Legislative Production and Ideology Voter Scores: Three Essays

by

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Abstract

Legislators possess supply-side characteristics in the production process of public sector outcomes. Constituents demand legislative services and choose those who most closely resemble their preferences. There are several organizations that rate the performance of congressmen and senators with respect to their votes on identified sets of bills they (the rating organizations) concern themselves with. It is well-known that legislative production is influenced significantly by the ideology of legislators (Kau and Rubin 1979 ; Dougan and Munger 1989; Poole & Rosenthal 1996;Levitt 1996). However, while these scores have been labeled ideology scores it is not clear whether or not they are merely responses to constituent interest (Downs 1957:Kalt & Zupan 1984; Strattmann, 1998;Strattmann 2000). While this question is not novel, with findings on both sides of the discussion containing scholastic merit (Bender and Lott 1996), we seek to analyze the import of these scores on legislative production; do they influence contributions? co-sponsorship behavior on certain bills? Do economic conditions influence the scores themselves? We find evidence of the affirmative in all three cases.

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Introduction

In the last half-century, Public Choice scholars have revolutionized our understanding of public sector production (organization and behavior). Previously, researchers interested in political behavior had argued, in effect, that government officials seek to maximize something loosely referred to as the "public interest." This view was founded on the premise that individuals make different decisions in the political arena than they do in their private lives. That is, *Homo economicus* and *Homo politicus* are different species. But starting with Downs (1957) and Buchanan and Tullock (1962), researchers in the Public Choice tradition argued that individuals always maximize their own private interests, even in a public sector context. Thus, *Homo politicus* is *Homo economicus* and an understanding of political behavior necessarily requires us to examine and appreciate the incentives and constraints facing individuals engaged in public sector activity. Moreover, public sector production can be analyzed as markets that are closely analogous to markets for private goods and services. In a public sector context, citizens *qua* voters demand public goods and services and elect representatives to supply these legislative services.

Because provision of improved environmental quality has characteristics of public goods (joint production, non-excludability), much production of environmental goods and services has taken place in the public sector (as legislation). But important aspects of

the production of environmental legislation have been neglected in the scientific literature. In this dissertation, I attempt to at least partially fill 3 gaps in the literature on environmental policy: (1) whether economic special interests are significant predictors of the pattern of political co-sponsorship of environmental legislation, (2) whether support for environmental legislation is privately-captured by politicians, in the form of campaign contributions and/or voter support, and (3) whether political support for environmental legislation is influenced by macroeconomic conditions.

These 3 issues are bound together by a common thread: whether the private incentives and constraints facing politicians influence their production of environmental legislation. So the analyses contained in the following chapters reflect a Public Choice perspective.

There has been relatively little analysis of bill co-sponsorship behavior generally speaking, and no analysis whatsoever of co-sponsorship of environmental legislation. In chapter 2, I examine whether the pattern of co-sponsorship in the U.S. Senate of a 2007 bill seeking to reduce taxation of harvested timber was related to the strength of forestry interests in each state. That is, was the likelihood that a Senator agreed to co-sponsor this legislation influenced by the economic importance of forestry in his/her state? In a nutshell, the answer is 'yes.'

Increasingly, it seems, private firms are marketing their goods and services with environmental appeals. This suggests that private market producers anticipate higher profits from their pro-environment behavior than they expect in the absence of that pro-environment behavior. In chapter 3, I explore whether this is also happening in political

markets, by examining empirically whether politicians who support environmental legislation reap higher 'profits' than those who do not support environmental legislation, where profits in this political context refer to campaign contributions and votes made to individual legislators. Using data from the U.S. Senate and House of Representatives for the period 2002-2006, I find little evidence that either campaign contributions or votes for incumbent politicians of either party are influenced by their support for environmental legislation. However, I find that campaign contributions to Republican members of the House of Representatives prior to the 2006 general election were influenced significantly by their environmental voting record.

Finally, in chapter 4, I investigate whether political support for environmental legislation is subject to the Law of Demand - - that more is demanded/supplied when price is low than when price is high. Presumably, we can afford more public sector production of environmental goods and services when economic times are good than when economic times are bad. If so, this implies that political support for environmental legislation will ebb and flow with conditions in the macro economy. I conduct a time-series analysis of the relationship between political support for environmental legislation in the U.S. from the early 1970s through 2008 and a measure of economic well-being: per capita income.

An Empirical Analysis of Bill Co-sponsorship in the U.S. Senate:

The Tree Act of 2007

> "Ultimately I vote the economic interest of my district. That's what I'm elected to do, and if it grows jobs and strengthens industry, that's a positive thing."
>
> Artur Davis (U.S. Congressman, District 7-AL)

Introduction

Much empirical analysis of legislative production focuses on determinants of roll call voting on specific bills (recent examples in a forestry context are Mehmood and Zhang, 2001; and Hussain and Laband, 2005). But final voting in legislatures occurs on only a small fraction of bills introduced.[1] This suggests that there is much about the legislative production process that has heretofore escaped the attention of scholars, a large part of which might aptly be referred to as legislative destruction. Indeed, relatively little attention has been paid to the quite visible starting point: bill introduction and co-sponsorship.

Public choice economists view the legislative process as a political market, in which interest groups attempt to influence the production of legislation that has pecuniary and non-pecuniary consequences for them and politicians compete to provide these groups with relevant legislation.

[1] In the 109th Congress (from 2005-2006) there were 6,436 bills introduced in the U.S. Senate and House of Representatives, but only 316 bills were passed by both chambers and signed by the President to become law. http://giffords.house.gov/services/government-information/congress-faq/index.shtml). In their analysis of bill co-sponsorship behavior in the 99th Congress, Wilson and Young (1997) report a passage rate of less than 10% of all bills introduced into the U.S. Senate.

In this context, bill co-sponsorship acts as a signal to interest groups that a legislator is working to promote their interests and thereby maximize his/her rents from such groups.

The introductory quote by Rep. Artur Davis is a reflection of this behavioral motivation relative to his public life. Rep. Davis's sponsorship of the congressional version of Senate Bill 402 is one very visible indication to members of his district that he promotes their interests (in this particular instance, their forestry interests). This bill would allow taxpayers to deduct 60 percent of timber gains from the sale or exchange of timber held for more than one year. The change results in a reduction of the income tax rate on corporations from the regular rate of thirty-five percent to fourteen percent, which is competitive with the tax rates paid by foreign timber companies. According to Rep. Davis (quoted in Orndorff, 2007), "If there are unfair or arbitrary tax burdens facing an industry and that industry is faced with unfair anti-competitive practices from foreign competition, one way we can help is through the tax code."
Two-thirds of the acreage in Alabama is forestland (twenty-two million acres) and 75 percent is owned by non-industrial private landowners. As well, the forest products industry in Alabama (defined broadly to include growers, loggers, mills, etc.) generates thirteen billion dollars a year in revenues and employs approximately 170,000 employees, directly or indirectly.[2] During the 2005-2006 legislative cycle, Rep. Davis accepted $14,500 dollars from PAC's (political action committees) that represent these economically powerful forest interests in Alabama. While this is may seem consistent with his decision to co-sponsor the House companion bill to S402, a single observation does not provide compelling evidence in support of a broader conclusion that the bill co-sponsorship behavior of legislators is related to the strength of economic interests with a state. In this paper we examine empirically whether interest group politics significantly

[2] Total GSP for Alabama in 2006 was $138,534,000,000, see http://www.statemaster.com/graph/eco_gdp-gross-state-product-current-dollars.

explain bill co-sponsorship behavior in the U.S. Senate. Specifically, we focus on co-sponsorship of Senate bill 402, a bill seeking to amend the Internal Revenue Code of 1986 to allow a deduction for qualified timber gains. Senate co-sponsorship decisions concerning S. 402 are assessed using a model that identifies various political and forest industry interests/characteristics. We demonstrate that a Senator's co-sponsorship of this bill is correlated with his/her seniority, tax-cutting ideology, strength of electoral victory in his/her most recent election, campaign contributions received from forestry interests, the relative contribution of forestry to Gross State Product, and the percent of total land in his/her state that is privately owned.

Literature Review

The notion that elected legislators and other public officials maximize their self interest, not some supposed social welfare function, was put forward powerfully by Buchanan and Tullock (1962). Tullock (1965) further developed the argument with specific application to government bureaucrats. Olson (1965) was the first to argue that interest groups' pursuit of special favors granted by government officials leads to reduced economic performance. This was followed by a formal demonstration by Tullock (1967) that such behavior, while privately rational, was socially costly. Ensuing contributions by Stigler (1971), Kreuger (1974), Peltzman (1975) and Becker (1983) helped flesh out our understanding that interest groups demand, and government officials (at all levels) supply, special favors (or rents). Such favors almost never take the form of cash payments from the Treasury, as this is simply too obvious. Rather, they take a myriad of forms - - e.g., regulatory control of entry into a market by a firm's potential competitors, special provisions in the tax code, environmental regulations that impose

differentially high costs on one's competitors, price support programs, no-bid contracts awarded to select firms, and the like.

This model with some nuanced elaboration now is widely accepted by both economists and political scientists as a more accurate description of the behavior of public officials than the so-called 'public interest' theory of government (Kalt & Zupan, 1984; Peltzman, 1984).

In recent years, researchers have started applying this public choice model in a forest policy context, to explore empirically whether interest group activity appears to help explain forest and natural resources policy outcomes. For example, Mehmood & Zhang (2001) find that the relative importance of the forestry and forest products industries in each state correlate significantly with congressional voting on bills that have consequences for forest landowners. Likewise, Zhang and Laband (2004) report that the relative importance of the forestry and forest products industries in each state was a highly significant predictor of whether each state's U.S. senators signed a letter sent to President G.W. Bush in 2000, privately urging him to act on behalf of U.S. timber interests against imports of Canadian softwood lumber (Zhang & Laband (2005).

A completely unexplored aspect of the interest-group theory of politics is the extent to which interest group activities can be tied not only to final voting on bills, but also to bill introductions. It makes intuitive sense that interest groups that stand to gain or lose will lobby elected officials regarding their votes on a bill that comes up for a floor vote. What is not-so-obvious is how active interest groups are with respect to lining up co-sponsorship support for a bill that is being introduced for consideration by the Congress. Most introduced bills are never voted on - - they die in committee, are withdrawn, etc. So the prospective benefits to interest groups of lobbying elected legislators to co-sponsor a given bill appear to be much lower than if

they wait to see whether the bill in question even gets reported out of the (sub)committee it was assigned to before ramping up their lobbying efforts. But even this is speculative, as we simply have little understanding of, or appreciation for, the importance of bill co-sponsorship in the legislative production process.

What little that is known has been aptly summed up by Campbell (1982, pp. 415-16):

"*Though seldom mentioned in treatments of congressional procedures and practices, the cosponsoring of legislation has become an integral part of the legislative process in both houses of Congress. There are at least three reasons to suspect that the cosponsoring of proposed legislation is important in the legislative process. First, there is a significant effort to recruit members as cosponsors. Most members when introducing legislation routinely circulate "Dear Colleague" letters to the entire membership explaining the desirable features of their proposals and requesting support in the form of co-sponsorship.*

Second, both the number and the diversity of cosponsors (e.g., their diversity by party, or in ideology) are often cited by legislators during floor debate and in public discussions as evidence of a bill's support. For instance, one member prefaced his remarks in floor debate by noting that he was acting "in concert with the 100 members of this body who have cosponsored legislation of similar intent during this Congress."

Third, the importance of cosponsoring legislation is indicated by how frequently members of each house decide to cosponsor. To the typical congressman, the decision to cosponsor a bill seems to be neither a rare nor a routine matter. During the 95th Congress, the typical member of the House cosponsored 147 bills and the typical senator cosponsored 131 bills."

According to Campbell, legislators expend resources and reputational capital both to co-sponsor legislation and to convince others to co-sponsor also. While there is some theoretical speculation as to *why* Congressman and Senators co-sponsor legislation, there is little empirical research that identifies factors that are significantly correlated with bill co-sponsorship. Adherents of electoral-connection theories of legislative politics view bill co-sponsorship as position-taking by rational legislators as a means of communicating cheaply but effectively with constituents (e.g., Campbell 1982). However, in their analysis of *when* a congressman co-

sponsors a bill, Kessler and Krehbiel (1996) find evidence that congressmen use co-sponsorship to communicate *within* the legislature. Extremists on either side of the political isle are early sponsors; they are followed later on by more moderate legislators. Fowler (2006) augments the intra-legislative signaling argument by proposing a model where the connectedness of members is examined. Indeed, he suggests that patterns of bill co-sponsorship may serve to measure those among Congress who are influential.

