

How Many Laws does the Legislature Make?
Cross Country Comparison and Cointegrated Time Series of Japan

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Abstract

The number of laws a legislature makes in a given year reflects the broadness or narrowness of the area in which it updates current policy during that period. The legislature decides on this so as to maximize the chair's utility. Those variables, therefore, that increase benefit or decrease cost add to the annual number of laws; socio-economic change, political change, the strength of the governing parties, and legislative resources are expected to influence legislative productivity. In this paper, these hypotheses are tested in two ways. The first approach compares 45 countries. The second deals with the longitudinal data of Japanese lawmaking from 1961 to 1994. In terms of statistics, it is necessary to tackle the problem of spurious regressions because these time series data are unit root processes. Engle Granger methodology solves it and confirms the theory. The results show that political factors, not socio-economic ones, determine the number of laws.

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Introduction

Political systems transform input (demand) into output (policy) (Easton 1957). The most important output is legislative, i.e., laws. As long as a political system, especially the legislature, responds to input from the external environment and supplies appropriate legislative output, it is effective and stable enough to survive for a long time. Otherwise, its governability would be questionable. Therefore, in order to ascertain how well a political system functions, it is meaningful to consider what decides legislative output. This is the question to be addressed here. This paper focuses on the quantity of legislative output, not the quality (e.g., how well new policies represent public opinion or solve the problem).¹

A political system, however, cannot convert all input into output. The government may not submit enough bills. The legislature may fail to reach a conclusion. In other words, the internal structure of the political system also matters for legislative output. Hence, the more demand a political system receives, or the more efficient it is, the more legislative output it produces.

This macro-level hypothesis may sound obvious. Although the mechanism of legislative output has been poorly studied in the literature, several scholars have actually pointed out that socio-economic indexes such as population, urbanization, industrialization, unemployment, social inequality, and economic growth (Mulligan

¹ Huber and Shipan argue that the length of each law decides the degree to which the parliament limits the executive's discretion (Huber and Shipan 2002).

and Shleifer 2004; Rosenthal and Forth 1978; Tanabe 1995) or political factors like the seat share of governing parties (or divided governments), agenda control, the number of veto players, the duration of the government, ideological change or diversity of the government, and electoral year (Binder 2003; Doering 1995; Mayhew 1991; Tsebelis 2002) affect legislative output level.

These arguments, however, are to some extent flawed. First, no micro-foundation has been shown to account for why each legislator responds to social demand or how a political situation shapes their incentives. Since it is the legislature, rather than the government, that finally decides legislative output, this is where attention should be focused. Furthermore, the legislature is not a unitary actor, but a diverse assembly. Therefore, it is necessary to show how the socio-economic or political situation affects each legislator's utility, how their various preferences are aggregated, and how this calculation leads to the level of legislative output.

Second, although scholars use the annual number of (important) laws as an indicator of legislative output, they do not explain exactly what aspect of legislative output the number of laws stands for. I would like to emphasize that laws represent policy change, and their number represents the breadth of change, not the magnitude of change as scholars have argued.

Taking these problems seriously, this paper constructs a theory that specifies what factors increase or decrease legislative output. Though a majority of the legislature determines the policy position of a law, the chair, or the agenda setter, controls the order in which bills are put on the agenda. He then sets the legislative

output level so as to maximize his own utility. Socio-economic and political changes increase benefit, while the strength of the governing parties and legislative resources decrease cost. My hypothesis, therefore, predicts that these four factors increase legislative output.

To test the hypothesis, two sets of data and two kinds of methods are employed. One analysis is cross-section regression of countries all over the world; the other is time series analysis of Japanese data. These two routes reach the same conclusion: political factors, not socio economic ones, actually affect legislative output.

In addition, I intend to contribute to political methodology. In political science, time series data are often analyzed, though proper methods developed in econometrics are not always employed. Further, most attention has been paid to approval, though other serial data remain to be studied. So does legislative output. This paper applies the time series analysis method, especially cointegration, to political science and leads to better understanding of legislative behavior as well.

The argument proceeds as following. The first section constructs a theory to show what factors increase or decrease legislative output. Initially here, I argue that legislative output is measured by the annual number of laws. Next, the utility maximizing model is shown. Then, explaining variables are considered in detail. In the second section, my hypothesis is tested using data from 45 countries. In the third section, Japanese time series data also confirm my prediction. Finally, I will present my conclusion.

Theory

Explained Variable: Legislative Output (Annual Number of Laws)

Breadth of Change. The object of my research is legislative output. Considering that a law is a change of policy, legislative output has two aspects: the magnitude and breadth of change a set of laws produces. The magnitude of change means how intensive the change is, that is, how far a law moves the current policy from the status quo. For instance, a law that raises the consumption tax rate from 5% to 15% results in a larger magnitude than one that increases it from 5% to 10%. Breadth of change represents how extensive the change is, namely, in how many policy areas a set of laws alters the status quo. Let us imagine that Legislature A enacts a tax law and a welfare law, but Legislature B enacts only a tax law. Legislature A, therefore, produces broader change than Legislature B.

The usual index of legislative output, the annual number of laws, does not measure the magnitude of change. One law can cause either major or minor change. Hence, even if the legislature makes many laws, this does not necessarily mean that the resultant policy change is enormous. On the other hand, as suggested above, the number of laws stands for breadth of change of legislative output. I will explain this in detail below.

Each law can deal with one policy area so that it can move the current policy along only one policy dimension. A tax law, for example, changes tax policy only, not welfare policy. Of course, a tax law may affect welfare policy. But it does not regulate

welfare policy directly. And, if the legislature wants to update individual as well as corporate tax policy, it should make two laws to deal with the respective areas, instead of incorporating the two dimensions into one law.

On the other hand, several *items* that are germane to a certain policy *dimension* can and should be written in one law that has exclusive jurisdiction over that policy dimension. For instance, the contributions and benefits of civil servants' health insurance are written in one law. Therefore, policy pertaining to this issue consists of one policy dimension. To put it another way, in this paper, policy dimension is that jurisdiction which one law can and should cover, which is far narrower than usual meaning of the word.

Some assume that several laws are necessary in order to move the policy a long distance from the status quo along one policy dimension; this is not reasonable, however. For example, imagine that one law raises the tax rate from 5% to 10%, and another in the same session increases it further from 10% to 15%. Why does the legislature not enact one law that raises the rate from 5% to 15%? As a general rule, too, "an assembly cannot be asked to decide the same ... question twice during one session" (Robert 1970, secs. 6, 10, 37, esp. pp. 64, 92, 285). Empirically as well, we rarely see more than one law on the same policy dimension.

Therefore, the annual number of laws means in how broad a policy area, or how comprehensively, the legislature revises the current policy in a year.

It is true that there are some omnibus laws, but no legislature can include all policy change into one mega omnibus law. Even if a small part of all laws are omnibus

laws, it is safe to say that the number of laws is, at least, a good proxy of the breadth of policy innovation. Cases also arise in which two laws deal with the seemingly same policy dimension. But no two laws cover precisely the same issues. Even if two policy objects covered by two laws seem to be on one dimension, they are separate policy dimensions as long as they are written in different laws.

