correlation is stable). In light of our conceptual discussion above, this is all that is required for individuals to use the institution as a guide to future behavior – they simply predict that seniority will continue to be a stronger predictor of position from year to year. Finally, the last pattern is that of de-institutionalization, in which a stable pattern devolves into a random walk. Our picture has this happen suddenly – illustrating a case in which,

for example, there is a change in an underlying rule (like imposing term limits) that disrupts the empirical regularity dramatically – but it could also happen gradually.

#### **4. LEGISLATIVE INSTITUTIONALIZATION: A QUICK OVERVIEW OF THE LITERATURE**

Before proceeding to our empirical tests, we will take a short digression into the research on legislative institutionalization. Over the years, institutionalization has been a significant concept in the study of legislatures. In fact, “It has become conventional wisdom to discuss institutionalization as one of the fundamental characteristics of a legislature, ... as another arrow to the quiver of institutional analysis” (Peters, 1999: 85). We will not recount the development of the concept in depth here but refer the reader to Hedlund’s 2006 piece for a comprehensive review. Instead, we wish to make the following points. One early discussion of an institutionalized legislature was Nelson Polsby’s influential and acclaimed formulation of indicators to describe the emergence of institutionalization in the U.S. House of Representatives (1968). He explored three sets of indicators for an institutionalized legislative organization: (1) having well defined boundaries that differentiate its members so that the organization is recognizable and “autonomous”; (2) being relatively complex in its internal organization so that there are recognized features like a division of labor, shared expectations, regularized recruitment of people and movement of people within the organization; and (3) using universalistic (as opposed to particularistic), and automatic (as opposed to discretionary) methods in the internal conduct of business. In a major analysis of the U.S. House, Polsby detailed its evolution over almost two centuries illustrating how one governmental organization had become institutionalized, but was susceptible to change including the possible erosion of institutionalization.

The impact of Polsby’s work is seen in two quite different ways. First, quantitative as well as qualitative studies for both U.S. and other political systems used legislative institutionalization as a key organizing scheme and guide for identifying defining indicators. Prominent examples of this work include:

- a comparison of institutionalization levels across the lower legislative chambers of two U.S. states, Montana and Wisconsin (Chaffey, 1970);
- a comparative description of the processes and conditions associated with the institutionalization of fifteen European parliaments (Gerlich, 1973);
- the relationship between institutionalization of parliaments and legislatures on the level of attitudinal support for the political system using four different political systems (Lowenberg, 1973);

- the evolution of the Italian Parliament as the primary center for decision making due to institutionalization (Leonardi, Nanetti, & Pasquino, 1978);
- the growth of institutionalization in Portugal's Parliament (Opello, 1986);
- the use of institutionalization to explain change and evolution in the British House of Commons (Hibbing, 1988);
- the consequences of competing approaches to legislative institutionalization among Chinese local people's congresses (O'Brien & Luehrmann, 1998);
- the effects of member careers on developing an institutionalized Brazilian Congress (Santos, 1999); and
- the appearance of institutionalization in the Czech and Slovak parliaments (Kopecky, 2001)

Second, Polsby's work provided a concept and framework that could be used to structure as well as systematize the across-time development and evolution of parliamentary and legislative organizational characteristics. The great majority of this research has been carefully formulated "case studies" involving non-U.S. parliaments and legislatures first in the work of Alan Kornberg and his associates (1973) and later in a series of books and special issues of the *Journal of Legislative Studies* under the leadership of Philip Norton and others (Norton, 1996; Olson & Norton, 1996; Norton, 1998c; Longley & Davidson, 1998; and Ahmed & Norton, 1999). The application of institutionalization as an organizing principle to understand parliamentary evolution and change was natural given the integral use of institutions made in cross-national studies. As Apter stated, "Institutionalism constitutes the bedrock of comparative politics. It remains foundational." (1996) Some examples of this work using parliaments and legislatures include:

- an effort to structure analyses of several cross-national parliaments and legislatures using institutionalization (Kornberg, 1973)
- a basic text on American legislative process used institutionalization and its dimensions to illustrate and explain the development of U.S. legislatures across two centuries (Jewell and Patterson, 1977);
- an anthology describing the evolution of twelve parliamentary systems used institutionalization as the organizing approach (Copeland & Patterson, 1994);
- descriptions of institutionalization in ten emerging Central and Eastern European Parliaments (Olson & Norton, 1996);
- an assessment of institutional changes in ten national European parliaments as a result of the European Union (Norton, 1996a)
- a series of original research works describing how parliaments have evolved institutionally to constrain governments in Western Europe (Norton, 1998c)