Wilson and Young (1997) argue that bill co-sponsorship is an overrated cue. That is, within a legislative body co-sponsorship provides a signal concerning members' expertise and interest in a bill at the time of introduction, but it serves little real purpose from then on.

Campbell (1982) examined the number of bills co-sponsored by members of the U.S. House of Representatives and Senate. He argues that the intensity/frequency of bill co-sponsorship by U.S. Senators is influenced by four factors: electoral margin of victory, party affiliation, ideology, and general legislative activity. Campbell's work was done while the interest-group theory of legislative production was still being developed; therefore, he focused his analysis on legislator characteristics and did not even consider possible explanatory variables that might have served as proxies for interest group activity. Indeed, to our knowledge, no one has explored empirically whether the interest-group theory of politics is relevant at the bill introduction stage of the legislative production process.

In this paper, we provide compelling evidence that demand-side factors (related specifically to the economic importance of forestry within a state) as well as supply-side factors (consistent with Campbell's previous work) significantly influence the likelihood of bill co-sponsorship in the U.S. Senate.

Methods

We are specifically interested in whether the presence and/or relative importance of certain interest groups located within a legislator's political jurisdiction is statistically correlated with that legislator's co-sponsorship of legislation favored by those interest groups. Because data that reflects the presence and/or relative importance of interest groups typically is aggregated at the state level and not available at the congressional district level, we focus our empirical analysis on co-sponsorship behavior of U.S. senators.

We use a traditional roll call analysis model and logistic regression techniques to analyze the co-sponsorship decisions on Senate Bill 402. In general, we expect bill co-sponsorship to be influenced by demand-side considerations, reflecting constituent interests, and supply-side considerations, reflecting the willingness and ability of a Senator to 'go public' with his/her support for a given piece of legislation.[3] With respect to S402, it is important to specify believably the relevant constituent interests; our quote from Rep. Davis offers suggestions. We can proxy the "economic interest" in S402 in a given state by measures of the relative contribution of private forestry (industrial and non-industrial) to the state economy. This might take the form of total employment (indicated by Rep. Davis) in the forestry sector, the forestry sector share of gross state product, campaign contributions by forestry interests to a Senator, the fraction of land in a state devoted to forestry, and so on. No doubt, some of these measures will be highly correlated with each other.

With this in mind, the specific model we estimated is:

$$(1)\quad Cosponsor_i = \alpha_0 + \alpha_1 Forestry\$\$_i + \alpha_2 \%PrivateLand_i + \alpha_3 \%ForestGSP_i + \alpha_4 NTUscore_i + \alpha_5 \%Vote_i + \alpha_6 \%Seniority_i + \varepsilon_i ,$$

[3] Grier and Munger (1986, p. 349) put this point rather succinctly: "Legislators possess political assets that economic interest groups may find valuable in pursuing their goals."

where

$Cosponsor_i$ = 1 if Senator i cosponsored S402; 0 otherwise;

$Forestry\$\$_i$ = the amount of campaign contributions received by Senator i during the 2005-2006 and 2007-2008[4] election cycles combined from forestry interests, both individuals and Political Action Committees (PACs);[5]

$\%ForestGSP_i$ = the percentage of state i's gross state product (GSP) derived from forestry and forest products[6];

$\%Privateland_i$ = acres in state i that are private as a percent of total acres in the state;

$NTUscore_i$ = Senator i's 2006 score assigned by the National Taxpayers Union. Scaled between 0 and 100, it reflects the percentage of bills identified by the NTU that each senator voted in accord with the NTU's desired position (typically to lower taxes).

$\%Vote_i$ = the % of the vote Senator i obtained in the last election (s)he ran in. [7]

Seniority = Senator i's current ranking in the senate based on his/her time in office.

ε_i = the error term assumed to be logistically distributed.

[4] We identified contributions from the 2007-2008 legislative cycle only through May 2008 because relevant aspects of Senate Bill 402 were included in the Farm Bill that was passed on May 15, 2008. While it is possible that contributors may indeed donate money after the fact in response to passage of favorable legislation, such an analysis is not possible within the scope of this paper.

[5] We explicitly model the legislative production process as a temporal one in which prospective demanders of more favorable tax treatment of timber sales convey this desire to a Senator *prior to and post* introduction of a bill providing tax relief. That is, campaign contributions that reveal an interest group's intensity of desire for a policy outcome precede and coincide with bill introduction. One might argue that interest groups will be loathe to pony up money unless and until they are assured that a desired bill actually will be passed, thus campaign contributions will post-date bill passage and, obviously, bill introduction as well. While we don't confine our attention to the relationship between bill co-sponsorship and campaign contributions that *precede* bill introduction, we identify the possibility of a more time sensitive contribution strategy as a line of future research. See Stratmann (1998) for analysis in a Roll-Call voting context.

[6] We use four categories to compile the contribution of the forest industry to the overall GSP of a state. These include Forestry, fishing, and related activities; wood product manufacturing, furniture and related manufacturing activities, and paper manufacturing.

[7] Although Campbell (1982) found margin of victory to be a significant predictor of bill co-sponsorship behavior, we use percent of total vote and not margin of victory. However, the two metrics obviously are close substitutes.

In virtually every study of floor votes on particular bills, campaign contributions have been found to be a statistically important explanatory variable. As in private markets for goods and services, the 'price' paid for a legislative service (in the form of campaign contributions) reflects the demanders' intensity of desire. Prospective contributors with an interest in legislative favors donate more money to legislators who support desired legislation than to legislators who do not support desired legislation. This is true regardless of whether or not a politician does so as a *quid pro quo* transaction or believes in the position from an ideological standpoint. Drawing from this established result, we expect that the likelihood that a given senator co-sponsors legislation favorable to timber interests is positively related to the amount of campaign contributions received from those interests.[8] Thus, we expect the coefficient on Forest$$ to be positive.

Zhang & Laband (2005) use several timber-related economic variables to explain whether or not U.S. Senators signed a private communication to President George W. Bush, urging him to restrict imports of Canadian softwood. Drawing from their work, we use the share of Gross State Product (GSP) derived from forestry and forest products as an indication of the relative importance of private forestry. The greater the forestry-related contribution to GSP in a congressional district or state, the more likely is the district/state to have: (a) strong economic interests tied to the success of the forest industry, and (b) lots of potential voters who own timberland (or other land that could be converted to timber production) and thus would benefit from passage of S.B.402. Following the lead provided by Rep. Davis, we expect the likelihood that a senator co-sponsored S.B.402 to increase as this percentage increases. Similarly, we expect a positive relationship between the likelihood that a senator co-sponsored S.B.402 and the

[8] Because the tax benefits provided by S402 accrue to all private owners of timberland, whether private landowners or industrial timber companies, we identify all forestry-related campaign contributions received by each senator, without separating them by donor category.

percentage of privately held land in each state. As suggested above, as the percentage of privately-held land increases, so does the likelihood that land owners may benefit from (actually or potentially), and therefore support passage of, a bill lowering taxes on timber sales.

Turning to supply-side characteristics, it is well-known that legislative production is influenced significantly by the ideology of legislators (Kau and Rubin 1982 ; Nelson 2002; Downs 1957; Dougan and Munger 1989; Kalt 1981; Peltzman 1984). There are several organizations that rate the performance of congressmen and senators with respect to their votes on identified sets of bills they (the rating organizations) concern themselves with. Since S.B.402 seeks to lower taxes on the sale of timber, it is possible, if not likely, that each senator's ideological stance on taxes (favors lower taxes generally versus favors higher taxes generally) may have influenced the likelihood that (s)he co-sponsored the bill. With respect to the scoring by the National Taxpayer Union, a higher score indicates that an individual opposed higher taxes and/or spending and a lower score indicates that an individual voted in favor of higher taxes and/or spending.[9] Thus, we expect a positive relationship between a senator's NTU score and the likelihood that (s)he co-sponsored S.B.402.

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[9] From the NTU website (http://www.ntu.org/main/misc.php?MiscID=13): Every year National Taxpayers Union (NTU) rates U.S. Representatives and Senators on their actual votes--***every*** vote that affects taxes, spending, and debt. Unlike most organizations that publish ratings, we refuse to play the "rating game" of focusing on only a handful of congressional votes on selected issues. The NTU voting study is the fairest and most accurate guide available on congressional spending. It is a completely unbiased accounting of votes. NTU assigned weights to the votes, reflecting the importance of each vote's effect on federal spending. NTU has no partisan axe to grind. All members of Congress are treated the same regardless of political affiliation. Our only constituency is the overburdened American taxpayer. Grades are given impartially, based on the Taxpayer Score.

The Taxpayer Score measures the strength of support for reducing spending and opposing higher taxes. In general, a higher score is better because it means a member of Congress voted to spend less money. The Taxpayer Score can range between zero and 100. We do not expect anyone to score a 100, nor has any legislator ever scored a perfect 100 in the multi-year history of the comprehensive NTU scoring system. A high score does not mean that the member of Congress was opposed to all spending or all programs. High-scoring members have indicated that they would vote for many programs if the amount of spending were lower or if the budget were balanced. A member who wants to increase spending on some programs can achieve a high score if he or she votes for offsetting cuts in other

We expect the likelihood of bill co-sponsorhip to decline with legislative seniority, for straightforward economic reasons. With increasing tenure in office, the sheer amount of information that constituents have been provided (by a variety of sources) about their legislator also increases. This implies that over time there is lower uncertainty among constituents about how their legislator will react to different policy proposals. This reduces the marginal return, to the legislator, of signaling his positions on bills via co-sponsorship which further implies that a senior legislator will be less likely than a junior legislator to co-sponsor proposed bills.

Finally, other things held constant, we expect to observe a negative correlation between the percent of the vote won by a senator in his/her most recent election and the likelihood that (s)he co-sponsored S.B.402. Again, this is based on the empirical work of Campbell (1982), who reported that more secure members in both the House and Senate co-sponsor fewer pieces of legislation than do less secure members. Campbell's explanation is that junior members of the senate enjoy closer contact with a larger portion of their chamber, receive a large amount of media attention, and also are less likely to have specialized in particular policy areas.

Because the distribution of responses to our dependent variable, co-sponsorship of S.B.402, is limited to Yes (1) or No (0), logistic regression is an appropriate regression estimation technique (Woolridge 2006). In logistic regression, the probabilities of each outcome are:

$$\mathrm{P}(Yi = 1) = Pi = \frac{e^{Xi\beta}}{1 + e^{(Xi\beta)}} \text{ and}$$

$$\mathrm{P}(Yi = 0) = 1 - Pi = \frac{1}{1 + e^{(Xi\beta)}},$$

programs. A zero score would indicate that the member of Congress approved every spending proposal and opposed every pro-taxpayer reform.

the likelihood function for the model is:

$$L = \prod_{i=1}^{n} P_i^{yi} (1 - Pi)^{(1-yi)}, \text{ and}$$

the marginal effects for each independent variable, at each observation can be calculated as:

$$\frac{\partial Pi}{\partial Xi} = Pi(1 - Pi)\beta,$$

where, P*i* and (1-P*i*) are both probabilities that the dependent variable takes the value "1" and "0", respectively, and β is the estimated coefficient for each variable or observation.

Our data set is based on the 89 Senators for whom we had complete information on all variables included in our analysis. By virtue of deaths, retirements, and special elections for other reasons, several states had newly-elected senators; since NTU scores are not available for legislators with less than 1 year of service, this created several observational casualties. Sample statistics are reported in Table 1.

Results

Since our goal was to identify factors associated with co-sponsorship of S.B.402, as opposed to developing a predictive model, we estimated specific models drawn from equation (1), rather than using forward or backward-selection estimation procedures. Selected logistic regression estimation results are reported in Table 2 and discussed below.