Should We Focus on Important Laws Only? So far, the literature on the number of laws generally focuses on “landmark” or “significant” laws (Doering 1995; Mayhew 1991; Tsebelis 2002). But even (seemingly) unimportant laws change the status quo policy in their own policy dimension. No other law can substitute for them. That is why they are enacted. Most laws seem to be unimportant. If we ignore them, we fail to comprehend the roles that many ordinary laws play.

As I will argue below, “unimportant” laws also bring about some benefits to a majority of legislators. Otherwise, why should the legislature bother to deliberate, scrutinize, and vote on them? The utility, not the importance, of laws is important for this research. At least, enacted laws have a larger benefit than dead bills, and this is why the legislature passes some bills and not others. Important bills are more likely to suffer from harsh attacks from the opposition, so that they may fail. In addition, it is thought that importance is correlated to benefit.

Finally, it is hard to know (operationally) how important a law is. Doering and Tsebelis rely on the ILO’s rating. But their confidence may be misplaced; others can evaluate laws in another way. In addition, this rating can be applied only to labor laws.

Using the number of all laws remedies these kinds of measurement errors and facilitates a comparison of the legislative output of a number of countries.

The number of important laws may measure magnitude rather than breadth of change, though the dichotomy of importance cannot capture the continuum of the magnitude. Tsebelis “thinks” that significant laws “produce sweeping change,” while insignificant laws “produce incremental change of the status quo” (Tsebelis 2002, 183-4). But he never measures how large a change each law produces.

Model

Preview. In most countries, it is the legislature that makes, or, at least, finally accepts, laws, because it holds a veto power. Therefore, although in ordinary countries the government submits most of the bills, the legislature, not the government, decides how many laws it will enact. Further, it sets legislative output level so as to maximize its own utility. While each law provides the legislature with some benefits, the marginal cost rises as the number of laws enacted increases. Hence, there is an upper limit of the number of laws beyond which the legislature begins to lose.

As a result, those variables that increase benefit or decrease cost add to the number of laws. For example, socio-economic change such as inflation and political change like elections bring about benefits, while the strength of the governing parties or legislative resources such as committees reduce cost. Why is this the case? In my model, laws are policy change from the status quo to the legislature’s ideal point. The

larger the difference between these two points, the more benefits the laws produce. And wide deviance is brought about by huge socio-economic or political changes.

As I argued in the previous section, however, each law moves policy only along one policy dimension. Therefore, policy change should be broken down to one-dimensional changes, which represent respective laws; the legislature should project its own ideal point on every dimension and make laws accordingly. In addition, since the legislature is not a unitary actor, its “ideal point” and “utility” must be derived from those of its members.

In the following, my theory is explained in more detail.

Preliminary Considerations. At first, let us suppose that policy space is one dimension, and a real number stands for policy position. The status quo policy is zero. Government or legislators (called *proposers*) submit a bill. The legislature may amend this bill. If the legislature is unicameral without any institutional restriction, it passes the median. When party discipline is strong, the leader of the majority party can set a law. If a committee enjoys the closed rule, the committee’s median becomes the law. When the president has a veto, the override pivot becomes the law (Krehbiel 1998). If the legislature is bicameral, a certain point between each chamber’s median is made a law (Tsebelis and Money 1997). In any case, exactly what point the legislature enacts is of no interest here; what matters is that, given the members’ preferences and institutional restrictions, the policy position on that dimension the legislature turns into a law is *uniquely* specified, wherever an original bill is. We call this *the feasible ideal point of the legislature*.

Even if a proposer submits more than one bill on one dimension, the legislature will pass only one bill at most. Below, we consider cases in which a proposer submits at most one bill on each dimension. This restriction does not change the essence of the discussion.

The following augments the argument about uni-dimension policy space into that on multi-dimension policy space. Hereafter, a capital letter means a vector; a small letter is a number; italics represent a function; and $\{ \}$ denotes a set. Let $\{P\} = \{P \mid P = (p_1, p_2, \dots, p_d)\}$ denote policy space set, where d is the number of policy dimensions and much larger than the possible number of laws. p_i stands for the policy position on the i th dimension. The status quo policy is the original point; $SQ = O = (0, 0, \dots, 0) \in \{P\}$. Each policy dimension is linear and independent of one other; the i th policy dimension is such a partial set of $\{P\}$ as $\{D_i\} = \{kJ_i \mid J_i = (p_1, p_2, \dots, p_d), \text{ if } x=i, p_x=1, \text{ else } p_x=0\} \subset \{P\}$, where J_i is an elementary vector on this dimension; then $J_i * J_j = 0$ when $i \neq j$. Let $L_i \in \{D_i\}$ be the legislature's feasible ideal point on the i th dimension. By definition, L_i has no effect on any other dimension; $L_i * J_j = 0$ when $i \neq j$. And the summation of the legislature's feasible ideal points on all dimensions, $\sum_1^d L_i = L \in \{P\}$, is called *the dimension by dimension feasible ideal point of the legislature*.²

I assume that any bill, B_i , is an attempt to change the status quo only along the i th policy dimension; $B_i = bJ_i \in \{D_i\}$. Suppose the legislature transforms B_i into a law, $t(B_i) \in \{P\}$. Here I also assume that, if the legislature amends B_i , it moves B_i only along

² If L_i is the median on the i th dimension, L is the dimension by dimension median in the legislature (Laver and Shepsle 1996).

the same dimension; $t(B_i) \in \{D_i\}$. Then, according to the argument above on linear policy space, a law transformed from *any* bill on the \hat{n} th dimension should be *the* feasible ideal point on this dimension; $\forall b, t(bJ_i)=L_i$. And, since $L_i=(L^*J_i)J_i$, the law on the \hat{n} th dimension is a projection of the dimension by dimension feasible ideal point of the legislature, L , on the dimension.

The Number of Laws to Maximize the Chair's Utility. Suppose a proposer submits a set of m bills from m different dimensions, $\{B_i \mid i=1, 2, \dots, m, \text{ when } j \neq k, B_j^*B_k=0\} = \{B_{1-m}\}$, where $m < d$. The chair, or the agenda setter of the legislature, takes votes on bills in the order of utilities of laws derived from bills for him. Once the chair puts B_i on the agenda, the legislature always passes $L_i=t(B_i)$, in whatever order it is placed on the agenda. Let $u(L_i)$ be the utility of $L_i=t(B_i)$ for the chair. Renumber i so that $u(L_i) \geq u(L_{i+1})$. Then, the legislature passes L_i in the \hat{n} th order; that is, it makes L_1 first, L_2 second, and so on (Cox and McCubbins 1993, Ch. 9 and Appendix 2). This order may be different from what most legislators would prefer, though, at least, the majority of legislators do not pay the net cost. This is because, if they did, they should reject that bill. And note that the chair decides only the order of making laws, not the contents of laws.