- the emergence of strong committees as an institutional feature in both national parliaments and legislative bodies (Longley & Davidson, 1998)
- an analysis of seven Asian parliaments regarding the development of institutionalization (Ahmed & Norton, 1999);
- an anthology forecasting directions in sub-national U.S. governments for the 21<sup>st</sup> Century included a chapter that traced the development of legislative institutionalization and depicted future trends as being based on the reduced level of legislative institutionalization (Brace & Ward, 1999); and
- an analysis regarding how the institutional design of three legislatures—the Russian Supreme Soviet, the Russian Duma and the Estonian Riigikogu—accounted for their differences in being able to manage conflict (Ostrow, 2000).

At the same time, other literature has raised questions about the conceptualization (Cooper and Brady, 1981); the measurement and specification used for institutionalization (Mishler & Hildreth, 1984; and Rosenthal 1996); the degree to which it is an adequate “process theory” (Judge, 2003); and the inevitability of institutionalization in the evolution of legislatures (Loewenberg & Patterson, 1979; Copeland & Patterson 1994; and Longley, 1996). Institutionalization has not been very amenable to measurement with simple, quantitative indicators that can be applied across political systems; rather, it provides a very useful framework for examining legislative change and evolution. (Rosenthal, 1996) As a result, institutionalization has been more frequently used as a means for identifying and organizing the characteristics of a parliament or legislature for explanation rather than a device to measure the nature of that parliamentary/legislative organization. Also important is the notion that institutions change constantly so that “history does not end with ‘institutionalization’.” (Longley, 1996: 24) Rather, “. . . parliamentary institutionalization [is not] a unidirectional and finite process ultimately leading to parliamentary rigidity.” (Longley, 1996: 23) Parliaments and legislatures continue to change even after achieving a high level of institutionalization so that organizational “rigor mortis” does not set in. (See also Copeland and Patterson, 1994: viii)

Recently, David Judge (2003) in a review piece argued that the conceptualization specification and measurement have been insufficient when it come to the study of legislatures. We agree with this assessment. We also believe that the procedure outlined in this manuscript will advance our understanding of the development of, “how the organization’s structures and procedures establish stable relationships and a unique identity among its units and staffs” (quoted in Judge, 2003: 516 from Ragsdale and Thesis, 1997: 1284.), or the process of internal institutionalization.

It is also useful at this point to mention the relationship, if any, between professionalization and institutionalization. The concept of professionalization can be traced back to Hugh Douglas Price (1975) with an elaboration by Polsby (1975). In explaining this “professionalization” process, Price described the transformation both in terms of individual legislators as well as the institutions themselves.<sup>12</sup> Obviously, there was substantial compatibility between the notions of institutionalization and professionalization, but differences were hypothesized to exist. Peverill Squire explored this difference through an examination of the California State Assembly and Congress.

“I argue that Professionalization and Institutionalization are distinct but linked concepts and that each is driven by the main career goals of the membership. Thus, it is likely that professionalization will lead to institutionalization, at least along some dimensions.” (Emphasis added, Squire, 1992b: 1027)<sup>13</sup>

In his work, Squire accepted Polsby’s definition and description of the nature of a transformed U.S. Congress as the essence of an institutionalized/professionalized legislature. Based on an impressive data collection and analysis regarding the California Assembly to create a comparison with Polsby’s formulation of the institutionalized U.S. House, Squire concluded:

First, professionalization and institutionalization are not the same thing.<sup>14</sup> . . . nly in those areas professionalization is intended to yield direct results, like staffing, pay and session length can it be suggested that it necessarily leads to institutionalization, or, perhaps more correctly, that they occur simultaneously. But again, the argument I have advanced is not that one is sufficient to lead to the other but that members of professionalized legislatures are likely to want to make the sorts of changes resulting in institutionalization.

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<sup>12</sup> Individual factors such as membership turnover and stability, member’s time commitment (part-versus full-time) and legislative service becoming a “career” were the differentiating factors for a professionalized legislature. Similarly, organizational structure and process factors like a reduced influence disparity among members, enhanced capability *vis-à-vis* the executive, greater autonomy from outside influence, and strengthened legislative committees were identified with professionalization. As a consequence, professionalized legislative organizations had greater capacity for independently implementing its policy making role.