Analysis of Pearson correlation coefficients calculated with respect to our independent variables revealed significant correlation between specific pairs of variables. NTU score appears as an explanatory variable in all of the models. In unreported estimation results, we included a party dummy which we found to be a statistically significant predictor of co-sponsorship of S.B. 402. However, the Pearson correlation coefficient between Party and NTU score was 0.92

Table 1. Descriptive Statistics

Variable	Mean	Std.Dev.	Minimum	Maximum	
Co-sponsor[a]	0.26	0.44	0	1	
Forest$$ (x1,000)[b]	15.93	26.18		0	157.33
Vote%[c]	62.48	10.15	48.60	99.00	
Seniority[d]	15.94	10.77	2.00	50.00	
NTU score[e]	47.56	31.76	9.00	92.00	
% Forest GSP[f]	1.18	0.95	0.14	3.93	
% Privateland[g]	79.87	22.85	10.78	99.08	

N= 89

a. http://thomas.loc.gov/cgi-bin/bdquery/z?d110:SN00402:@@@@P Taken from the Library of congress bill record

b. taken from the center for responsive politics. http://www.opensecrets.org/

c. taken from the National Journal website, which reports election outcomes.

d & e. National taxpayers Union score. http://www.ntu.org/main/

f. Bureau of economic analysis. http://www.bea.gov/regional/gsp/

g. Devised by the national wilderness institute, which reports public land holdings. The authors subtracted the % figures and subtracted from 100 to get the private land holdings. These do not include land held by municipalities. http://www.nrcm.org/documents/publiclandownership.pdf

($p<.0001$).[10] In our opinion, the NTU score is a more appropriate indicator of ideology than party, with respect to a *tax*-related bill such as S.B. 402. With a dummy variable denoting party, the individual's intensity of preference (for or against tax cutting) is subsumed beneath an all-or-

[10] H_0: *rho* = 0 (the null hypothesis); H_a: *rho* <> 0 (the alternative hypothesis)
If the p-value for the test is small (usually less than 0.05) then the conclusion is that *rho* is ***not*** 0, thus the relationship is *statistically* significant. The researcher will then have to make a professional judgment to determine if the association is important in terms of the context of the focus of the analysis.

nothing score that may reflect other, non-tax, ideology. Put differently, the variation among observations is much larger using the NTU score than when the party dummy limits the response to one of two possibilities; this variance is more likely to reflect each senator's ideology with respect to a tax-cut bill than is the dummy variable for party.

Table 2. Logistic Estimation Results

Explanatory Variable	Coefficient Estimate	Odds Ratio	Coefficient Estimate	Odds Ratio	Coefficient Estimate	Odds Ratio	Coefficient Estimate	Odds Ratio
Intercept	-2.6539		-6.3737**		-0.0705		-2.0211**	
	(2.4525)		(1.6762)		(2.0038)		(1.6366)	
Forest$$	0.0281**	1.029	0.0328***	1.033				
	(0..0113)		(0.0125)					
%ForestGSP					1.0787***	3.186	1.0916***	2.979
					(0.3197)		(0.3090)	
%PrivateLand	0.0348**	1.035	0.0314**	1.031				
	(0.0168)		(0.0163)					
NTU score	0.0228**	1.023	0.0182*	1.018	0.0255**	1.026	0.0190*	1.019
	(0.0094)		(0.0099)		(0.0103)		(0.0105)	
%Vote	-0.0348*	0.952			-0.0647**	0.937		
	(0.0308)				(0.0322)			
Seniority			-0.1113**	0.895			-0.1227**	0.885
			(0.0442)				(0.0487)	
% concordant	80.6		84.8		85.0		86.2	
-2 Log Likelihood	78.310		72.550		73.378		69.340	
Likelihood ratio	23.40***		29.16***		28.33***		32.37***	

N = 89
standard errors in parentheses
*** significant at 0.01 level ** significant at 0.05 level * significant at 0.10 level

Other observed correlations between pairs of possible explanatory variables led us to estimate models with different combinations of explanatory variables. Our intent was two-fold: (1) to avoid models plagued by multi-collinearity, and (2) to reflect the statistical viability of alternative, albeit related, explanatory variables. For example, in models 1 and 2 we include forestry-related campaign contributions received by each senator (Forestry$$) as an explanatory variable. Since these contributions are, as might be expected, highly correlated with the

importance of forestry to GSP (Pearson correlation coefficient = 0.43, p <.0001), in models 3 and 4 we include %ForestGSP as an explanatory variable, without including Forestry$$ in the model. Similarly, Seniority and % of vote won were found to be correlated; the Pearson correlation coefficient between Seniority and % of vote won is .36 (p = 0.0004). We include % Vote won in models 1 and 3, and Seniority in models 2 and 4.

As expected, we find that the likelihood that a specific senator co-sponsored S.B. 402 increased with: (1) Forestry$$ - - the total amount of contributions (s) he received from forestry-related sources (individuals and/or interest groups), (2) %PrivateLand - - the percentage of all land in the senator's state that was privately-owned, and (3) %ForestGSP - - the percentage of Gross State Product in the senator's state that was derived from forestry. However, as indicated in models 3 and 4, we consistently found that in the presence of GSP, other forestry-related explanatory variables such as Forestry$$ and %PrivateLand are statistically insignificant. This is plausible, as %ForestGSP is likely to reflect both the relative contribution of the forest sector to employment in a state, as well as the relative strength of forestry-related special interests compared to other economic interests. This finding is consistent with those of Mehmood and Zhang (2001) who argued that economic interests in their respective districts loom large with respect to Roll Call voting by members of Congress. Specifically, they found that House members from districts characterized by a significant construction sector were more likely to support the Tellico Dam legislation as it provided a large project for constituents employed in the construction industry. Inclusion of the percent of private land in a state in our model follows the same logic. The more private land in a state, the greater the number of land owners that would benefit from the proposed change in the tax code contained in S.B. 402. Because these individuals are direct beneficiaries of the proposed tax change, they may be more likely to vote

than other individuals who do not receive such politically-conferred benefits. More pointedly, they may be more likely to vote to re-elect the sponsors of such legislation and/or to contribute significant amounts of money to help re-elect politicians who can credibly claim - - through co-sponsorship - - to have at least tried to secure such benefits for their constituents.

The odds ratio that reflects the estimated impact of %ForestGSP is quite sizable - - indicating that, for example, doubling a state's %ForestGSP from the sample mean of 1.18 percent triples the likelihood that the senator(s) from that state co-sponsored S.B. 402. Likewise (from models 1 and 2), every additional $10,000 that a senator received in campaign contributions from forestry-related sources increased the likelihood that (s) he co-sponsored S.B. 402 to approximately 30 percent up from 25 percent. We are most interested in the impact of this variable on co-sponsorship decisions as the other demand side variables are unlikely to change as quickly as campaign contributions from the interested parties.

In terms of supply-side factors, we find that the likelihood of co-sponsorship of S.B. 402 was: (1) positively correlated with a senator's National Taxpayers Union score, as expected, and (2) correlated negatively with both the senator's percent vote won in his/her most recent election and his/her seniority, also both expected. The sign and the estimated relationship between seniority and the likelihood of co-sponsorship are negative. This means that, other things equal, junior senators were more likely than senior senators to co-sponsor S.B. 402.

Discussion

The motivation for conducting this analysis was to determine whether there is statistically significant empirical evidence that is consistent with the hypothesis that economic interests in a legislator's state or district influence his/her bill co-sponsorship behavior. Our analysis of the pattern of co-sponsorship of the 2007 Tree Act (S.B. 402) in the U.S. Senate suggests that co-

sponsorship indeed was affected by the forestry-related explanatory variables we examined. In addition, we find that legislator-specific characteristics (ideology, seniority, and strength of electoral victory in the most recent election) also are significant predictors of bill co-sponsorship. Our best model, while fairly parsimonious, correctly predicted 86 percent of the co-sponsorship decisions relative to S.B. 402. While our findings are highly consistent with the well-established result that the importance of economic interest groups in a state influences roll call voting on legislation and policy implementation, we regard them as preliminary rather than definitive.

Interest groups of all persuasions are vitally concerned with legislative outcomes, taken broadly to include roll call (floor) votes, decisions made in committee or subcommittee, etc. Because of the relative visibility of roll call votes (i.e., data is readily available), the attention of empirical researchers has tended to focus more-or-less exclusively on this specific aspect of legislative production. But the proportion of bills that reaches a floor vote is a small fraction of those that are introduced. This suggests that there is a lot of potentially important, if not occasionally critical, legislative activity that has heretofore escaped scientific analysis. In particular, a bill must be introduced to have any possibility of eventually receiving a roll call vote. But the mere fact that most introduced bills never reach a floor vote clearly implies that not all bill introductions are created equal. To our knowledge, there has been no previous analysis of the relationship, if any, between patterns of roll call voting and patterns of bill co-sponsorship or, for that matter, of the possible relationship between bill co-sponsorship, roll call voting, and campaign contributions.

There are many questions that command answers in order to develop a better understanding of this policy nexus. For example, does the likelihood and/or speed that a bill reaches a floor vote depend on the number of co-sponsors? Does either depend on specific

attributes of the co-sponsors, such as their seniority, presence on certain critical (sub)committees, etc.? Similarly, are the outcomes of floor votes influenced by these aspects of bill co-sponsors?

S.B 402 died in committee the first time it was introduced, however The Tree Act was successfully tucked into the 2008 Farm Bill. Once a bill has been introduced and the pattern of co-sponsorship has been established (and is therefore well-known within the legislature), possibilities for the merger of bills and/or horse trading on bills may become apparent. Bills that may not stand much of a chance on their own may be merged into an omnibus bill where supporters each get a little something, even at the cost of agreeing to support specific provisions that they ordinarily would vote against.

The answers to the questions posed above have powerful and comprehensive relevance to the forestry community writ large, since legislative decisions have the potential to radically alter the economic landscape within which companies, shareholders, NGOs, landowners, and demanders of forest products operate. There is a concomitant incentive for members of the forestry community to find ways to generate desired political outcomes generally and especially with respect to items of specific interest. But the critical question is, 'what are the best strategies to adopt in pursuit of this general goal?'

An economist will argue that the best strategies are defined as those which yield the maximum benefit per dollar spent to influence political outcomes. We know, for example, that in terms of maximizing political influence generally a company like Weyerhaeuser may be much better served by contributing money to the chair of the Senate Agriculture committee than to either of the U.S. Senators from the state of Washington. But with respect to generating political support for specific forestry-related items, it may be quite critical to have one or both of the Senators from Washington co-sponsor desired legislation. We just do not know (yet) how

important this may be. But clearly, at least from our perspective, if members of the forestry community are not aware of important relationships in this regard, they inadvertently may be failing to take advantage of critical opportunities to influence legislative outcomes. In short, we believe that additional research is needed in order to develop a greater appreciation for the importance of bill co-sponsorship in the policy process and to identify potential opportunities for members of the forestry community to influence legislative outcomes.

Economic considerations have been shown to exert significant impact on patterns of roll call voting by legislators. In this paper, we have demonstrated that economic considerations exert significant impact at an even earlier stage of the legislative production process - - bill co-sponsorship. One take-home message from this line of research is that readers should understand that public policy is not created in a vacuum or by legislators acting altruistically in the 'public interest.' Interested parties seek to influence legislative outcomes and their presence (and success) in the process is reflected by patterns of campaign contributions, the pattern of roll call votes, and patterns of bill co-sponsorship. A second take-home message for the forestry community specifically, is that defining success with respect to legislative outcomes narrowly in terms of roll call votes may cause interested parties to overlook strategic opportunities to influence legislative outcomes earlier in the legislative process. But these opportunities may not only be quite important, they may be quite cost-effective.

Political Ramifications of Voting Green:

Evidence from the 2002-2006 Congressional Elections

> "All I can say is when you ask politicians what subjects come up at town-hall meetings-which is something I do a lot - issues like global warming and environmentalism never come up."
>
> TIME Magazine journalist David Brooks (2005)

Introduction

Corporate social responsibility implies a comprehensive mission/objective that does not begin and end with profit maximization. Pressured by non-governmental organizations (NGOs) and the like, companies voluntarily have begun implementing policies that go further than restrictive government regulations. This 21st century business model may not be without merit; indeed, there has been a good bit of discussion recently about whether embracing environmentally 'friendly' policies and technologies pay off financially for firms. At least one corporate giant seems to think that 'going green' will generate more profits. In a recent Wall Street Journal article[11], General Electric (the world's largest publicly held company) CEO Jeff Immelt argued that "new restrictions on green house gas emissions would have a *de minimus* impact on my investors." As well, Immelt believes that additional profits will be generated by further carbon emission controls that allow the company to capitalize on its robust line of 'friendly' products—wind turbines, efficient jet engines, etc. "Wind, water, lowering emissions,

[11] Will Social Responsibility harm business, (May 18, 2005)

having an environmental service business…the economics of scarcity are going to drive lots of technological innovation over the next ten, 20, 30 years," Immelt says. "This is an approach to growing the company faster."