When the legislature passes the n th law, the chair pays the cost $c(n)$ arising from political negotiations between governing and opposition parties, or due to scarce legislative resources such as committees, facilities, and session time (Blondel 1969). The more laws the legislature enacts, the more scarce are legislative resources per law. As a result, those who object to the n th bill may have more leverage and successfully hinder the passage of bills. Then, $c(n)$ is strictly increasing in n and it is not related to

the content of the n th law. Therefore, *even if all n laws bring about positive utility ($u(L_i) > 0$), the legislature does not turn all of them into laws.*

When the legislature makes up to n laws ($n \leq m$), the total utility the chair receives, $U(n)$, is the summation of the benefit minus the cost of each law; $U(n) =$

$$\int_0^n (u(L_x) - c(x)) dx. \text{ The first order condition to maximize } U(n) \text{ is } \frac{dU(n)}{dn} = u(L_n) - c(n) = 0.$$

$\frac{dU(n)}{dn}$ is strictly decreasing in n , because $u(L_n)$ is decreasing in n (by construction)

and $c(n)$ is strictly increasing in n (shown above). Therefore, it is reasonable to employ

Taylor series linear approximation of $\frac{dU(n)}{dn}$ at $n=1$, that is,

$$\frac{dU(n)}{dn} \sim \frac{dU(1)}{dn} + \frac{d^2U(1)}{dn^2} (n-1) = u(L_1) - c(1) + \left(\frac{du(L_1)}{dn} - \frac{dc(1)}{dn} \right) (n-1). \text{ Then, } U(n) \text{ is maximized}$$

at n_{\max} , where

$$n_{\max} = \frac{u(L_1) - c(1)}{\left(\frac{dc(1)}{dn} - \frac{du(L_1)}{dn} \right)} + 1 \quad (*)$$

It is concluded that the legislature makes n_{\max} laws in order to make the chair happiest.

Let T be a function from submitted bills into laws; $T(\{B_{1-m}\}) = \{L_i \mid i=1, 2, \dots, n_{\max}\} = \{L_{1-n_{\max}}\}$, where $n_{\max} \leq m$. Let $v(L_i)$ be utility of L_i for the proposer. And define the total

utility of all passed laws for proposers as V ; $V(\{L_{1-n_{\max}}\}) = \sum_1^{n_{\max}} v(L_i)$. Then, a proposer

submits $\{B_{1-m}\}$ so as to maximize $V(\{L_{1-n_{\max}}\}) = V(T(\{B_{1-m}\}))$.

Explanatory Variables

According to (*), those factors that increase $u(L_1)$ or decrease $\frac{dc(1)}{dn}$ increase the number of laws, n_{\max} (I do not consider $c(1)$ and $\frac{du(L_1)}{dn}$). That is, benefit-increasing variables and cost-decreasing variables have a positive effect on the annual number of laws.

Benefit Increasing Variables. It is reasonable to suppose that $u(L_1)$ increases as L_1 brings about larger change, namely, as $|L_1|$ gets larger.³ Here, $|L_1| = |(L * J_1) J_1| = |L| * s$, where $s = \frac{|L * J_1|}{|L|}$, $0 \leq s \leq 1$. Suppose that s is constant, or, at least, independent of $|L|$, then, *those that increase the size of $|L|$ also add to $u(L_1)$.*

Considering the dynamic model and relaxing the supposition $SQ=O$, $|L|$ is interpreted as the magnitude of change of the legislature's dimension by dimension feasible ideal point. Let $SQ(t)$ and $P(t)$ be pre-legislation status quo policy and the legislature's dimension by dimension feasible ideal point in year t , respectively. Then the law on the i th dimension in year t , $L_i(t)$, is a projection of $L(t)=P(t)-SQ(t)$, change from the status quo to the legislature's dimension by dimension feasible ideal point, on this dimension; $L_i(t)=(L(t)*J_i)J_i$. Post-legislation policy in year t becomes the subsequent year's pre-legislation status quo policy; $SQ(t) + \sum_1^{n_{\max}(t)} L_i(t) = SQ(t+1)$. If all L_i s are passed ($n_{\max}(t)=d$), $\sum_1^{n_{\max}(t)} L_i(t)$ is equal to $L(t)$. I assume, however, that $\sum_1^{n_{\max}(t)} L_i(t)$ is

³ For example, let the utility of a law, L_i , be the difference between the squared distance from the chair (denoted by A) to the status quo, and that from the chair to the i th dimension feasible ideal point, L_i ; $u(L_i) = |L_i - A|^2 - (|SQ - A|^2)$. If we approximate A by L_i , $L_i \sim A$, we get $u(L_i) \sim |L_i|^2$ (note $SQ=O$).

close enough to $L(t)$ even if not all L_i s are enacted; $\sum_1^{n_{\max}(t)} L_i(t) \sim L(t)$. Then, it is said that the legislature's dimension by dimension feasible ideal point in year t will become the subsequent year's pre-legislation status quo policy; $P(t) = SQ(t) + L(t) \sim SQ(t) + \sum_1^{n_{\max}(t)} L_i(t) = SQ(t+1)$. From the above, it is concluded that $P(t) - P(t-1) \sim P(t) - SQ(t) = L(t)$. Hence, *change of the legislature's dimension by dimension feasible ideal point from year $t-1$ to year t increases the size of $|L(t)|$ and, therefore, $u(L_1)$.*

There are two kinds of variables that promote change of the legislature's dimension by dimension feasible ideal point: socio-economic changes and political changes. When the socio-economic situation changes, $P(t)$ also changes from $P(t-1)$, because $P(t-1) = SQ(t)$ does not fit the new circumstances and distinct policy objects. For example, if there is a change of price level, i.e., inflation, the old progressive tax rate would mean a substantial tax increase (tax creep), or the current pension payments would be discounted. Therefore, the legislature updates its own feasible ideal point, that is, reduces taxes or increases nominal pension payments. Since the absolute size, not the direction, of the price level change matters, deflation also changes $P(t)$. Besides price level, this paper considers absolute changes of the GNP and population as proxies of socio-economic change.⁴ $P(t)$ also differs from $P(t-1)$ due to political change, that is,

⁴ Rosenthal and Forth believe that "societal needs" result in more legislation (Rosenthal and Forth 1978). But they operationalize societal needs only by population, urbanization, and industrialization. Mulligan and Shleifer also argue that large populations bring about more regulations, though their argument is different from mine, which is that large populations can pay the cost to set up and run regulatory

elections, which alter the components of the legislature. From the above, it is expected that *high INFLATION, rapid GNP growth, rapid POPULATION growth, and ELECTIONS during the year increase the annual number of LAWs*. Therefore, no change, no new laws.

Cost Decreasing Variables. As mentioned already, cost $c(n)$ is incurred by scarce legislative resources or political negotiations between the governing and opposition parties. Therefore, strong governing parties and plentiful legislative resources can retard cost increasing speed, $\frac{dc(1)}{dn}$.