<sup>13</sup> Squire continued, noting that a professionalized legislature has “. . . higher member remuneration levels, staff support and facilities, and service time demands. Legislatures deemed professional are those which meet in unlimited sessions, pay their members well and provide superior staff resources and facilities. Essentially, such a body offers potential and current members incentives sufficient to consider service as a career.” (1992b: 1028) As parliaments and legislative bodies professionalize, the members tend to re-shape the organization structurally and procedurally and with regard to relationships with other governmental components, thereby becoming more self-sufficient, assertive and powerful in policy making.

<sup>14</sup> On some scores, such as the formalization of the leadership posts and increased speakership tenures, the Assembly was already institutionalizing well before it became professionalized. On some other standards, particularly those involving boundedness, professionalization produced few, if any, changes in the trends favorable or unfavorable for institutionalization.

Second, the Assembly's lapse in not valuing seniority should not be taken as evidence of noninstitutionalization. (1992b: 1046)

Thus, empirical evidence was provided by Squire demonstrating that the professionalization of U.S. state legislatures can be differentiated from institutionalization and that a different set of indicators further differentiates professionalization from institutionalization.

## **5. CONTRASTING OUR METHOD TO CURRENT METHODS FOR TRACKING INSTITUTIONAL CHANGE AND INSTITUTIONALIZATION**

There are three current empirical approaches to measuring components of legislative institutionalization. In terms of internal institutionalization, one approach is to use written rules and see how they change over time. John Hibbing's analysis of the development of universalistic rules in the British House of Commons focuses on the evolution of a very elaborate set of "rules of the game" regarding Question Time (1988: 706). Amed in his recent (1998) study of the institutionalization of the Parliament in Bangladesh focuses on the various rules that guide behavior. Of course the recurrent criticism of this approach is that it captures only formal rule changes and not the informal changes that may have been more consequential.

A second approach to internal institutionalization is to utilize one-time surveys of legislators. Topics include criteria perceived as used in chairmanship appointments and influence of committee chairmen( Chaffey, 1970), distribution of functions and level of efficiency of institutions in Moldova and Romania (Crowther and Roper, 1998) While the data collected in this manner are informative for one-shot case-studies, they are not really be useful in the study of institutionalization unless an over time component is added.

In other cases, measuring formal rules is not an option – so for example, bargaining protocols are not observable, so an attempt is made to estimate a set of underlying empirical regularities associated with the institution from data collected over time. Polsby's work on the establishment of boundaries over time in the U.S. Congress is a classic example of this approach. Polsby collects data from the first to the 89<sup>th</sup> congress in terms of percentage of first term members, the number of terms served by members, and the number of years served in Congress before first selection as speaker. John Hibbing (1988) follows a similar formula for the British House of Commons. These analyses do not use any type of statistical tests, rather they simply permit the reader to eye-ball the data in tabular or chart form in order to see relevant trends. Squire (1992b) provides the most complex analysis to date using an



interrupted time series analysis to establish the degree of institutionalization in terms of boundaries and universalistic criteria in the California Assembly.

Partly in response to these empirical approaches to studying the dynamics of institutions and institutional change, historical institutionalists have advocated a more historical and narrative style of analysis that seeks to use in-depth case studies to track both formal and informal institutions as they change over time. While this is clearly the best possible strategy for a given case since it is most likely to uncover all the relevant information, it is practically difficult to apply to a large number of cases, is subject to the researchers' interpretations, and is hard to reproduce.

We offer an alternative empirical procedure that we think can complement the work of historical institutionalist and can be a valuable tool they can use to identify in historical data on any case, the critical historical junctures in which institutions and their effects change and so that require a more careful examination. Further, and more importantly, they can use our method to identify institutional change that applies across cases, or to test the insights developed for one case on others.

## **6. APPLICATION TO SENIORITY SYSTEMS IN THE U.S. STATES**

To get an idea of how our conception of institutionalization works, we examine the committee assignment process during the last two sessions of each decade during the 20<sup>th</sup> century using data collected by two of the co-authors (Hamm and Hedlund).<sup>15</sup> The larger study contains total of 441,840 committee positions (legislators having a seat on a standing committee for a two year session) on 40,936 committees in the house and senate in 35 states-- Arizona, California, Colorado, Connecticut, Delaware, Georgia, Iowa, Idaho, Illinois, Indiana, Kansas, Maine, Maryland, Massachusetts Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, North Carolina, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin and Wyoming. In this paper we focus only on committee chairs in a sample of the states in order to highlight the various patterns.