We find Mr. Immelt's pronunciations to be intriguing, because they imply a perception on his part that there is now a sizable level of public support for firm-specific actions that are viewed as environmentally 'friendly.' Further, he evidently believes that his company is (or will be) positioned to benefit financially from this shift in consumer preferences. We wondered whether such a shift in consumer preferences also is reflected in production decisions made in the public sector. While production in a legislative context is not characterized overtly by profits, elected officials may benefit from the production decisions they make by trading in the coins of that realm: campaign contributions and votes. Elected politicians normally are quick to sense and exploit such 'profit' opportunities.

Mr. Immelt's sentiment about the possible profitability of corporate environmentalism notwithstanding, there is reason to believe that such a payoff, on balance, may not exist in the public sector. Following up the quote at the beginning of this paper, TIME Magazine journalist David Brooks added: "In surveys too, when you ask people for the 10 issues that matter most to them, it's always health care, jobs, education, gas prices. Environment is never there." This is highly consistent with remarks made by Representative Artur Davis (AL-7) when co-sponsoring recent legislation to lower the effective income tax rate on timber sales: "Ultimately I vote the economic interest of my district. That's what I'm elected to do, and if it grows jobs and strengthens industry, that's a positive thing" (Orndorff, 2007).

With this in mind, the empirical question we explore in this paper is whether having a demonstrable record of support for environmental legislation has a significant impact on a

congressman's campaign contributions and/or percent of vote won - - that is, is there a 'payoff' for producers who embrace 'environmentally friendly' production in politics? We empiricize this question by using League of Conservation Voter (LCV) scores as a barometer of a Congressman's support for (co-production of) environmentally friendly legislation. Focusing on the 107th- -109th Congress, we estimate the impact of LCV scores on percent of vote won in the 2002, 2004 and 2006 general elections and campaign contributions received in the election cycle building leading up to each of these elections. Controlling for other factors that influence campaign contributions and votes received, we find that LCV scores were not important to voters in any election cycle and that contributors did not react to LCV scores until the 2006 election. In that election, they punished Republicans with differentially high LCV scores.

Literature Review

Our analysis starts from a different perspective than Riddel (2003), who examined the donation strategies of environmental political action committees (E-PACS). Rather, we adopt the perspective of a prospective producer of environmental legislation: the individual legislator. Presumably, his (her) behavior with respect to any specific bill introduced reflects careful weighing of the present value of a stream of anticipated costs and benefits tied, directly or indirectly, to that vote. In certain measure, these costs and benefits may be observable to a third party in the form of campaign contributions and/or votes. Indeed, we focus our analysis on both of these measures.[12] However, we assume that the marginal utility of a campaign contribution dollar received by the legislator is the same irrespective of the source donor. Therefore, unlike Riddel (2003), we do not restrict our empirical examination of campaign contributions to those

[12] We acknowledge, of course, that the complete set of a legislator's anticipated bill-specific costs and benefits presumably also includes highly personalized (ideological) components that may not readily be quantifiable.

that derive exclusively from E-PACS. That is, we wish to ascertain whether a legislator's campaign contributions in aggregate are affected by his/her support for environmentally friendly legislation.

Undoubtedly the most commonly-used indicator of political support for environmentally friendly legislation is the LCV's Environmental Scorecard (e.g., Shipan and Lowery, 2001; Nelson, 2002; Riddel, 2003; Hussain and Laband, 2005). This rating, developed *ex post* for each legislative session, scores each representative and senator according to the percentage of the time they cast votes in accordance with the LCV-supported position on a selected set of environment-relevant bills that advanced to floor votes. Thus, the values range from 0 – 100. The Environmental Scorecard represents "…the consensus of experts from 22 environmental and conservation organizations who selected the key votes on which members of congress were graded."

A particular drawback to LCV scores is that they are available only for individuals who are in a position to influence production of environmental legislation (i.e., incumbent congressmen, not challengers). A second drawback is that they reflect only legislators' behavior with respect to a select set of bills that received floor votes; they do not reflect a more comprehensive spectrum of ways in which an individual can advance (or obstruct) environment-relevant legislation. However, since the scores are constructed from votes on a number of different bills, they arguably reflect each individual's breadth of support for the environment, which may, in turn, be taken as a sign of his/her degree of commitment to environmental protection[13]. Riddel (2003) used E-PAC contributions as an alternative measure of candidate eco-labeling. However, in her analysis of individual donations to U.S. Senate candidates, Riddel

[13] Unfortunately, if a Congressman does not vote at all on a bill due to any number of reasons, he/she's vote on that particular bill is counted as a vote against the stated position of the LCV.

looked only at whether or not each of 4 E-PACs donated to each candidate and did not examine the intensity of the signal (the amount donated). One might also use candidates' stated positions on environmental issues as an indicator (Project Vote Smart). But, of course, stated positions do not necessarily imply policy fidelity, so basing empirical analysis on such a variable may be problematic[14] (Ringquist 2004). We use LCV scores as our indicator of each legislator's documented record of support for the environment and estimate the impact on both total campaign contributions received and on the percent of vote won in the general election.

There is considerable previous research on the determinants of vote percent won and campaign contributions (e.g., Jacobson, 1978; Grier and Munger 1985; Bronars and Lott, 1997; Dix and Santore, 2003; Riddel, 2003). Following in this tradition, we characterize the percent of vote won by a legislator in any given election as reflecting his/her political vulnerability (as indicated, perhaps, by the percent of votes won in the previous general election and/or the level of campaign contributions received by his principal opponent in the current election cycle), how much money he has available to spend (indicated by contributions to his campaign), and his political party affiliation. Onto this general model, we graft a measure of the individual's support for 'pro' environmental legislation, defined in terms of his/her LCV score. In general, campaign contributions received by a candidate in any given election are influenced by many of the same factors that influence votes received, with one important difference: the current political vulnerability of a legislator in a given election (and thus the incentive of especially-interested parties to invest money to help ensure that the legislator remains in office) can be proxied *ex post* by the actual closeness of that race.

[14] The Project Vote Smart sample is truncated as not all incumbents and challengers participate in the political courage test.

Our empirical analysis focused on U.S House races in the 2002, 2004, and 2006 general elections; the specific models we estimated are:

$$(1)\ \text{Contributions}_i = \alpha_0 + \alpha_1 \text{PoCC}_i + \alpha_2 \text{Sen}_i + \alpha_3 \text{Age}_i + \alpha_4 \text{PrevVote}_i + \alpha_5 \text{PrevVote}^2_i + \alpha_6 \text{CurrVote}_i + \alpha_7 \text{CurrVote}^2_i + \alpha_8 \text{Par}_i + \alpha_9 \text{LCV}_i + \varepsilon_i$$

$$(2)\ \%\ \text{of Vote Won}_i = \beta_0 + \beta_1 \text{Contributions}_i + \beta_2 \text{PoCC}_i + \beta_3 \text{PoCC}^2_i + \beta_4 \text{Sen}_i + \beta_5 \text{PreviousVote}_i + \beta_6 \text{PreviousVote}^2_i + \beta_7 \text{Par}_i + \beta_8 \text{UnOpposed}_i + \beta_9 \text{LCV}_i + \varepsilon_i$$

Where

Contributions_i = total PAC plus individual contributions ($'s) received by each winning candidate during the 2001-2002, 2003-2004, 2005-2006 general election cycle for the U.S. House of Representatives, as reported by the Center for Responsive politics.[15]

PrevVote_i = the percentage of the vote that the winning candidate received in the previous general election;

CurrVote_i = the percentage of the vote that the winning candidate received in the current general election.

PoCC_i = the amount of money raised by the winning congressman's principal opponent in the general election cycle;

LCV_i = the League of Conservation Voters environmental score for the legislator, in the year prior to the general election in question;

Seniority_i = the number of years the congressman had served in the House of

[15] www.opensecrets.org

Representatives up to the general election;

Age_i = the congressman's age as of January 1, 2002, 2004 and 2006, respectively;

$Unopposed_i$ = 1 if legislator i was unopposed in his/her most recent election; 0 otherwise;

ε_i = the error term, assumed to be i.i.d.

We expect campaign contributions received by individual i prior to the 2002 (2004, 2006) general election to be influenced negatively by how badly he beat his opponent in the 2000 (2002, 2004) general election. Other factors held constant, there is less pressing need to donate significant sums of money to a legislator who crushed his opponent in the most recent election, because barring an unforeseeable event that besmirches the individual, (s)he is not as likely to face serious opposition in the current election as an otherwise similar candidate whose most recent electoral victory was narrow. However, as the general election draws nearer, the results from the past election may be a less important predictor of the legislator's political vulnerability than his actual opponent's perceived strength. Since campaign contributions are more likely to influence the outcome of a close election than a non-close election, campaign contributions should be greater in hotly-contested elections (proxied *ex ante* by the level of campaign contributions raised by the legislator's principal opponent and proxied *ex post* by the actual election results) than in blowout elections[16]. We expect the amount of money contributed to legislator i to be related positively to his seniority and negatively to his age. In general, more senior legislators are able to produce better political outputs than less senior legislators, *ceteris paribus*; they will, thus, command greater investment by parties with interests in legislative

[16] In our analysis both unopposed and current vote variables were attempted for Campaign Contributions. According to our analysis current vote is a more accurate marginally as far as contributors are concerned. While both measure how much of the vote a candidate captured, current vote is much more sensitive to changes and therefore a more accurate measure of the impact on contributor's donation strategies.

outcomes. However, holding seniority constant, donors have a greater expected time horizon for reaping the political returns to campaign contributions with younger legislators than older ones. We include a control for party (Republican = 1) to investigate whether there were significant party-based differences in campaign contributions during the 3 election cycles we examined. Finally, we look to the sign and significance of the estimated coefficient on LCV to reveal whether legislators' demonstrated support for pro-environment legislation affected the overall level of campaign contributions received.

We expect the percent of vote won by legislator i to be positively related to the amount of money (s)he raises and inversely related to the level of campaign contributions raised by the incumbent's principal opponent in the general election (Jacobson, 1978). As with the level of campaign contributions received, we expect a legislator's electoral success in the 2002 (2004, 2006) general election to be influenced by how badly he beat his opponent in the 2000 (2002, 2004) general election. With respect to percent vote won, however, we expect a positive relationship. That is, a legislator who beat his opponent handily in the previous election is not as likely to face serious opposition in the current election as an otherwise similar legislator who narrowly beat his opponent in the most recent election. In the extreme, a sufficiently strong (i.e., well-liked) legislator will face no challenger; legislators who run unopposed surely will receive a significantly larger percentage of votes than those who are actively challenged. Two of the three election years we focus on were mid-term elections, during which the party of the president typically suffers losses according to Erickson (1988). Since Republican George W. Bush was President of the United States from 2001 – 2008, this should be reflected in lower vote percentages for Republican legislators, especially in 2006. We expect vote percent to be related positively to seniority for the simplest of reasons: success breeds success. Long-term winners

have demonstrated consistently that they are well-liked by the voters in their districts. Finally, with respect to the impact of a legislator's support for pro-environment legislation on the votes (s)he receives from the electorate, Riddel (2003) found that donations by environmental Political Action Committees (EPACs) have a positive impact on the likelihood of victory in U.S. Senate elections. In turn, E-PAC contributions, which serve an eco-labeling function in Riddel's analysis, are impacted positively by the candidate's LCV score. So the impact of an individual's environmental voting record on the likelihood of electoral success was indirect, rather than direct. This gives us reason to expect a positive relationship between LCV scores and the percent of vote won. Riddel also indicates that environmental extremist candidates are more likely to be rejected by the voters on Election Day than candidates exhibiting moderate support for environmental issues.[17] This suggests that the relationship may be complex (e.g., non-linear).

Methods

Our sample necessarily was limited to those candidates who received environmental voting scores from the League of Conservation Voters, which required that they served during the 107th - 109th Congresses. This caused us to delete from our sample those House members who did not serve that full term for any of a multitude of reasons (e.g., death, retirement, expulsion, and entry by means of a special election in mid-term). Since we were interested in campaign contributions received during the period 2002-2006, we included only those incumbents from the 2000, 2002, 2004 elections. Our sample did not include the Speaker of the House, since the League of Conservation Voters does not include a score for this individual, noting that the Speaker votes at his own discretion. This left us with a usable sample of 376,

[17] For additional analysis of the impact of extremism in politics, see Westley (2000).