Three kinds of governing-party strength are considered. First, when the governing parties control more seats in the legislature, they are more likely to get agenda control of the plenary sessions and committees and reduce the negotiation cost. This hypothesis seems to be intuitively persuasive, although the current state of political science does not necessary support it. For example, it is said that, in the United States, divided government is not the main cause of gridlock in Congress (Binder 2003; Mayhew 1991). In Europe, Doering argues that “[d]ue to its control of the agenda, the more a government can easily afford to enact bills, the fewer bills... it is actually likely to pass. Yet presumably the more conflictual these bills will be.” (Doering 1995, 46) Though his proposition concerned the number of bills, not laws, its application to laws leads to a different prediction from mine. And I am not concerned

institutions (Mulligan and Shleifer 2004). As implied by Philips curve, unemployment is inversely related to inflation so that it is omitted from regression to avoid multicollinearity problems.

with whether the country has a parliamentary or presidential system, because it is not the separation of powers, but the separation of purpose, that matters to the final output (Haggard and McCubbins 2001), and seat share measures the latter. For the same reason, seat share covers whether the government secures majority status in the legislature or not.

Next, a new chief executive (prime minister or president) has more legitimacy so that it is easier to insist on a position against the opposition. On the other hand, a longer tenure of a chief executive may result in better skills to negotiate with the opposition parties (Tsebelis 2002). Readers may wonder if the ideological position of the government affects legislative output. Tsebelis argues that “the number of significant laws will be an increasing function of the distance between the current government and the previous one” (Tsebelis 2002, 165). But, in my model, a government’s policy position is not relevant, because it is the legislature, not a proposer, that finally decides what law is made.

Finally, a government that enjoys a high rate of approval can weaken opposition resistance, saying that government bills are supported by public opinion.

These three variables, *SEAT share of the governing parties*, *a new chief EXECUTIVE*, and *popular APPROVAL*, increase the number of *LAWs proposed by the government*. Hence I will analyze government laws and legislators’ laws separately.

The amount of legislative resources, such as time and personnel strength, divided by n laws becomes smaller as n increases. Therefore, the more plentiful resources the legislature has, the more resources the n th law enjoys and the more

slowly $c(n)$ increases, that is, the less cost increasing speed $\frac{dc(n)}{dn}$ is.⁵ A legislature with more committees has more time because this allows quantitative division of labor and informational efficiency through policy-based specialization (Krehbiel 1991). If the legislature is equipped with adequate personnel, such as secretaries and research assistants, or facilities like office premises, it can make legislative work more efficient. In sum, *when the legislature establishes more COMMITTEES and is provided with more ample FACILITIES, then the cost increasing speed $\frac{dc(1)}{dn}$ is slower and more LAWs are passed.*

Now I test the above hypotheses by using two sets of data.

Cross-Country Comparison

Data

The first dataset is composed of 45 countries, both developed and developing.⁶ All variables are averages from 1978 to 1982 (if available; see also the Appendix about the definitions and sources of variables). Table 1 summarizes descriptive statistics.

⁵ Rosenthal and Forth also argue that legislative capacities, such as staff, time, facilities, and resources generally, help enactment of bills (Rosenthal and Forth 1978). They confirm that, using data from U.S. state legislatures, the budget for the legislative branch has partial correlations with the number of laws.

⁶ The 23 free countries (defined below) to be studied are Australia, Austria, Canada, Denmark, Fiji, Finland, France, Greece, India, Ireland, Israel, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Sri Lanka, Sweden, Switzerland, United Kingdom, and Vanuatu. The 22 non-democracies (defined below) to be included are Algeria, Brazil, Cameroon, Congo, Cyprus, Egypt, Gabon, Hungary, Indonesia,

<Table 1 about here>

The explained variable is LAW, the average number of laws the legislature makes annually. Laws proposed by the government and those proposed by legislators are distinguished.

I include three *socio-economic change* variables: percentages of INFLATION (consumer's price index), GDP growth rate, and POPULATION growth rate. Since my theory is concerned only with the size of change, not its direction, absolute values are employed.

In addition, the normal term of the (lower) house, TERM, is used. A longer TERM means less frequent elections, less frequent *political change*, and smaller LAW.

As for *cost decreasing variables*, SEAT, the fraction of seats held by the government, is considered. TURNOVER denotes how many times the chief executive (prime minister or president) is changed during this period. When TURNOVER is high, the chief executives are legitimized frequently, while they are not seasoned enough to negotiate with the opposition. Hence, the direction of its effect is ambiguous.

There are two *legislative resource* variables. COMMITTEE is the number of permanent committees in the (lower) house. FACILITY is a dummy variable. It is one if the legislature is equipped with all the following kinds of facilities: secretarial assistance, research and reference assistance, office premises, postal and

Ivory Coast, Kenya, Kuwait, Malaysia, Mauritius, Nicaragua, Philippines, Poland, Republic of Korea, Rwanda, Senegal, South Africa, and Zaire. These countries are selected only because of data availability.

telecommunication facilities, travel and transport, residential accommodations, restaurants, and provisions for medical care; otherwise, it is equal to zero.

My hypothesis is that all coefficients except TERM and TURNOVER are expected to be positive. TERM should be negative. TURNOVER may be positive or negative.

Results

Table 2 shows the results of OLS model.⁷ Two dependent variables, government LAW and legislators' LAW, are regressed separately.

<Table 2 about here>

To begin, I consider the case of government LAW. Two political variables, TERM and TURNOVER, increase LAW significantly, as expected. We can surmise, however, that different mechanisms are at work in democracies and non-democratic countries. I divide the dataset into 23 countries that Freedom House calls "free countries"⁸ and 22 other countries that I call "non-democracies," and analyze them separately. In free countries, SEAT increases LAW as my theory anticipated. Instead, TURNOVER ceases to be effective. In non-democracies, no variables become significant. Throughout all

⁷ Tanabe warns that the data generation process of the number of laws is Poisson because this is event count data (Tanabe 1995). But King says that "the number of events counted for each ... observation is greater than 30, then it is probably safe to assume the disturbances are approximately normally" distributed (King 1988, 845). Most of five-year count value (not average), five times of LAW, is more than 30. Therefore, OLS has no problem.

⁸ <http://www.freedomhouse.org/ratings/index.htm>.

analyses, other socio-economic variables and legislatures' capacities to mitigate political cost do not work.

Next, I study legislators' LAW of all countries. INFLATION and COMMITTEE increase LAW. The fact that SEAT and TURNOVER are insignificant is also consistent with my model, according to which these two variables should be effective only for government LAW. Against my prediction, however, TERM increases LAW. When I focus on the data of the free countries, no variables are significant. As for non-democracies, INFLATION and COMMITTEE remain positive, while TERM is no longer effective.

Japanese Time Series

Data

I test my theory again, using another dataset by a different method: time series analysis of Japanese lawmaking from 1961 to 1994 (the accurate definitions and sources of variables are contained in the Appendix; Table 3 gives summary statistics). This offers some merits because it controls unobserved country-specific variables, such as legal culture. (But, even if some omitted country-specific variables are significant, they are least likely to be systematically correlated with included independent variables so that cross-country analysis does not suffer from omitted variables problem.)