In previous work (Hamm, Hedlund and Vonnahme, 2008), we have developed a seven point scale of key committees: 0= local delegation (e.g. Los Angeles county); 1=minor administration committees (e.g., third reading committee); 2= member perks (e.g., mileage, office space); 3= minor

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<sup>15</sup> The specific years analyzed are 1907/1908 & 1909/1910, 1917/1918 & 1919/1920, 1927/1928 & 1929/1930, 1937/1938 & 1939/1940, 1947/1948 & 1949/1950, 1957/1958 & 1959/1960, 1967/1968 & 1969/1970, 1977/1978 & 1979/1980, 1987/1988 & 1989/1990 and 1997/1998 & 1999/2000.

substantive committees; 4= general policy; 5= constitutional affairs and reapportionment/redistricting; and 6=money (e.g. appropriations or control (e.g., rules) committees. We focus on whether legislators were a chair of any committee, and /or chair of a key committee (i.e, chair of a # 5 or a #6 committee).

We demonstrate the variety of institutional patterns and the possible uses of the technique in the following figures. Again, let us emphasize that we are not simply reporting the relationship between two variables at any point in time. Rather, we are estimating the posterior distribution of beliefs about the strength of the relationship between receiving a committee chair position and the length of chamber seniority given the strength of the relationship in prior periods, controlling for any relevant conditioning variable (in this case political party). We also assume that legislators update their beliefs via Bayes' Rule and that this represents the strength of the behavioral relationships as updated by observable data.

In Figure 2 we present data for four chambers indicating different patterns of institutionalization in assigning committee chairs by chamber seniority. The case of the South Carolina House seems to fit the normal conception of institutionalization, albeit at a fairly low level. The Pennsylvania House demonstrates an upwardly moving coefficient over time, at least until the late 1990s. The case of the Indiana House demonstrates a more complex pattern with a trend institutionalization in the early years, followed a fairly strong level of institutionalization for a few decades and then a trend institutionalization over the rest of the century. The case of the California Assembly in Figure 2 might strike some as being a non-pattern given that the relationship is roughly zero for the last 50 years of the 20<sup>th</sup> century. However, this case nicely fits our argument that members know with almost certainty that there is no relationship between the two variables.

The Bayesian technique can also be useful when looking at patterns for different variables over time in the same chamber. We use the Connecticut House and Senate as two examples. In Figure 3, we see two different patterns in the Connecticut House. In terms of being a committee chair, there is a trend institutionalization over time, while for the top committee chair the pattern is one of institutionalization, albeit at a low level, for the past 70 years. The relationships for the two dependent variables are much more similar in the Connecticut Senate (see Figure 4).

Aside from pure description, what would be the value of this type of analysis? First, let us consider whether we can see any effects of major structural changes in the legislative institutions. One possibility would be to trace out the impact of professionalization on seniority systems as Squire did in his famous

piece on the California Assembly (1988). Another possibility would be to examine the effects of major structural changes that occur over a short period of time. The impact of the reapportionment revolution in the United States, chronicled so thoroughly by Ansolabehre and Snyder in their recent book (2008), provides us one possibility. We use this as simply a guide to future research, not as a statement of any empirically substantiated argument. We select one state to show the possible effects. In the Missouri House and Senate, the patterns are the same in that there is a period of relative institutionalization emerging for several decades preceding the reapportionment decision, followed by a trend institutionalization (downward), although the strength of the decline varies across the two chambers (see Figure 5). Given the prevalence of this pattern in several of the figures not shown here, we want to pursue the idea that the reapportionment changes wrought by the U.S. Supreme Court decision of one-person, one-vote may have had a significant effect on level of institutionalization. But this analysis will have to wait for a later day when we can sort out the impact of other contending explanations (e.g., reform movement).

Another possibility is to use the results from the Bayesian analysis as independent variables. For example, we may want to investigate whether seniority systems impact the size of the incumbency advantage. We know from previous studies at the state legislative level that

The reelection hypothesis as formulated by Masters (1961) is disconfirmed emphatically by this analysis. It appears that election margins may have no significant effect on committee assignment success at all or else that wide margins of electoral victory may enhance a member's chances of getting desired committee assignments. Indeed, legislative leaders, when making committee appointments, may pay more attention to satisfying the requests of members elected by wide margins than by narrow margins. The leaders' motivation may be to confer a reward upon legislators winning by substantial margins, rather than seeking to assist in the reelection efforts of members from marginal districts. Such recognition of safe-seat members should not be surprising, inasmuch as these members are more likely to be reelected and provide membership for the majority party coalition in the house. Furthermore, some committees in these bodies—appropriations or finance committees—are reserved for incumbent legislators who are frequently products of more one-sided election outcomes. (Hedlund and Patterson, 1992: 553).