392, and 378 individuals, respectively. Sample statistics for Democrats, Republicans, and combined samples are reported for 2006, 2004, and 2002 in Tables a-c.

Table 3a. Descriptive Statistics – 2006

Variable	Combined sample N = 378	Democrats N = 189	Republicans N = 189
Contributions 2006[a]	$1,161,647.70 (712,926.65)	$1,032,242.42 (588,829.64)	$1,290,371.89 (798,899.02)
% of Vote won 2006[b]	68.79 (13.26)	75.57 (13.52)	62.05 (8.84)
% of Vote won 2004[b]	70.14 (12.68)	71.47 (13.06)	68.81 (12.17)
Contributions to Principal Opponent[a]	$240,043.44 (557,531.91)	$141,448.08 (389,473.91)	$338,119.88 (671,867.09)
LCV	49.93 (40.51)	82.76 (24.39)	17.28 (23.28)
Party (Republican = 1)	50.13 (50.07)		
Seniority[b]	11.44 (7.88)	12.53 (8.50)	10.35 (7.05)
Age[b]	56.16 (9.56)	57.28 (9.39)	55.05 (9.63)
Unopposed (%)	7.12 (25.75)	13.23 (33.97)	1.05 (10.23)

[a] from Federal Election Commission Campaign Finance Reports

[b] from the National Journal (www. National Journal.com).

Table 3b. Descriptive Statistics – 2004

Variable	Combined sample N = 392	Democrats N = 185	Republicans N = 207
Contributions 2004[a]	$1,098,166.50 (870,511.59)	$987,923.04 (629,838.67)	$1,197,120.65 (1,029,454.18)
% of Vote won 2004[b]	70.51 (12.71)	72.64 (12.94)	68.60 (12.18)
% of Vote won 2002[b]	70.61 (13.09)	71.50 (12.94)	69.77 (12.11)
Contributions to Principal Opponent[a]	$204,638.82 (538,382.54)	$182,761.65 (413,033.27)	$223,434.50 (629,109.08)
LCV	47.36 (40.75)	84.46 (20.37)	13.98 (20.64)
Party (Republican = 1)	52.81 (49.98)		
Seniority[b]	10.92 (7.75)	11.45 (8.06)	10.41 (7.44)
Age[b]	54.80 (9.40)	55.65 (9.24)	53.98 (9.52)
Unopposed (%)	6.38 (24.47)	4.84 (21.52)	7.73 (26.77)

[a] from Federal Election Commission Campaign Finance Reports

[b] from the National Journal (www. National Journal.com)

Table 3c. Descriptive Statistics – 2002

Variable	Combined sample N = 376	Democrats N = 184	Republicans N = 192
Contributions 2002[a]	$864,092.24 (554,398.26)	$827,908.84 (569,843.83)	$898,767.99 (538,385.95)
% of Vote won 2002[b]	71.92 (12.85)	72.29 (13.85)	71.57 (11.85)
% of Vote won 2000[b]	68.40 (13.28)	70.93 (14.32)	65.91 (11.71)
Contributions to Principal Opponent[a]	$128,255.50 (313,772.45)	$107,778.52 (286,804.81)	$147,879.27 (337,187.40)
LCV	47.34 (37.39)	79.45 (21.48)	16.57 (18.93)
Party (Republican = 1)	51.06 (50.05)		
Seniority[b]	10.40 (7.38)	11.05 (7.92)	9.79 (6.78)
Age[b]	53.93 (9.30)	54.76 (9.03)	53.14 (9.50)
Unopposed (%)	6.91 (25.40)	8.70 (28.25)	5.21 (22.28)

[a] from Federal Election Commission Campaign Finance Reports

[b] from the National Journal (www. National Journal.com).

Average campaign contributions increased from $864,092 in 2002 to $1,161, 647 in 2006 - - a 34 percent increase. But over that same, relatively brief, time span average contributions to principal opponents rose 87 percent - - from $128,255 in 2002 to $240,043 in 2006. Party-specific differences are revealing. Both nominally and in percentages, Republicans benefitted more than Democrats from increases in campaign contributions. Campaign contributions to Republicans increased by 44 percent, versus an average increase of 25 percent for Democrats. But the growth in contributions to principal opponents was heavily skewed against Republicans also. The average percentage increase in principal opponent campaign contributions for Democrats was 31 percent, whereas for Republicans it was 129 percent, starting from a base level that was considerably larger. That is, Republican incumbents faced a much stronger increase in competition for their seats than did Democratic incumbents. This is confirmed by the sharp decrease (increase) in the percent of Republican (Democratic) incumbents that were unopposed in 2006, as well as the decline in the percent of vote won by Republican incumbents (while the percent vote by Democratic incumbents rose).

A significant difference between the two major political parties, at least for our purposes, is that the average LCV score for Democrats consistently is 4-5 times higher than the average LCV score for Republicans. Notwithstanding this sharp division between the parties with respect to mean LCV scores, not all Democrats are rigidly pro-environment and not all Republicans are rigidly anti-environment, so there is considerable dispersion in the actual LCV scores.

All equations were estimated using Ordinary Least Squares (OLS) regression. We estimated a number of different model formulations, including linear and squared terms for each variable as well as interaction terms, to investigate the structure of possible relationships. Because there is such a striking difference (on average) between Republicans and Democrats

with respect to LCV scores, we estimated separate models for Republicans and Democrats, to investigate whether the impact of LCV scores on campaign contributions and vote received differed by party, as such possible differences would not necessarily be revealed in models that included all House members. Our testing indicated the presence of heteroskedasticity; we corrected for it using the adjustment recommended by White (1980). The estimated structural models are reported in Tables 3 and 4 and discussed below.

Table 4. Ordinary Least Squares Regression Results for Campaign Contributions

Dependent variable = Campaign Contributions in 2006

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	5,932,037***	(1613058)	5,165,151***	(1803347)	7,380,025***	(2785589)
Prin	0.663211***	(0.0939)	0.703416***	(0.1580)	0.668282***	(0.1227)
Sen	11,333.42**	(4180.5)	13,381.72**	(5276.6)	10,010.98	(6536.5)
Age	-9,850.31**	(3011.9)	-9,285.72**	(4084.1)	-10,283.1**	(4283.5)
Vote04	-85,737.6**	(25828.0)	-92,812.3**	(29128.7)	-81,990.3*	(47543.3)
Vote04sq	520.42**	(162.7)	540.1122*	(180.5)	517.875*	(298.4)
Vote06	-23,534.4	(31080.3)	-398.497	(46214.6)	72,557.9	(45842.8)
Vote06sq	126.5867	(189.8)	-10.9586	(275.5)	468.5049	(297.4)
Republican	-79,828.8	(86352.3)				
LCV	-1,908.43	(954.7)	109.7318	(1388.7)	-4,137.29**	(1632.3)
R-square adj,	0.47		0.43		0.47	
N	366		180		178	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Dependent variable = Campaign Contributions in 2004

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	1,849,646	(1739478)	4,172,040	(1576044)	342,131.4	(2543268)
Prin	0.90276***	(0.1600)	0.64748***	(0.1072)	0.968099*	(0.1684)
Sen	8,775.838*	(4642.2)	13,339.26**	(6183.2)	5,003.355	(6302.1)
Age	-7,965.68**	(3616.0)	-12,619.8**	(5103.6)	-4,823.93	(4699.6)
Vote02	-18,106.4	(31361.1)	-69,066.6**	(34531.1)	27,375.54	(50511.7)
Vote02sq	96.0354	(200.7)	409.9066*	(223.3)	-190.983	(323.3)
Vote04	7,857.248	(36840.6)	6,819.036	(43124.2)	2,341.549	(52207.5)
Vote04sq	-73.8577	(226.9)	-61.7073	(268.0)	-53.2656	(323.1)
Republican	98,494.7	(133943)				
LCV	-784.904	(1625.8)	-1,757.12	(2395)	-322.651	(1,894.1)
R-square adj	0.37		0.36		0.34	
N	380		176		198	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Dependent variable = Campaign Contributions in 2002

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	2,928,338***	(1067082)	3,895,825***	(1236340)	1,955,327	(2096242)
Prin	0.66534***	(0.1250)	0.60438***	(0.1140)	0.753731***	(0.2143)
Sen	13,861.81**	(6677.9)	22,983.3**	(10104.8)	1,888.38	(6917.6)
Age	-12,351.2***	(2636.9)	-14,153.4***	(3986.7)	-10,962.2***	(3307.6)
Vote00	-11,251.6	(11396.0)	-7720.91	(13247.3)	-22493	(18199.2)
Vote00sq	41.90861	(77.9562)	8.626317	(88.3795)	144.14	(127.6)
Vote02	-24,476	(27107.2)	-52,011.7**	(30769.9)	11,043.4	(52519.1)
Vote02sq	113.1973	(166.0)	284.802	(186.9)	-112.745	(321.4)
Republican	81,017.87	(9366739)				
LCV	962.4744	(1222.2)	1,236.465	(1838.3)	1,932.824	(1665.7)
R-squared adj.	0.33		0.31		0.36	
N	359		174		177	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Table 4. Ordinary Least Squares Regression Results for Percent of Vote won in the general election

Dependent variable = % of Vote in 2006

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	12.33993	(15.9513)	7.627974	(21.4789)	21.29534	(20.9314)
Contr	2.451E-7	(6.882E-7)	1.339E-6	(1.233E-6)	-2.61E-7	(7.448E-7)
Prin	-0.00001***	(1.781E-6)	-0.00003***	(4.816E-6)	-0.00001***	(1.749E-6)
Prinsq	3.13E-12***	(5.37E-13)	1.03E-11***	(2.37E-12)	2.44E-12***	(4.43E-13)
Sen	0.02278	(0.0547)	0.017458	(0.0679)	0.064418	(0.0786)
Vote04	1.337554***	(0.4151)	1.400941**	(0.5498)	0.970173*	(0.5607)
Vote04sq	-0.0068**	(0.00265)	-0.00666*	(0.00348)	-0.00502	(0.00367)
Par	-7.65351***	(1.4076)				
Unopposed	24.60188***	(1.0122	22.43652***	(1.0988)	34.7495***	(1.0356)
LCV	0.011691	(0.0156)	0.004481	(0.0235)	-0.00172	(0.0216)
R-square adj.	0.76		0.75		0.52	
N	368		180		180	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Dependent variable = % of Vote in 2004

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	21.08955	(15.2548)	8.588469	(23.8579)	31.19015*	(18.7843)
Contr.	-1.21E-6*	(6.223E-7)	-1.07E-6	(1.223E-6)	-1.08E-6	(6.847E-7)
Prin	-0.00001***	(1.749E-6)	-0.00002***	(4.126E-6)	-0.00001***	(1.832E-6)
Prinsq	1.94E-12***	(4.29E-13)	9.34E-12***	(1.73E-12)	1.59E-12***	(3.74E-13)
Sen	-0.05495	(0.0635)	-0.03124*	(0.0412)	0.01654	(0.0929)
Vote02	1.286189***	(0.4003)	1.734288***	(0.6319)	0.76598	(0.5079)
Vote02sq	-0.00671**	(0.00263)	-0.00997**	(0.00412	-0.00289	(0.00341)
Par	-5.91958***	(1.9407)				
Unopposed	17.81552***	(3.0937)	18.51433***	(4.0084)	18.72261***	(4.1222)
LCV	-0.0244	(0.0230)	-0.03124	(0.0412)	-0.02132	(0.0201)
R-square adj.	0.45		0.43		0.46	
N	379		176		197	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Dependent variable = % of Vote in 2002

	Combined Sample		Democrats		Republicans	
Variable	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Intercept	57.90277***	(6.3985)	60.83184***	(7.0196)	55.74752***	(10.2422)
Contr	-1.67E-6**	(7.9E-7)	-1.7E-6*	(9.581E-7)	-2.12E-6	(1.326E-6)
Prin	0.00003***	(3.709E-6)	-0.00003***	(6.146E-6)	-0.00003***	(5.062E-6)
Prinsq	1.27E-11***	(2.2E-12)	1.3E-11***	(3.22E-12)	1.38E-11***	(3.45E-12)
Sen	-0.03494	(0.0530)	0.11242	(0.0718)	-0.20095**	(0.0823)
Vote00	0.120966	(0.1813)	-0.10862	(0.1987)	0.394227	(0.2906)
Vote00sq	0.001161	(0.00134)	0.002968	(0.00143)	-0.00121	(0.00214)
Par	2.802772*	(1.7177)				
Unopposed	23.64496***	(1.3848)	23.16868***	(2.1260)	24.44873***	(1.6835)
LCV	0.0122	(0.0228)	0.041215	(0.0379)	-0.01532	(0.0228)
R-square adj.	0.60		0.63		0.57	
N	359		174		177	