<Table 3 about here>

The dependent variable, LAW, is the annual number of laws the Diet passes. I again distinguish LAWs proposed by the government and those by legislators. The legislative year starts from the “budgetary session,” when the government submits the main budget and most of its bills. Most budget sessions begin in December of the previous year.

For *socio-economic change*, absolute percentage values of the INFLATION (consumer’s price index) rate, GNP growth rate, and POPULATION growth rate are employed. One year lagged values are used, because legislators and the government refer to the previous year’s value of these indices. Most government bills are prepared by January (Fukumoto 2000; Fukumoto 2003-4), when the current year’s information is available to nobody.

Political change, ELECTION, is a binary variable. It is equal to one when that year’s budgetary session is the first one since the latest general election; otherwise, it is zero.

As one of *cost decreasing variables*, SEAT, which is the seat share of the governing parties in the House of Representatives, is included. TENURE indicates how many budgetary sessions the prime minister (the chief executive) has experienced (logarithm). APPROVAL is average approval rate percentage of the governing parties in the monthly Jiji Tsushin Co. poll.

COMMITTEE is the number of standing committees in the House of Representatives. This enriches *legislative resources*.

The coefficients of all variables except TENURE are expected to be positive. TENURE may increase (because of mature negotiation skills) or decrease (due to fading legitimacy) LAW.

Caveats for Time Series Analysis

We must resist the temptation to use OLS model, because, in most cases, time series data do not meet the assumption of OLS; residuals are serially autocorrelated. As a result, the estimation result is likely to be spurious; many coefficients seem to be significant and R square is high, even if this is false. One solution is to use the difference of each series as an ARIMA model does; $\Delta X_t = X_t - X_{t-1}$, where X_t is a stochastic variable X at time t . But this eliminates level information. Analysis of differences can tell us something about short-term change only, but nothing about long-term level of time series data.

Another solution is Engle Granger methodology, which I use here. When a dependent variable and all the independent ones are an “integrated” series and residuals are not integrated, they share long-term relationships, and OLS coefficients and standard errors are meaningful enough to be interpreted safely. In this case, these series are said to be “cointegrated.” In addition, the differences of cointegrated series can be analyzed in an “error correction model,” which enables us to explain short-term fluctuations as well. Some analysts smooth time series data, while they neglect short-term dynamics. Therefore, I do not.

In the following, I explain integrated series, cointegration model, and the error correction model in order, and apply them to the Japanese time series data.

Integrated Series, Stationary Series, and Unit Root Test

Let $\{X_t\}$ be stochastic process and $X_t = \alpha + \beta X_{t-1} + \varepsilon_t$, where ε_t is (weakly) *stationary*, that is, for any $j < t$, $E(\varepsilon_t) = E(\varepsilon_j)$, $\text{Var}(\varepsilon_t) = \text{Var}(\varepsilon_j)$, and $\text{CoVar}(\varepsilon_t, \varepsilon_j) = \gamma_{t-j}$. If $\beta = 1$ (that is, $\{X_t\}$ has *unit root*), $\{X_t\}$ is *integrated* and written as $\{X_t\} \sim I(1)$. $I(1)$ is non-stationary. Then, difference of $I(1)$, $\Delta X_t = X_t - X_{t-1} = \alpha + \varepsilon_t$, is stationary and not integrated. It is denoted by $\{\Delta X_t\} \sim I(0)$.

One of characteristics of integrated process is that it has a “long memory.” If $\beta < 1$ ($I(0)$), the present effects of past shocks ($\alpha + \varepsilon_j$) to X_t are discounted (“forgotten”) by factor of β . Then, $X_t = \beta^t X_0 + \sum_{j=1}^t \beta^{t-j} (\alpha + \varepsilon_{t+1-j})$. Otherwise ($\beta = 1$, i.e., integrated), X_t accumulates (“memorizes”) all innovations given to old variables at face value, that is,

$$X_t = X_0 + \alpha t + \sum_{j=1}^t \varepsilon_j.$$

The earlier studies have proved that macro-econometric indices, like inflation rate or GDP growth, as well as political aggregate measures, such as presidential approval or policy mood, are integrated (Erikson, MacKuen, and Stimson 2002, *Political Analysis*, Vol. 4 (1992)). In addition, it is theoretically expected that LAW has a long memory, because of administrative and political incrementalism or inertia; when statesmen and bureaucrats decide how many bills they will prepare, submit, deliberate, and pass, they refer to the precedent. Following the theory of rational expectation formation, it is said that political players have already used the available

information to decide the appropriate level of legislative output. Without any special reason, they may well try to set LAW_t almost equal to LAW_{t-1} . Only unexpected shocks make LAW_t deviate from LAW_{t-1} . That is, it is plausible to anticipate that $LAW_t = LAW_{t-1} + \varepsilon_t$.

Now, I test whether each process is integrated or not. Table 4 shows the t-value of OLS estimator of β when the null hypothesis H_0 is $\beta = 1$.

< Table 4 about here >

But we cannot use the usual t-test, because the distribution of the t-statistic does not follow the t-distribution when $\{X_t\}$ is integrated. Instead, we should use the Dickey Fuller test for unit root, whose critical values are shown at the bottom of Table 4. MacKinnon approximate p-values are also shown in the right column. For all series except LAW proposed by legislators, ELECTION and TENURE, the Dickey Fuller test does not reject the null hypothesis that they have a unit root at the 5% level; they are integrated. Below, I consider LAW proposed by the government.

Long-Run Equilibrium: Cointegration Model

When dependent and independent variables in regression are integrated series, the residuals process is also usually integrated. But, if all these series share a common stochastic trend, the residuals process becomes stationary and these series are said to be *cointegrated*. In such cases, we do not have to worry about “spurious regression” problem of OLS estimator. And predicted values from this regression model mean the

long-term equilibrium level of the dependent variable. In order to test cointegration, we only have to test whether the residuals process has a unit root or not.

I regress LAW on integrated series only and check if they are cointegrated or not. (Since all variables must be integrated series of the same order, $I(1)$, I exclude stationary processes, $I(0)$), namely, ELECTION and TENURE.) OLS estimation results in Table 5, Model 1, show that SEAT and APPROVAL increase LAW significantly as expected; the more seats in the Diet and the more support governing parties get from voters, the more laws are enacted. And fortunately, the Dickey Fuller test shows that the residuals process is stationary (see $Z(t)$). Therefore, LAW, APPROVAL, and SEAT are cointegrated and they have a long-term relationship. Macro-economic and social change (INFLATION, GNP, and POPULATION) has nothing to do with LAW. After insignificant series are omitted, the result is almost the same (Model 2). Figure 1 shows actual values of LAW and predicted values only by SEAT and APPROVAL in Model 2. It can be easily seen that Model 2 follows the long trend of LAW very well.

<Table 5 and Figure 1 about here>

Short-Term Dynamics: Error Correction Model

How about short-term dynamics of LAW? Do not ELECTION and TENURE, which are omitted in the above analysis, affect LAW? Some complain that politics disturbs ideal governance by myopic considerations. Is this true? Besides, the economy may matter in the short term.