We may now want to extend the analysis and reverse the arrows and see whether the acquisition of committee positions, particularly committee chairs of key committees, translates into a robust incumbency advantage over time. We do not have the necessary data to undertake such analysis at this time, but suggest that it is one of the possible ways that the technique may be used.

## **7. CONCLUSION**

In this paper, we proposed an empirical method for exploring institutional change and institutionalization and applied our method to the study of seniority systems in U.S. state legislatures as they have developed over the last century. The method draws on existing work on the logic and nature of institutions (e.g., Knight 1992, Eggertsson 1990, Elster 1989), results from Bayesian statistics (and the more recent studies incorporating these insights into mainstream political science, e.g., Jackman 2000), and the large literature in comparative politics on historical institutionalism (e.g., Steinmo, Thelen, and Longstreth 1992.). We show that blending these three very disparate traditions in political science leads not just to a better understanding of the way our theories tend to use institutional concepts, but also a useful empirical strategy for quantifying their essential features and how these change over time. In this paper, we apply the technique to study the institutionalization of seniority systems in the legislatures of the American States from 1907 to 1999. Our findings suggest some ways that the approach may prove useful in future research.

Figure 2: Examples of Different Patterns of Relationships Between Committee Chairs and Seniority Using a Bayesian Technique

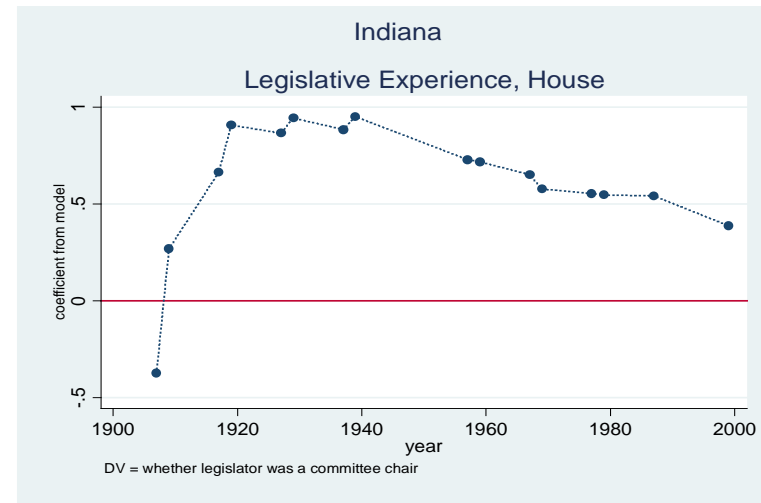
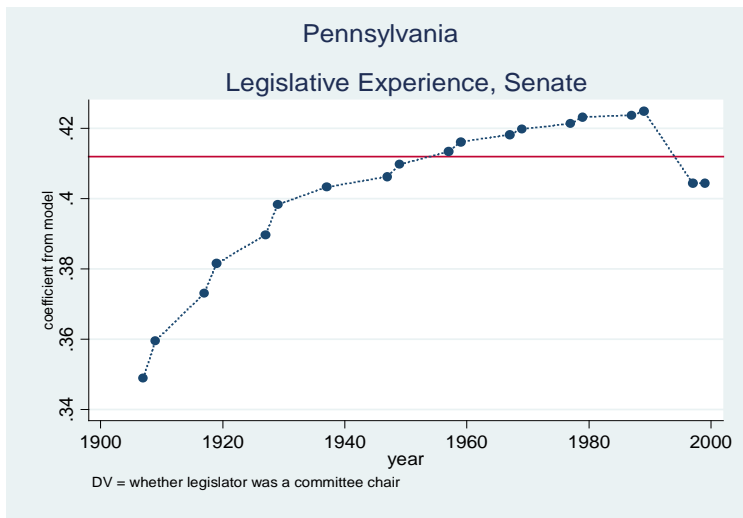
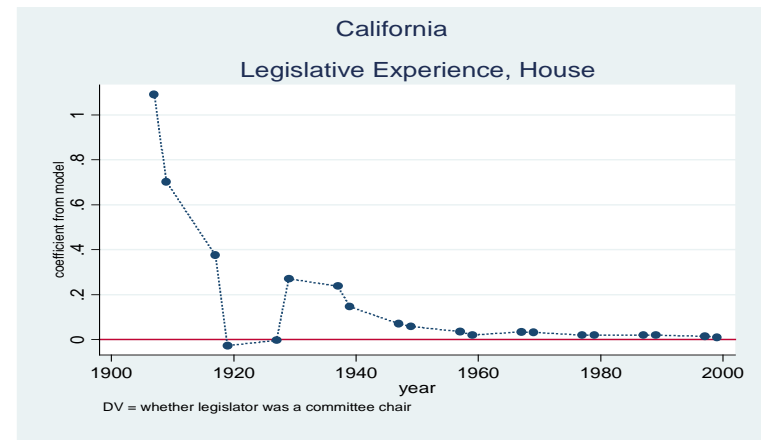
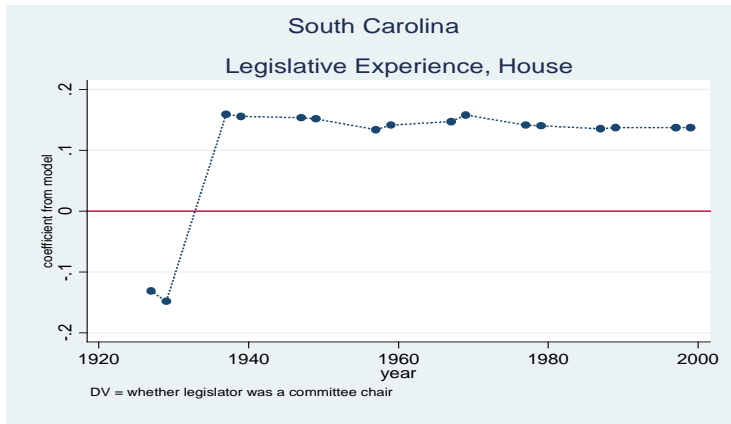