***, **, * - - significant at 0.01, 0.05, 0.10 levels, respectively.

Results

We focus first on the factors that influenced campaign contributions (Table 3). As expected, campaign contributions across all three election cycles examined were related positively to legislators' seniority and negatively to their age. However, there consistently appears to be a much stronger linkage between seniority and campaign contributions among Democrats than Republicans. The estimated coefficients for Seniority uniformly are much larger (and statistically significant) for Democrats as compared to Republicans, where the estimated coefficients are positive, as expected, but not statistically significant. In the combined sample for 2006, as expected, we find that campaign contributions decline with % of vote won in the previous election, but the relationship is curvilinear and turns positive at 82 percent of the vote. These findings hold for both Democrats and Republicans considered separately. While we see the same pattern of signs on the estimated coefficients in the combined models for 2004 and 2002, they are not statistically significant. However, in 2004 the estimated negative linear term and positive squared term on vote received in 2002 are statistically significant for Democrats but not Republicans; they are not significant for either party with respect to campaign contributions

leading up to the 2002 election. So there is some empirical support for the proposition that the strength of an incumbent's most recent election victory impacts campaign contributions in the subsequent period. We also observe across all three elections that a congressman's campaign contributions were strongly linked to contributions made to his/her principal opponent. The latter reflect the strength of the challenger in the coming election; on the margin a tighter race induces more campaign contributions for both challengers and incumbents because donor contributions are more likely to influence the outcome of the election. With the exception of Republicans in 2004, incumbents raised between 60 and 75 cents for every dollar raised by challengers, regardless of party. In 2004, however, Republican incumbents raised nearly $1 for every dollar raised by their principal opponents. Unexpectedly, in the three aggregate models we find that campaign contributions to incumbents were not sensitive to how close the current election actually was. The party-specific results are consistent, with the exception of Democrats in 2002, where we observe an estimated inverse (expected) relationship between the actual vote percent received and campaign contributions. The absence of a consistent result may reflect colinearity between this vote percent received by the incumbent and the level of campaign contributions received by his/her principal opponent.

Finally, there appears to be no impact of LCV score on campaign contributions received during the campaign cycles, for the combined sample of Republicans and Democrats. This finding held regardless of whether the estimated relationship was structured as linear or nonlinear. Among Democrats, we observe no empirical linkage between LCV scores and campaign contributions received during any of the election cycles examined. However, among Republicans in the 2006 election cycle, those with higher LCV scores paid a price, in terms of

foregone campaign contributions. We estimate that for every additional LCV point, a Republican incumbent received over $4,000 *less* in campaign contributions from all sources.

We turn now to the factors that influence the percent of vote won by incumbent congressmen (Table 4). Not surprisingly, incumbents who ran unopposed received significantly higher vote percentages in all three elections than incumbents who faced competition. The size of these effects was similar for Republican and Democratic incumbents in the 2002 and 2004 elections, but in 2006 unopposed Republican congressmen received 34 percentage points more vote than opposed Republican incumbents, whereas unopposed Democratic incumbents received 22 percentage points more votes than opposed Democratic incumbents. As expected, we find that an incumbent's percent of vote won was negatively related (with a diminishing effect) to the level of campaign contributions received by his/her principal opponent. Controlling for the other factors in our model, Republican incumbents enjoyed a 2.8 percent higher vote percentage than Democrats in 2002, but received an estimated 5.9 (7.65) percent smaller vote percentage in 2004 (2006). The 2002 result is at odds with the historical pattern of gains by the opposition party in non-presidential election years. However, this was the first congressional election after the 9/11/01 World Trade Center attacks and Republicans may have benefited from a general perception that they are more trustworthy than Democrats with respect to dealing with terrorists. On the other hand, the 2004 and 2006 slide by Republican incumbents suggests that the substantial gains made by the Democratic Party in both the House of Representatives and the Senate in the 2008 general elections were part of a longer-run pattern of voter dissatisfaction with Republican incumbents. In general, there is little consistent evidence linking seniority and percent of vote won, although there is a small but significant impact on Democratic (Republican) incumbents in 2004 (2002).

Focusing on our motivation for this empirical investigation, we find no evidence in support of the proposition that how congressmen vote on environmental legislation affects, either positively or negatively, the level of voter support they enjoy in the next general election. This result is consistent across members of both of the major political parties, despite the large difference in average LCV score noted previously.

Discussion

The motivation for conducting this analysis was to determine whether there is real-world evidence of positive (negative) returns to public sector producers from supporting (failing to support) environmentally friendly legislation. Our analysis of data from winners of the 2002-2006 elections to the U.S. House of Representatives suggests that the comment by TIME Magazine's David Brooks that we used to lead off our presentation was directly on-target, at least for the particular half-decade period covered by our data. Using League of Conservation Voter Environmental Scorecard ratings for incumbent congressmen that ran for re-election in the 2002, 2004, and 2006 general elections, we find no evidence that a congressman's support for environmentally-friendly legislation had a political payoff in terms of greater support by voters. Further, among Democrats we find no evidence that a congressman's support (or lack thereof) for environmentally-friendly legislation had a political payoff (cost) in terms of greater increased (decreased) campaign contributions. Among Republican incumbents, we find evidence, for 2006 only, of a statistically significant inverse relationship between total campaign contributions and LCV scores - - that is, as LCV scores went up, campaign contributions declined and vice-versa. However, in both the 2002 and 2004 election cycles we find no evidence of a statistically significant effect.

Although we might speculate about the importance of and/or explanation for this one-time impact among Republicans, from our standpoint such discussion is not advisable at this point in time. Even with our findings now established, it would be premature to declare that there are no significant political returns to supporting environmentally friendly legislation. Our analysis is restricted to incumbent legislators, because only incumbents have an established record of voting on environmental legislation that is tracked by the League of Conservation Voters. This data availability issue imposes a limitation on the generality of our finding. Ideally, one would conduct an analysis of the likelihood of electoral victory by *all* candidates (both challengers and incumbents). Indeed, environmental groups claimed credit for ousting incumbent Representative Tom Pombo (R-CA) from his House seat in the 2006 general election, after declaring him environmental public enemy #1 (LCV.org 2008). The anti-Pombo tactics employed by these groups (e.g., attack ads) are not as easily measured as campaign contributions to an incumbent or his/her principal challenger. So the empirical challenge with respect to employing more encompassing metrics of impacts is rather more daunting than the one we tackled.

A second limitation of our analysis is that it is static rather than dynamic. That is, a cross-section analysis like ours fails to identify possible impact(s) on campaign contributions or (re)election likelihood of an individual's changing support for pro-environment legislation over time. Quite obviously, such an analysis would require the investigator to focus exclusively not only on incumbent legislators, but more specifically on those who repeatedly were successful, with whatever biases that might imply. Nonetheless, it would be interesting to see what the consequences might be for someone whose demonstrable record of support (or lack thereof) for pro-environment legislation changed appreciably over time.

Political trade-offs between the economy and the environment:

A time series analysis from 1970-2008

"Against the backdrop of an economic downturn…conservation scores dropped across the board"

(Cindy Schwartz, League of Conservation Voters Director, 2008, Associated Press article)

I. Introduction

What has come to be known as the Environmental Kuznets Curve (EKC) reflects a simple, straightforward theoretical proposition: human demand for environmental quality depends in a particular way on their economic circumstances. Specifically, when people are economically destitute, they are willing to degrade the environment (or tolerate environmental degradation) in efforts to improve their economic well-being. However, as humans' economic well-being improves a threshold is reached where environmental quality becomes positively-valued. At this point, environmental quality becomes a 'normal good,' in which further increases in economic well-being lead to declines in environmental degradation.

A substantial number of economic studies have provided evidence on the empirical validity of the EKC, with mixed results (see below). However, most of these studies employ a similar methodology - - cross-sectional analysis of the relationship between a measure of economic well-being in a sample of countries at a particular point in time and incidence of one or

more specific indicators of environmental degradation at approximately the same point in time. In this paper, I take an emphatically different empirical approach - - *time-series* analysis of the relationship between economic well-being and *political* support for pro-environment legislation in the U.S. Senate and House of Representatives.

Political support for pro-environmental legislation is measured using the Environmental Scorecard ratings of Congressmen and Senators published annually by the League of Conservation Voters. In brief, the question of interest is whether these Environmental Scorecard ratings, aggregated across each legislative body, are sensitive over time to changing economic conditions - - that is, whether there is a political trade-off between economic conditions and the environment. Over nearly 40 years' worth of scorecard ratings, I find that, among the U.S. House of Representatives and Senate, political support for the environment (as measured by League of conservation voter scores) is significantly impacted by the per capita income of individuals in the United States.

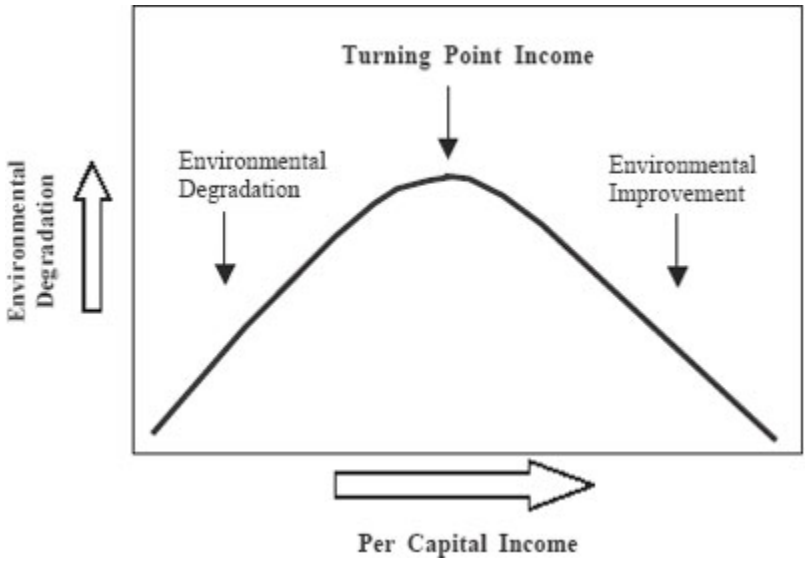
In section II, I review relevant literature on the EKC. My model of the relationship between political support for pro-environmental legislation and economic conditions is developed in section III. In this section I also introduce and discuss the data used in my analysis. This is followed, in section IV, by a brief discussion of methods. In Section V, I present my empirical results. Discussion and conclusions round out the presentation.

II. Literature Review

In theory, desperately poor people are willing to despoil their local environment in order to improve their economic circumstances. However, beyond some threshold level of economic well-being, environmental quality becomes a normal good - - i.e., demand for it increases with increasing income. This suggests an inverted U-shaped relationship (Figure 1) between

economic growth in terms of per capita income and various indicators of environmental degradation (Grossman and Krueger 1995; Barrett and Graddy 2000), although the relationship also has been described as N-shaped (Grossman and Krueger 1995; Torras and Boyce 1998).

Figure 1. Environmental Kuznets Curve



Using different measures of environmental degradation -- air pollution (Selden and Song 1994; Grossman and Krueger 1995; Torras and Boyce 1998), water pollution (Shafik 1994; Grossman and Krueger 1995; Torras and Boyce 1998), deforestation (Cropper and Griffiths 1994), and ecologically imperiled species (McPherson and Nieswiadomy 2005) -- researchers have presented empirical evidence in support of EKC relationships. However, EKC skeptics have raised questions about the existence of an EKC for specific forms of environmental degradation (Stern 2004). More pointedly, it has been argued that the EKC is an artifact of: (1) technological/structural change in production and associated impacts on indicators of environmental degradation (de Bruyn et al. 1998) and (2) specialization in production and trade of goods and services across the nations that permits richer nations to 'export' environmental degradation to poorer countries (Arrow et al. 1995; Stern et al. 1996). In addition, the lack of

econometric rigor, particularly the tests for some statistical properties such as variable distribution, serial correlation (in time series data), model adequacy and specification tests has raised concerns about earlier EKC studies (Stern 2004).