According to the Granger representation theorem, I can rewrite the cointegration model into an error correction model;

$$\Delta \text{LAW}_t = \alpha + \sum_{j=1}^k \beta_{1j} \Delta \text{LAW}_{t-j} + \sum_{j=1}^k \beta_{2j} \Delta \text{SEAT}_{t-j} + \sum_{j=1}^k \beta_{3j} \Delta \text{APPROVAL}_{t-j} - \beta_e \text{DISEQUILIBRIUM}_{t-1}$$

where

$$\text{DISEQUILIBRIUM}_t = \varepsilon_t \text{ (of Model 2)}$$

$$= \text{LAW}_t - (-256.981 + 4.561 * \text{SEAT}_t + 3.154 * \text{APPROVAL}_t)$$

$$1 > \beta_e > 0$$

In the long-term equilibrium, LAW, SEAT, and APPROVAL have the relationship indicated by Model 2. Thus, the residual in Model 2 means disequilibrium from this stable relationship. This model assumes that annual increases of LAW are not only affected by lagged differences of the three endogenous series, but also (partially) compensates for the previous year's deviation from the equilibrium. That is why this is called an error correction model.

I can safely rely on OLS estimators in analyzing an error correction model, because all series are differences of integrated process, that is, stationary process (I(0)). Lag order (k) is set to one. In Table 6, Model 3, DISEQUILIBRIUM's coefficient is significantly negative and larger than -1, as my error correction model predicts. Besides, SEAT is also significant. Figure 2 shows time series of ΔLAW and negative values of lagged DISEQUILIBRIUM. Both lines are almost parallel. This means that LAW moves so as to "correct" the previous year's DISEQUILIBRIUM from the long-term trend.

<Table 6 and Figure 2 about here>

Now I can include differences of other exogenous integrated processes (Δ INFLATION, Δ GNP, Δ POPULATION, and COMMITTEE, all are I(0)) as well as the level of stationary indices (ELECTION and TENURE, I(0)) in order to probe their effects (Table 6, Model 4). The results indicate that TENURE is a new significant variable; the longer the prime minister stays in office, the more skillful at negotiation with the opposition. Other indicators, including socio-economic ones, have no effect.

Laws Proposed by Legislators

In studying LAW proposed by members of the Diet, I do not use the Engle Granger methodology, because LAW is stationary. But if some independent variables are integrated processes, I should use their first differences. Table 7 shows the results of OLS model. Unfortunately, my model does not explain legislators' LAW. Even if I drop SEAT, TENURE and APPROVAL, which my model says are effective for government LAW only, no variable turns to be significant, anyway.

<Table 7 about here>

Conclusion

This paper predicts that legislative output, the annual number of laws, is decided by socio-economic change, political change, the strength of the governing parties, and legislative resources. The same conclusion is derived from two distinct data and

methods: politics matters. SEAT increases LAW. Frequent ELECTIONs increase LAW. APPROVAL of the governing parties by citizens adds to LAW. TENURE of chief executives is effective, though its direction is ambiguous.

By contrast, socio-economic change such as INFLATION, GDP/GNP growth, and POPULATION increase do not matter to LAW. This seems to mean that the legislature is not responsive to changes in its surroundings. But it is considered that socio-economic change moves the legislature's dimension by dimension feasible ideal point not directly, but through political change. Socio-economic input needs to be converted into political thrust in order to lead to laws. Lawmaking is the lawmaker's business. It's not the economy.

This finding is not a matter of course. As for the Japanese time series, Sato and Matsuzaki have said that the "seat share of the governing Liberal Democratic Party does not correlate with the number of laws" and "legislative output responds to nothing more than to social request." (Sato and Matsuzaki 1986, 128) Their view, however, is solely based on the impression of graphs. Actually, the opposite is true.

In terms of political methodology, this paper introduces cointegration time series analysis and shows that it enables the political scientist to study longitudinal data more appropriately.

Legislative output has much to do with how well the political system works. Legislative output is transformed into future support through feedback. It might contribute to the stability or tenure of the system, regime, or government. Since my theory assumes no parochial or epochal conditions but maximization of utility, these

results are universal enough to generalize. Whether it is the case or not is dependent on future research on other data from different periods or different countries.

APPENDIX: Definitions and Sources of Variables

Cross-Country Comparison

All variables are averages from 1978 to 1982 (if available). Source is indicated in parenthesis. As for the "Database of Political Institutions" by Beck et al. (2001), I downloaded their data from <<http://www.worldbank.org/research/bios/pkeeper.htm>>. They insist their data is superior to other datasets, including the frequently used Polity III.

LAW (Government): government bills passed (Inter-Parliamentary-Union 1986, Table 31.1). Though the source said "the average number of bills introduced into and passed by Parliament over the five-year period from 1978 to 1982" (Inter-Parliamentary-Union 1986, 909), I suspect, based on comparison with other references, that it reports the total, not average, number for this period. Therefore, I divided the number they report by five. In any case, whichever is correct affects only the size, not the significance level and direction, of the coefficients.

LAW (Legislator's): members' bills passed (Inter-Parliamentary-Union 1986, Table 31.1). I divided the number they report by five.

GDP: absolute value of GDP growth (annual %) (World-Bank 2000).

INFLATION: absolute value of change of consumer price index (annual %) (World-Bank 2000).

POPULATION: absolute value of POPULATION growth (annual %) (World-Bank 2000).

TERM: the normal term of the (lower) house (Inter-Parliamentary-Union 1986, Table 1.3).

SEAT: the fraction of seats held by the government (Beck et al. 2001).

TURNOVER: how many times the chief executive (the prime minister or the president) changed (Beck et al. 2001).

COMMITTEE: the number of permanent committees in the (lower) house (Inter-Parliamentary-Union 1986, Table 20.2).

FACILITY: a dummy variable; this is one if the country does not answer “none” in Table 6.1-6.6 of Inter Parliamentary Union (1986), that is, the legislature is equipped with all the following kinds of facilities: secretarial assistance, research and reference assistance, office premises, postal and telecommunication facilities, travel and transport, residential accommodations, restaurants, and provisions for medical care. Otherwise, it is zero.

Japanese Time Series

Each value indicates the annual one. The period extends from 1961 to 1994 (for one year lagged variable, 1960-1993. Lagged APPROVAL is from 1961-1993). This time span is limited according to the availability of materials.

LAW: the annual number of laws the Diet passes (Shugiin and Sangiin 1990). The legislative year starts from “budgetary session,” when the government submits the main budget, often in December of the previous year. Government laws and legislators’ laws are counted separately.

GNP: absolute value of annual GNP growth percentage of the former SNA68 series, benchmark year 1990, at constant price, calendar year (Economic and Social Research Institute, Cabinet Office, Government of Japan.
<http://www.esri.cao.go.jp/jp/sna/toukei.html>).