Figure 3: Relationship Between Being a Committee Chair, Key Committee Chair and Chamber Seniority in Connecticut House

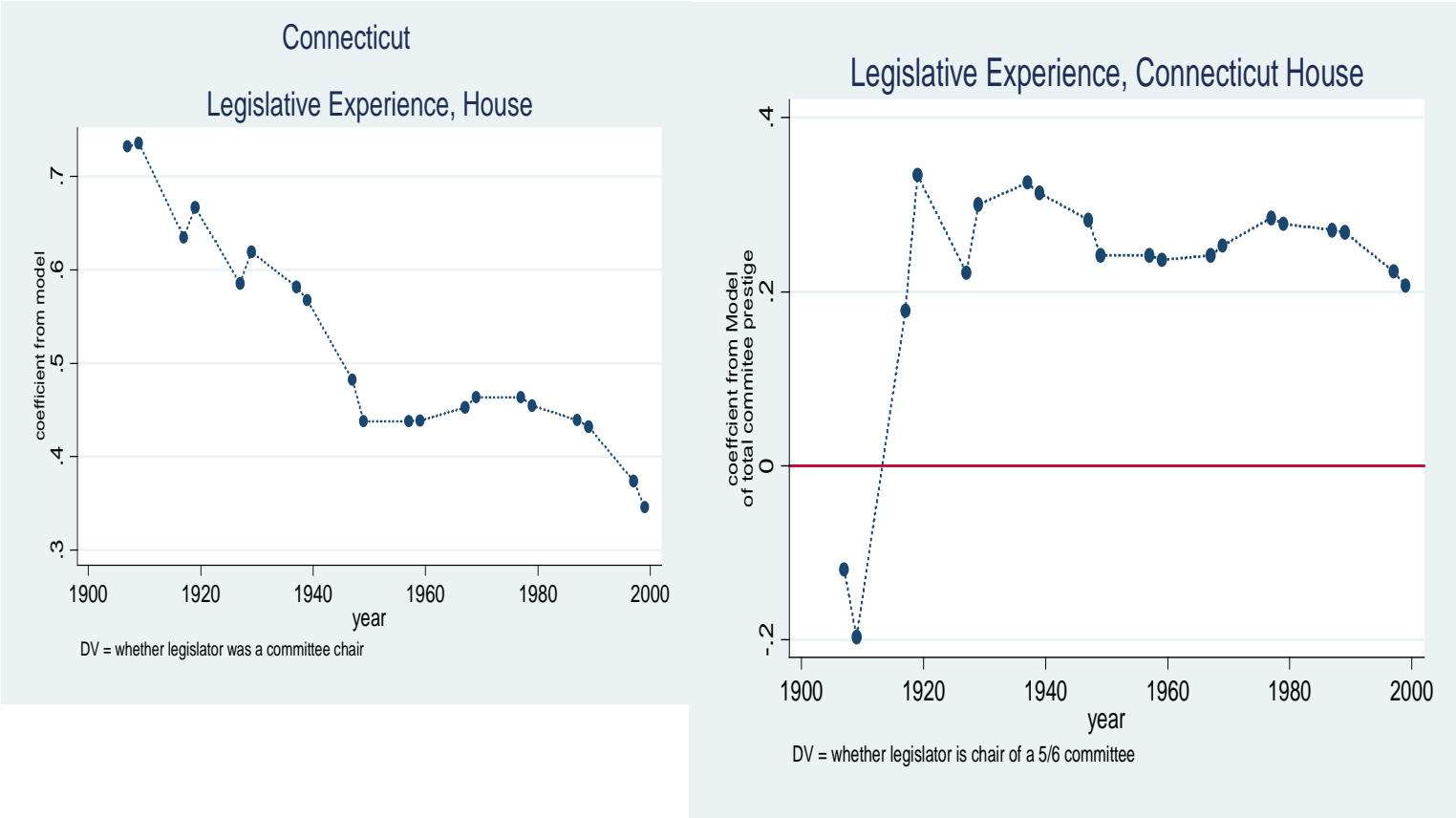


Figure 4: Relationship Between Being a Committee Chair, Key Committee Chair and Chamber Seniority in Connecticut Senate