While examination of the empirical relationship between specific indicators of environmental degradation and economic well-being may provide useful, perhaps compelling, insights, such investigation does not exhaust the set of possibilities. Of interest in its own right is the question of whether political support for pro-environment legislation is sensitive to economic conditions, irrespective of whether the legislation actually is enacted. As reported by Baumol and Oates (1988), separate findings indicate that higher income individuals support environmental laws and regulations more than low income individuals. This supposition is grounded in the Hedonic Pricing literature--separate findings indicate that property values are affected by air pollution levels in metropolitan areas and that exposure to air pollution varies inversely with income[18]. Although environmental quality may be characterized as a normal good beyond some threshold level of economic well-being, not all normal goods are created equal. In good economic times, political (voter) support for the environment, among many voter wants, may wax strong. However, when economic times are tough, politicians necessarily make hard choices between competing programs/initiatives/regulations that not only affect human quality of life, they also have economic costs and consequences that weigh more heavily in the voters' minds than when economic times are good. Thus, even if voters' preferences for environmental quality stay constant over time, their willingness to support environmental programs and regulations may be impacted by changing economic conditions that reflect on the feasibility of enacting such programs and regulations.

[18] To our knowledge no researchers have conducted an analysis of whether or not citizens pay more for home in districts or states that have, ceteris parabis, politicians who vote differentially higher LCV scores.

Indeed, as the quote that led off our paper reveals, the leadership of the League of Conservation Voters acknowledges that poor economic conditions act as a constraint on environmental legislation. To be clear, LCV Director Cindy Schwartz' comment was made with respect to changing LCV scores for Maryland state legislators, but the general thought expressed surely applies in the context of national politics as well. This same fiscal reality also has impeded passage of environmental legislation at the international level. For example, Germany's chancellor, Angela Merkel, who originally supported the Kyoto Protocol's requirement of drastic carbon dioxide emissions, now calls it "ill-advised climate policy" (Michaels 2008).

The question we're raising is, 'how sensitive is support for the environment to economic conditions in a political context?' Because most of the research to-date on the EKC has employed cross-section data, there has been little opportunity to observe how the pace of environmental degradation varies with changing economic conditions within a country. The above-mentioned findings by Baumol and Oates suggest that, within the United States, support for pro-environment regulation will increase as per capita income increases. But aside from conjecture, we have no empirically-based understanding of what this relationship actually looks like. For example, because government-produced environmental regulations are permanent, unless revoked, it seems unlikely that environmental degradation actually will increase during economic downturns. However, we do not know how much, if at all, citizen/political support for government policies aimed at protecting the environment erodes during economic slowdowns or downturns.

It is the structure of the relationship between political support for the environment and economic conditions implied by the EKC, that we focus our scientific lens on in this paper.

III. Methods

The general model implied by the EKC literature is that political support for the environment is hypothesized to be related to economic conditions:

(1) Political Support for the environment = f (economic conditions)

Arguably, economic conditions in the U.S. imply that we are, and have been for some time, in the region of the EKC to the right of the turning point (i.e., where environmental protection is a normal good). Since our empirical analysis is restricted to the U.S., the assumed relationship specified in equation (1) is positive.

There is plenty of anecdotal evidence to support this presumed relationship. Between 1970 and 2006, for example, the United States' inflation-adjusted GDP grew by 195%, the number of cars and trucks in the country more than doubled, and the total number of miles driven increased by 178%. However, during that same time period, annual emissions of carbon monoxide fell from 197 million tons to 89 million, nitrogen oxides emissions fell from 27 million tons to 19 million, sulfur dioxide emissions fell from 31 million tons to 15 million, particulate emissions fell by 80%, and lead emissions fell by more than 98% (Dupont 2006), despite a nearly 50 percent increase in the resident population over the same time period. Since the 1970s, at least, per capita income in the U.S. has been rising while a broad suite of indicators of environmental degradation have fallen.

Identifying a metric that accurately reflects political support for the environment is challenging, because the production process in politics can be difficult to track accurately. Much of the real action, in terms of support for, or opposition to, a bill takes place behind the generally closed doors of (sub)committee meetings. Moreover, there is a myriad of things a politician can

do to benefit the environment - - adding funding riders for environmental interest groups to pursue projects, changes in the tax code that encourage recycling or other environmentally-friendly behaviors, and the like. Tracking all of these possible political activities is sufficiently daunting that, to our knowledge, no one has even attempted it. Moreover, aggregating these activities into a single metric would be additionally problematic, as there is no established methodology for weighting the impacts.

These difficulties notwithstanding, a number of empirical researchers have used the Environmental Scorecard (ES) ratings of Senators and members of the House of Representatives, developed and published annually by the League of Conservation Voters (LCV), as a barometer of their support for the environment (e.g., Nelson 2002; Shipan and Lowery 2001; Riddel 2003; Ringqvist 2004). Scaled between 0 and 100, the score reported for each senator or congressman reflects the percentage time that each senator or congressman voted in accord with the LCV's desired position on a set of bills selected by the LCV that were reported out of committee and came to floor votes. Following in this tradition, we use LCV scores as our measure of politicians' support for the environment.

LCV's ES ratings are available for members of the U.S. House of Representatives (U.S. Senate) starting in 1970 (1973). The ES ratings have been produced annually (i.e., for each legislative session), except in 1987/88 when a single score was reported by the LCV for both legislative sessions. We use the same scores for both years. Because economic statistics are calculated at the state and national level, but not available for congressional districts, our analysis focuses on ES ratings averaged across all members of the House and Senate.

Economic well-being can be (and is) measured in a number of ways. The most direct tie to the EKC literature is exploration of possible empirical linkages between LCV's ES ratings and

real (i.e., inflation-adjusted) per capita income over time. However, one also might explore possible linkages between LCV's ES ratings and other conditions that affect socio/economic well-being, such as the unemployment and/or inflation rates.

We investigated the empirical linkage between LCV scores and per capita income via estimation of the following specific time series model:

(2) $LCVscore_t = \alpha_0 + \alpha_1 PCI_t + \alpha_2 share_t + \alpha_3 control_t + \alpha_4 presidency_{t+} \varepsilon_t$

where,

$LCV\ Score_t$ = the average LCV score in the U.S. House of Representatives/Senate in year t.

PCI = Per capita income in chained (2000) dollars

$Share_t$ = the share of the seats in the House/Senate that was held by Democrats in year t.

$ControlD_t$ = 1 if Democrats held majority power in *both* the House and Senate in year t, otherwise 0.

$ControlR_t$ = 1 if the Republicans held majority power in *both* the House and Senate in year t, otherwise 0.

$PresidencyD_t$ = 1 if the Democrats held majority power in *both* the House and Senate and the Executive branch in year t, otherwise 0.

$PresidencyR_t$ = 1 if the Republican held majority power in *both* the House and Senate and the Exective branch in year t, otherwise 0.

We expect the average LCV score of the House/Senate in any given year to be influenced positively by per capita income. This expectation results from a straightforward application of EKC theory to demand for publicly-provided goods/services: as real income rises (falls), our collective ability to afford consumption of those items we value positively increases (decreases).[19]

Much, if not most, environmental legislation consists of regulatory restrictions on business practices that are deemed to have detrimental consequence for the environment - - e.g., legislation protecting species legislation, wetlands mitigation, air and water quality restrictions, and the like (Zhang and Mehmood 2001; Anderson and Mizak 2006). Because these regulations mitigate economic growth, they are less likely to be embraced when economic times are tough than when they are rosy.

Economic conditions held constant, we assume that the larger the share of the House/Senate held by Democrats the higher the average LCV scores will be, since the aggregate scores are averages of the individual scores of members of both parties. The larger the Democrat presence in the legislative body the higher the aggregate score because Democrats have, on average, much higher scores than Republicans. While party affiliation has been found by an army of researchers to be important in predicting both environmental roll call votes and individual LCV scores (e.g., Anderson and Mizak 2006; Snyder and Groseclose 2000; Mehmood and Zhang 2001; Levitt 1996; 2002), only Shipan and Lowry (2001) have put forth a theory as to why Democrats are the 'party of the environment.

[19] Relatedly, we expect the average LCV score of the House/Senate to be related negatively to more narrowly-focused indicators of economic well-being, such as the unemployment rate and the rate of inflation, and thus also the Misery Index.

Moreover, if Democrats held a majority in the House/Senate, the average LCV score of Democrats (Republicans) is likely to rise (fall) for a different reason - - Democrats control the committee process that likely determines the fate of introduced bills. This implies that environmental legislation introduced into the House/Senate is more likely to formulate policy in ways that Democrats will support and Republicans will oppose. This is consistent with the contention of Mehmood and Zhang (2001) that Republicans are the more conservative party on economic issues and are expected to vote more in favor of free market approaches to environmental legislation and to contest government intervention.

Our sample necessarily was limited to those candidates who received environmental voting scores from the League of Conservation Voters, which required that they served during the 91st-110th Congresses. Although the E.S. ratings for the House/Senate were calculated as the average of the individual members' scores, in any given year there typically were fewer than 435 (100) observations from Congressmen (Senators). There were deletions from each year's sample for a number of reasons (e.g., prolonged sickness, death, retirement/resignation, expulsion, and entry by means of a special election in mid-term) that resulted in members who only served a partial term. The minimum number of observations for any one year was 370 congressmen and 81 senators. Our annual samples did not include the Speaker of the House, since the LCV does not include a score for this individual, noting that the Speaker votes at his own discretion.

The LCV Environmental Scorecard produces ratings from 0 (worst) to 100 (best) for Congressmen and Senators, detailing their support or opposition for what is deemed by the LCV as environmentally important legislation. A potential pitfall of using LCV scores as a measure of political support for the environment *across time* is that the metric itself does not stay constant over time. We know, for example, that the number and substance of bills voted on each year that

forms the basis for the E.S. ratings changes over time (Groseclose et al. 1999). If the number of bills used to generate the LCV's E.S. differs from year to year, then the resulting scores are calculated using different weights assigned to the constituent bills that comprise each year's score. As well, through judicious selection of bills to include when compiling the E.S. ratings, the LCV may change its scale over time to strategically move the average score in some preferred direction. This can serve to obfuscate the true preferences of constituencies expressed through the roll call mechanism. Finally, with respect to comparisons between the House and Senate, note that a congressman and senator may vote identically on the same set of bills in a given year, but their E.S. ratings may differ by virtue of differences across legislative bodies with respect to the set of bills used by LCV to create the E.S.

To make the voter scores more comparable over time and across chamber, we employ a linear transformation introduced by Groseclose et al. (1999). If the i-th member in chamber k has LCV score $y_{k,i,t}$ in period t, then the transformed score is $\hat{y}_{k,i,t} = \frac{y_{k,i,t} - \hat{a}_{k,t}}{\hat{b}_{k,t}}$, where the values $\hat{a}_{k,t}$ and $\hat{b}_{k,t}$ for each chamber-year are maximum likelihood parameter estimates of movements in the policy space. This adjusted score isolates the individual legislator's position from general trends in the congressional chamber, i.e. changes in majority party leadership that would alter the types or number of bills introduced (Lopez and Ramirez 2008).[20]

[20] Groseclose et al. (1999) argue that the adjusted scores more accurately represent a politician's position on legislation the score presumes to reflect. Indeed, they find that the adjustment results in substantive changes to the conclusions of previous research (e.g., Levitt 1996, Shipan and Lowery 2001), reduces the standard error of the estimates in most cases, reduces the sensitivity of empirical findings to the particular modeling assumptions, and improves the performance of the model on specification tests.

With respect to our analysis of LCV scores, implementing the Groseclose adjustment had the particular effect of resulting in adjusted scores that exceeded 100 for a number of individuals, in all cases Democrats, especially in the last decade.[21]

Figures 2 and 3 document the time-pattern of LCV scores in both nominal (i.e., published) and real terms. Figures 2a and 3a reveal the time pattern of nominal LCV scores in the Senate and House of Representatives, respectively. The mean scores for the both the Senate (as a whole) and the House (as a whole) have hovered, with some variation, around 50. However, in nominal terms at least, the mean scores for Democrats and Republicans have diverged dramatically over time, with this increasing divergence being driven by a more or less steady increase (decrease) in mean score for Democrats (Republicans) in both legislative bodies. Although these trends may suggest that Democrats are becoming more environmentally friendly while Republicans are becoming less environmentally friendly, the index-adjusted LCV scores (Figures 2b and 3b) indicate that this is an incorrect conclusion. In fact, Democrats are becoming more environmentally friendly, at least in terms of LCV scores, but Republican support for pro-environment policies is holding quite steady over time, in both legislative bodies. Further, it is quite apparent that the nominal LCV scores understate the support for pro-environment policy initiatives by members of *both* parties, as the adjusted scores, even with the truncation at 100 for Democrats, are higher for both Democrats and Republicans.