INFLATION: absolute value of annual growth percentage of consumer price index, calendar year (Statistics Bureau, Government of Japan.
<http://www.stat.go.jp/data/cpi/1.htm>).

POPULATION: absolute value of annual growth percentage of the population. (Table 2-1 B of the following site. Statistics Bureau, Government of Japan.
<http://www.stat.go.jp/data/nenkan/02.htm>).

ELECTION: a dummy variable. One when that year’s budgetary session is the first since the latest general election. Otherwise, zero.

SEAT: the percentage of seats held by the governing parties in the House of the Representatives (Shugiin and Sangiin 1990). Average of the values in the beginning of each session in the year, weighted by each session's days.

TENURE: logarithm of the number of budgetary sessions under the respective prime minister.

APPROVAL: annual average approval rate of governing parties in the monthly Jiji Tsushin Co. poll (Jiji-Tsushin-Sha 1981; Jiji-Tsushin-Sha various years; Jiji-Tsushin-Sha and Chuo-Chosa-Sha 1992).

COMMITTEE: the number of standing committees in the House of Representatives (Shugiin and Sangiin 1990). Average of the values in the beginning of each session in the year, weighted by each session's days.

DISEQUILIBRIUM: the residual of Model 2,
 $LAW_t - (-256.981 + 4.561 * SEAT_t + 3.154 * APPROVAL_t)$

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Figure 1. Government LAW of Japan

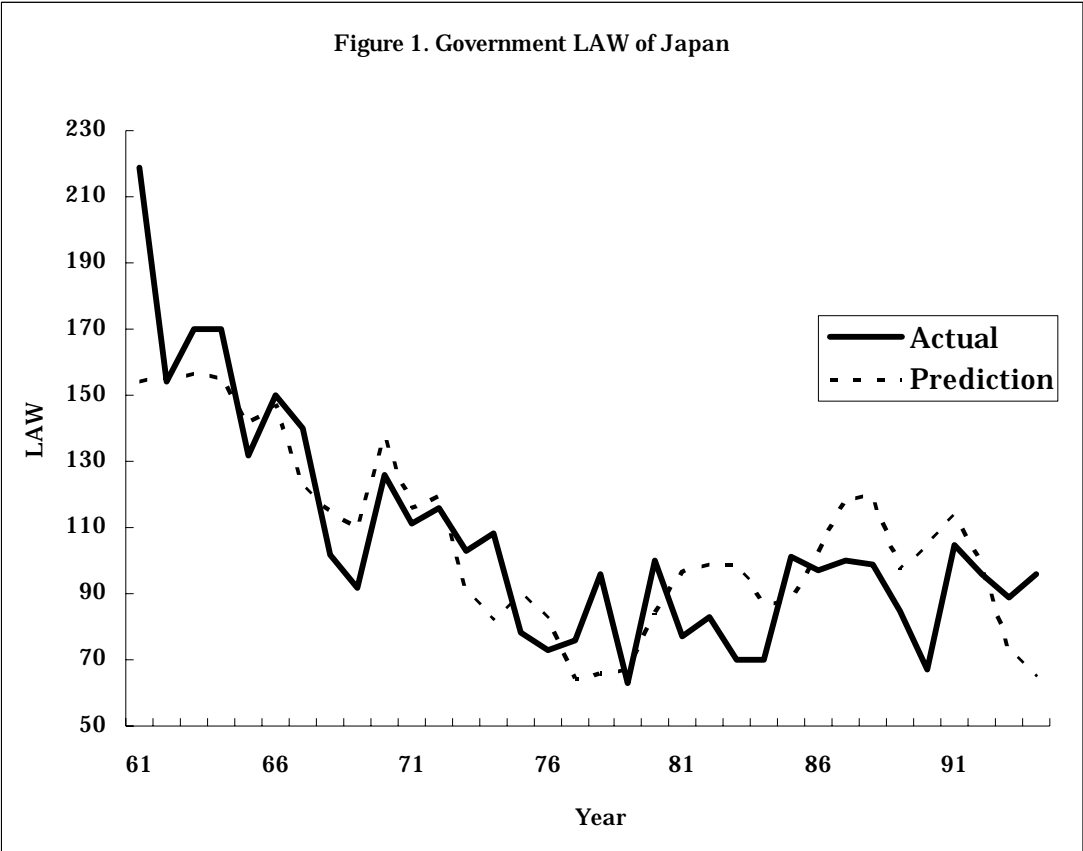


Figure. 2. Short Term Dynamics: Error Correction Model

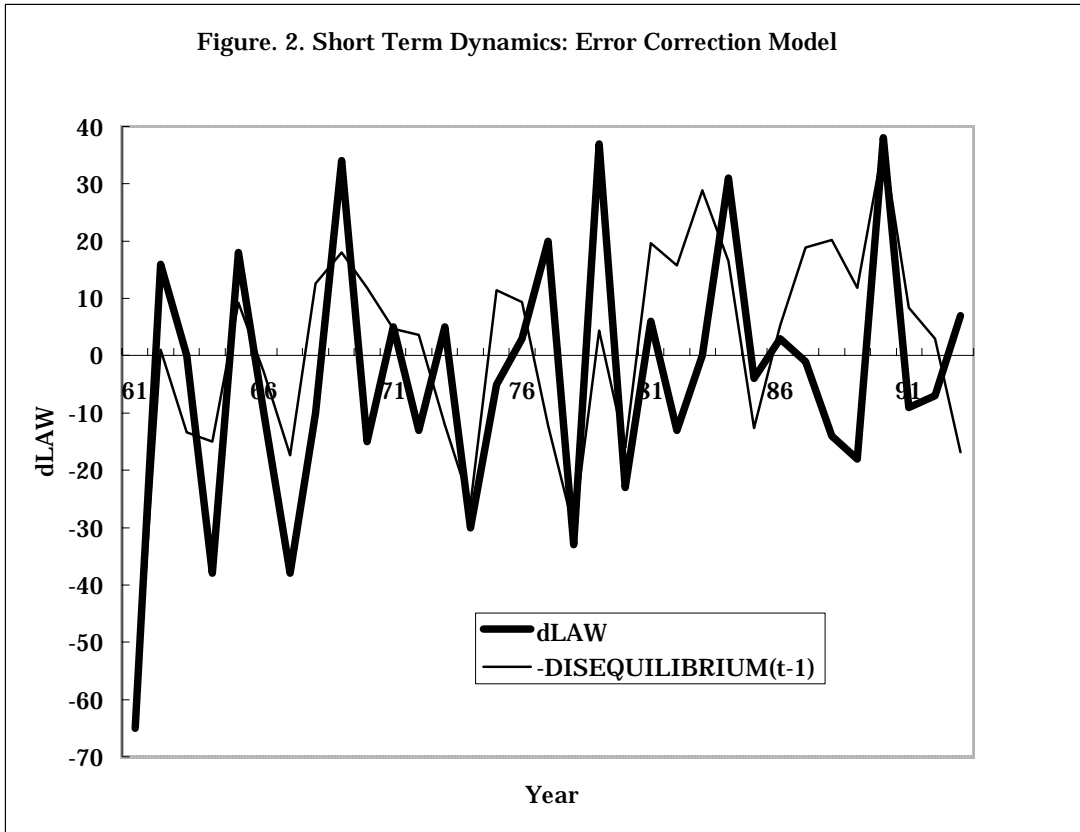


Table 1. Summary Statistics of Worldwide Countries Data

	Obs	Mean	Std. Dev.	Min	Max
LAW (Government	43	63.1	63.4	2.8	286.2
LAW (Legislators')	43	9.4	20.9	0.0	112.2
INFLATION	45	16.8	19.9	4.2	101.1
GDP	45	5.2	3.1	1.5	15.0
POPULATION	45	1.8	1.3	0.1	5.9
TERM	45	4.6	0.7	3.0	6.0
SEAT	45	73.0	20.2	38.5	100.0
TURNOVER	45	0.8	0.8	0.0	3.0
COMMITTEE	45	12.9	8.3	0.0	30.0
FACILITY	45	0.4	0.5	0.0	1.0