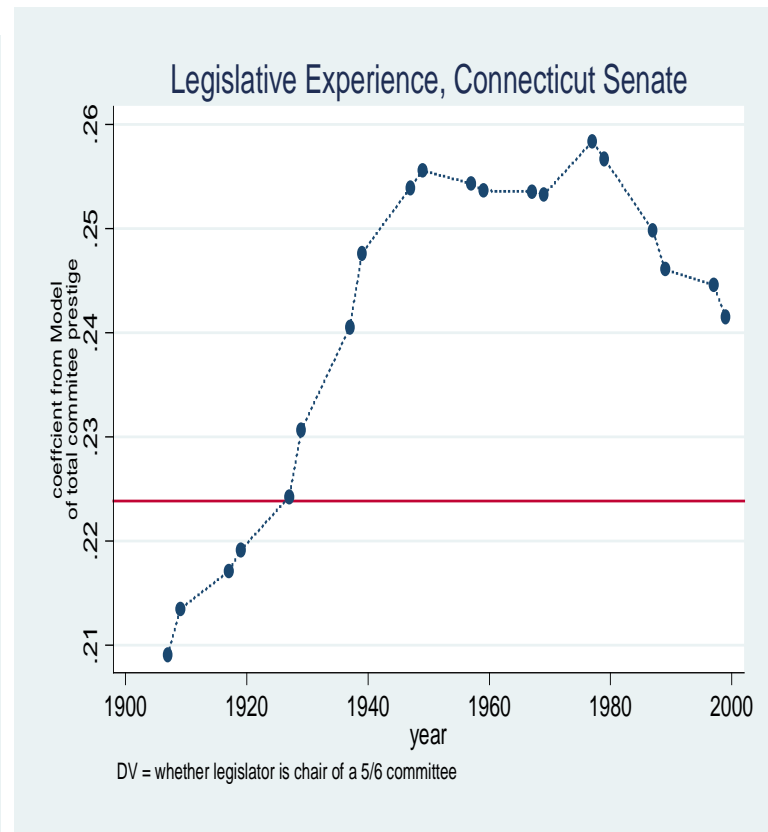
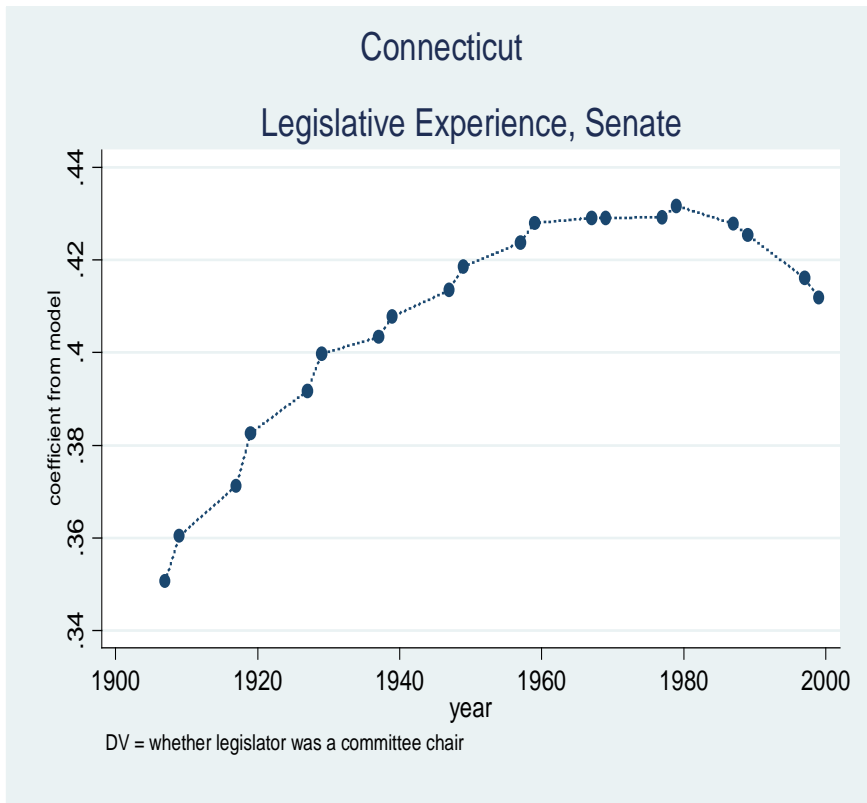
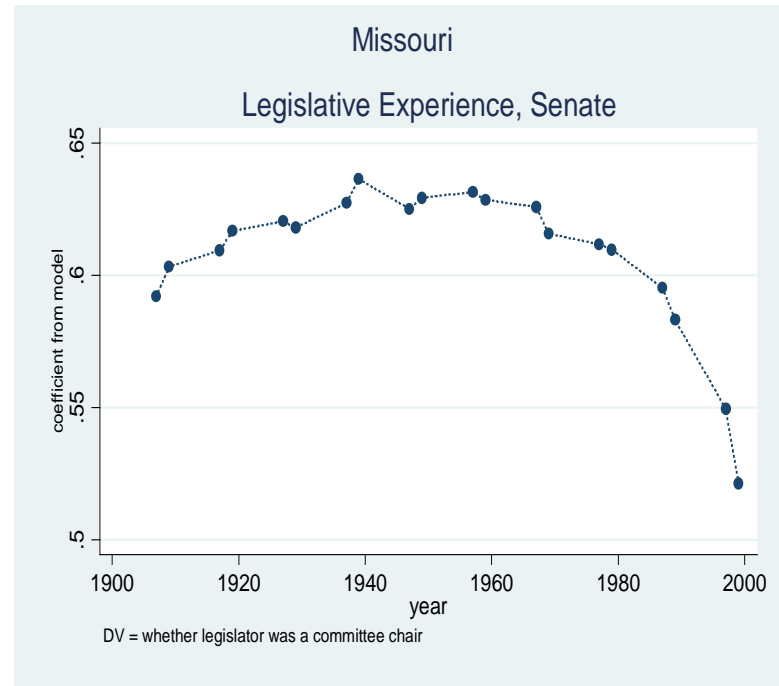
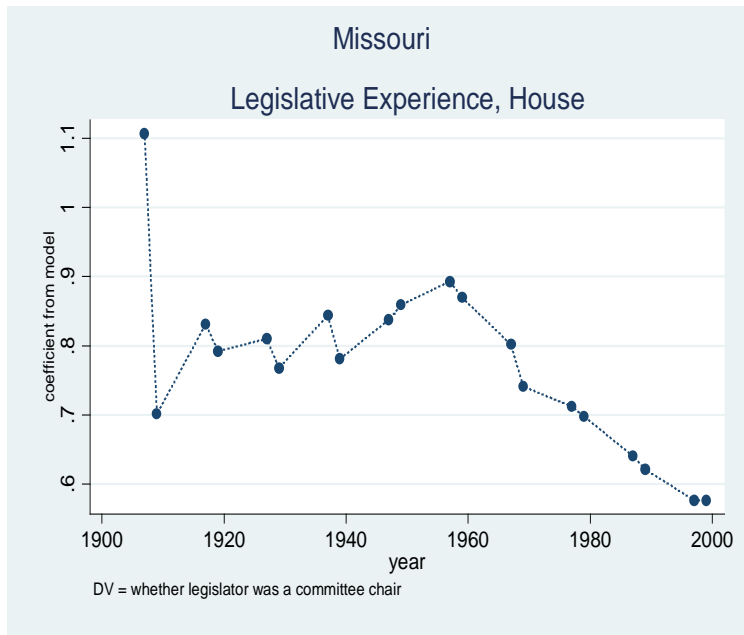


Figure 5: Possible Impacts of Reapportionment on Assigning Committee Chairs Using Chamber Seniority





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