Table 2. Cross Country Comparison of LAW (OLS)**(1) Government LAW**

LAW (Government)	All Countries		Free Countries		Non Democracy			
	Coef.	SE	Coef.	SE	Coef.	SE		
INFLATION	-0.616	0.408	0.091	0.788	-0.570	0.419		
GDP	-4.819	3.861	3.763	17.971	-2.039	3.134		
POPULATION	-2.500	10.269	-41.034	40.014	2.872	7.374		
TERM	-41.367	13.029	***	-71.872	21.394	***	-3.684	16.745
SEAT	0.264	0.589		4.422	1.667	**	-0.825	0.556
TURNOVER	20.892	10.290	*	4.745	15.851		22.671	13.640
COMMITTEE	1.473	1.065		2.649	2.220		1.362	1.094
FACILITY	-9.823	17.322		48.866	38.856		-13.393	15.512
Constant	244.614	64.629	***	113.414	139.780		120.097	96.303
Adj R-squared	0.365		0.450		0.151			
N	43		21		22			

(2) Legislators' LAW

LAW (Legislators')	All Countries		Free Countries		Non Democracy			
	Coef.	SE	Coef.	SE	Coef.	SE		
INFLATION	0.395	0.144	***	0.198	0.119	0.597	0.275	*
GDP	0.526	1.356		1.840	2.677	1.080	2.058	
POPULATION	1.759	3.626		-6.718	6.008	3.551	4.842	
TERM	7.725	4.342	*	-0.870	2.884	15.668	11.132	
SEAT	-0.159	0.202		-0.183	0.208	-0.284	0.369	
TURNOVER	-1.601	3.635		-0.573	2.349	-3.647	9.496	
COMMITTEE	1.252	0.376	***	0.102	0.326	2.284	0.718	***
FACILITY	-2.773	6.058		2.309	5.655	-8.163	10.459	
Constant	-41.107	21.342	*	16.121	18.053	-88.586	63.697	
Adj R-squared	0.263		-0.037		0.453			
N	43		23		20			

Table 3. Summary Statistics of Japanese Time Series Data

	Obs	Mean	Std. Dev.	Min	Max
LAW (Government)	34	106.3	34.4	63.0	219.0
LAW (Legislators')	34	14.1	4.0	5.0	20.0
INFLATION	34	5.3	4.5	0.2	24.5
GNP	34	6.1	3.6	0.3	13.0
POPULATION	34	0.9	0.3	0.3	1.4
ELECTION	34	0.4	0.5	0.0	1.0
SEAT	34	57.5	4.2	50.6	64.5
TENURE	34	0.7	0.7	0.0	2.1
APPROVAL	34	32.1	4.3	24.7	39.7
COMMITTEE	34	17.0	1.3	16.0	20.0

Table 4. Dickey Fuller Test of Unit Root

	Z(t)	MacKinnon approximate p-value	
LAW (Government)	-2.426	0.135	
LAW (Legislators')	-5.035	0.000	***
INFLATION	-2.702	0.074	*
GNP	-1.926	0.320	
POPULATION	-0.368	0.916	
ELECTION	-8.303	0.000	***
SEAT	-1.825	0.368	
TENURE	-4.314	0.000	***
APPROVAL	-2.010	0.282	
COMMITTEE	0.810	0.990	
Critical Value			
	1%	-3.689	
	5%	-2.975	
	10%	-2.619	
N		34	

*** $P < 0.001$ ** $p < 0.05$ * $p < 0.1$

Data: Japanese Time Series, 1961-94

Table 5. Cointegration Model of Government LAW (OLS)

DV=	Model 1		Model 2		
LAW (Government)	Coef.	SE	Coef.	SE	
INFLATION _{t-1}	0.599	1.281			
GNP _{t-1}	2.254	1.915			
POPULATION _{t-1}	-9.543	27.785			
SEAT	3.636	1.225	***	4.561	0.981 ***
APPROVAL	2.668	1.204	**	3.154	0.951 ***
COMMITTEE	-1.163	7.115			
Constant	-177.196	156.172		-256.981	50.779 ***
Adj R-squared	0.611			0.630	
Unit Root Test of Residuals Z(t)	-4.873		***	-4.915	***
N	34			34	

*** P < 0.001 ** p < 0.05 * p < 0.1

MacKinnon approximate p-value for Z(t)

Data: Japanese Time Series, 1961-94

Table 6. Error Correction Model of Government LAW (OLS)

DV=	Model 3		Model 4	
Δ LAW (Government)	Coef.	SE	Coef.	SE
DISEQUILIBRIUM _{t-1}	-0.564	0.217 **	-0.396	0.196 *
Δ LAW _{t-1}	-0.272	0.157 *	-0.374	0.152 **
Δ SEAT _{t-1}	-2.241	1.351		
Δ APPROVAL _{t-1}	1.019	1.097		
Δ INFLATION _{t-1}			0.503	0.934
Δ GNP _{t-1}			0.180	1.574
Δ POPULATION _{t-1}			-36.138	28.286
TENURE			9.625	5.108 *
ELECTION			4.398	6.682
COMMITTEE			14.131	9.807
Constant	-5.140	3.057	-15.514	5.519
Adj R-squared	0.344		0.458	
N	32		33	

*** P < 0.001 ** p < 0.05 * p < 0.1

Data: Japanese Time Series, 1961-94

Table 7. OLS of Legislators' LAW

DV=			
LAW (Legislators')	Coef.	SE	
Δ INFLATION _{t-1}	0.107	0.215	
Δ GNP _{t-1}	-0.403	0.370	
Δ POPULATION _{t-1}	-2.622	6.517	
ELECTION	0.953	1.693	
Δ SEAT	0.602	0.351	
TENURE	-0.703	1.281	
Δ APPROVAL	-0.144	0.252	
Δ COMMITTEE	-0.443	2.325	
Constant	14.149	1.388	***
Adj R-squared	-0.007		
N	33		

*** P < 0.001 ** p < 0.05 * p < 0.1

Data: Japanese Time Series, 1961-94