Sample statistics for LCV score averages for the U.S. House of Representatives and U.S. Senate, as well as Economic and Political Indicators are reported in Tables 5a-5c.[22]

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[21] Dr. Groseclose indicated (personal correspondence) that he and his coauthors found a similar result. Specifically they found that adjusted scores for several Senators and House members were above 100 for the ideological ratings (Americans for Democratic Action and Americans for Constitutional Action) they worked with. In our analysis this result was much more pronounced.

[22] We only report the full sample of Economic indicator variables in Table 5c, but for our statistical analysis as the Senate LCV scoring did not start until 1973 we truncate the economic indicator variables to N=36 for

Table 5a: Average Adjusted LCV scores for the U.S. House of Representatives, 1970-2008

	Full Senate	Senate Democrats	Senate Republicans	Percent Democrats
Mean	59.01	73.82	36.90	56.81
Standard Error	1.47	2.29	0.50	0.99
Median	60.09	73.94	37.38	58.20
Standard Deviation	9.24	14.33	3.17	6.18
Minimum	43.03	47.75	28.13	47.10
Maximum	75.95	96.88	44.07	67.10
# Years	39	39	39	39

Table 5b: Average Adjusted LCV scores for the U.S. Senate, 1973-2008

	Full Senate	Senate Democrats	Senate Republicans	Percent Democrats
Mean	61.77	79.15	39.92	51.71
Standard Error	1.24	2.32	0.65	0.96
Median	61.30	78.69	40.17	50.25
Standard Deviation	7.47	13.95	3.91	5.78
Minimum	47.69	52.26	33.09	45.00
Maximum	76.03	99.21	47.15	62.00
# Years	36	36	36	36

Table 5c: Sample Statistics for Economic Indicators

	Per Capita Income	Democrats Full Control	Republicans Full Control	Democrat President	Republican President
Mean	18913.43	0.49	0.23	0.15	0.13
Standard Error	754.52	0.08	0.07	0.06	0.05
Median	18848.00	NA	NA	NA	NA
Standard Deviation	4711.17	0.50	0.43	0.36	0.34
Minimum	11955.00	NA	NA	NA	NA
Maximum	27319.00	NA	NA	NA	NA
# Years	39	39	39	39	39

all models run with Senate samples so that the data stream for the dependent variable and independent variables is consistent.

Figure 2a. Unadjusted LCV scores 1973-2008 --Senate

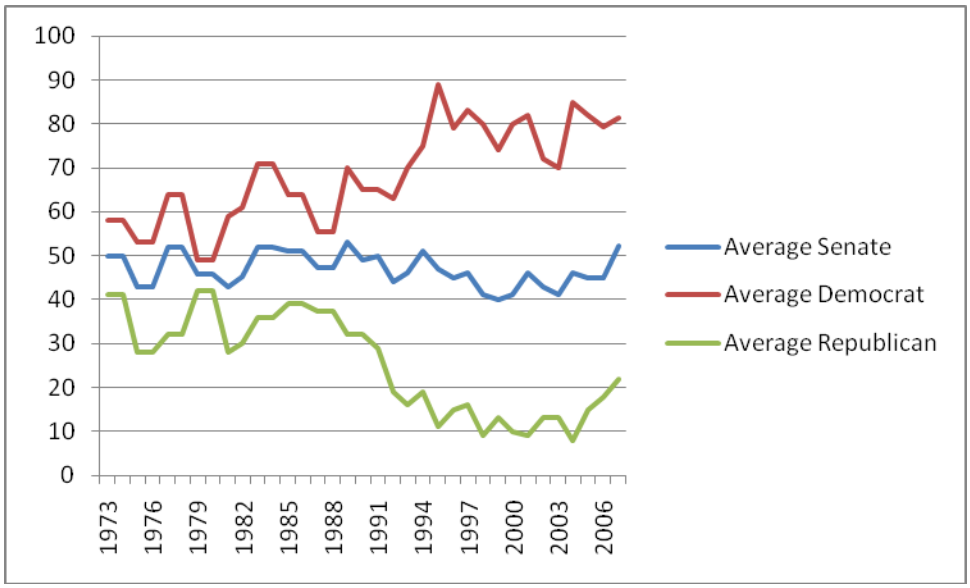


Figure 2b. Adjusted LCV scores 1973-2008 --Senate

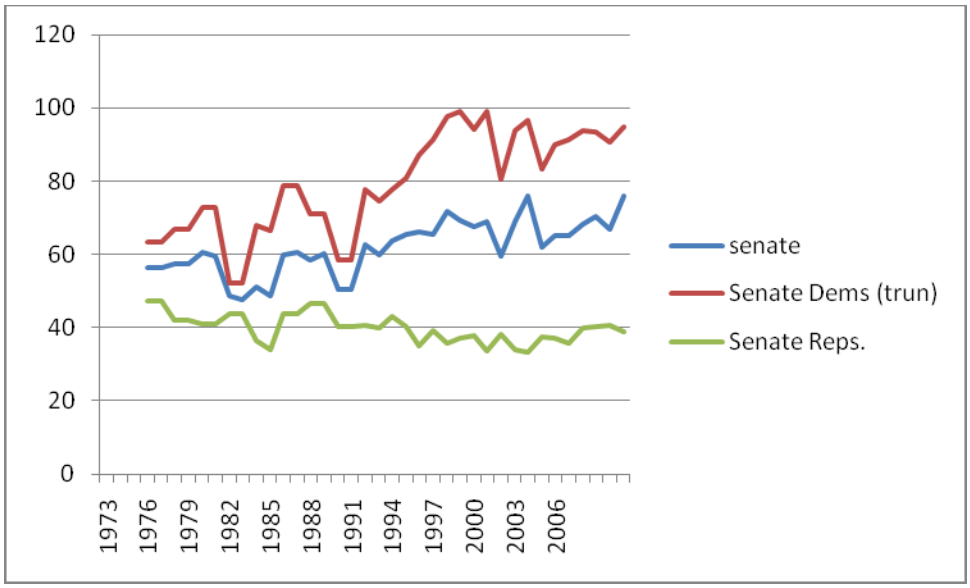


Figure 3a. Unadjusted LCV scores 1970-2008 –House of Representatives

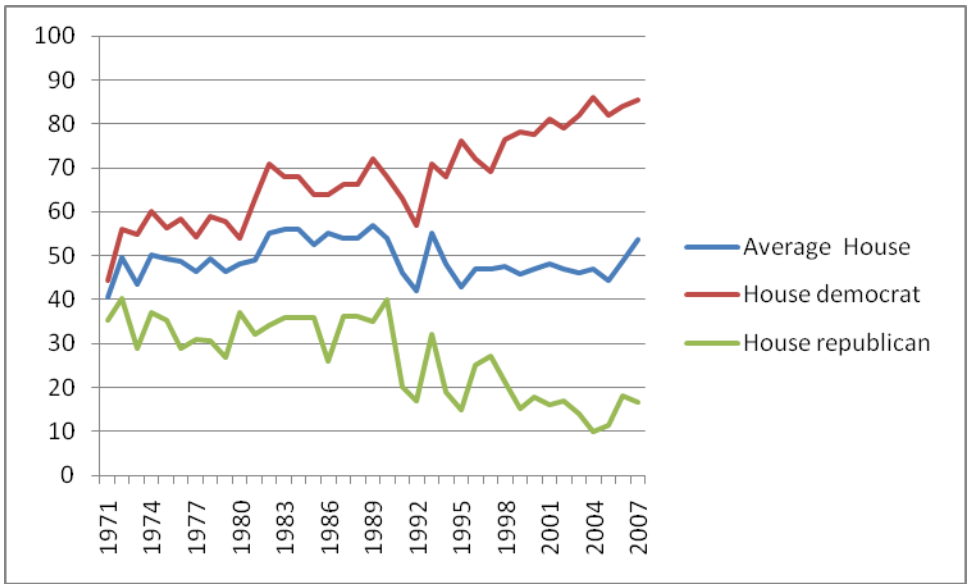
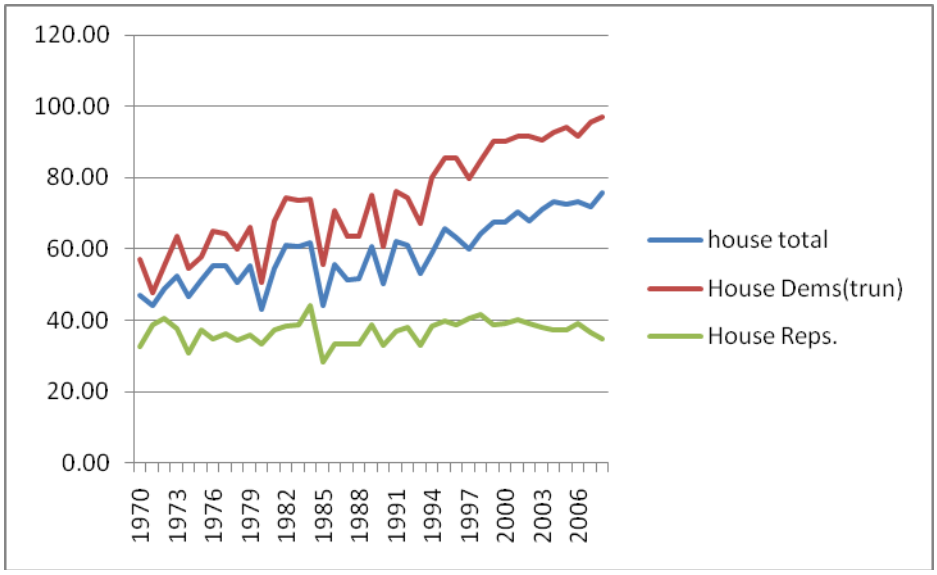


Figure 3b. Adjusted LCV scores 1970-2008 –House of Representatives



Once the LCV scores were properly adjusted, we estimated time series models based on equation 2 to determine if indeed there are any statistically significant linkages between indicators of economic well-being and political support for pro-environment policy, as reflected in the adjusted LCV scores. Models were run for samples consisting of the full House and Senate, House Democrats, House Republicans, Senate Democrats, and Senate Republicans. The party-specific samples were used to explore the possibility that the response functions differ from one party to the other - - which might reasonably be expected in light of the large divergence in mean LCV scores, both nominal and real, between the two parties.

We then tested the various models to assess whether they met the required stationarity and white noise requirements for time-series estimation.[23] While models estimated across Republicans in both the House and Senate were AR (1) stationary, none of the other model/sample possibilities (House Democrats, Senate Democrats, House – combined sample, Senate – combined sample) met the requirements of stationarity[24] and randomly-distributed residuals. Each variable was then first-differenced and a Dickey Fuller (DF) test performed on the differences. The explanatory variables were all Augmented Dickey-Fuller (ADF) stationary unless otherwise noted in Table 6, which reports the test results.

[23] The typical issue in time series estimation is that variables are not normally distributed, thus the coefficient estimates generated by Ordinary Least Squares (OLS) regression are characterized by understated standard errors. If theory suggests x_t should affect y_t and both have trends, they will be correlated and coefficients will appear significant when in reality the explanatory power of x_t is overstated. The residual error term ε_t in an OLS model should be distributed randomly (colloquially described as white noise –WN). An OLS regression with non-stationary variables is characterized by autocorrelation (ε_t, ε_{t-1}) in the residual series ε_t. Autocorrelation implies there is useful information in the residual ε_t relative to predicting y_t. Obtaining this information requires either a different model or transformed variables.

[24] If series are not stationary they may be difference stationary random walks, and OLS regressions in differences are then reliable. If variables are difference stationary, the difference model ; $\Delta y_t = \alpha_0 + \alpha_1 \Delta x_t + \alpha_2 \Delta z_t + u_t$ captures the dynamic adjustment process.

In all cases the explanatory variables were first-difference stationary and met the WN requirement in the ARCH tests[25] (except for House Republicans, which still showed signs of heteroskedasticity in the ARCH (1) test). We nonetheless report the results of House Republicans with this in mind. After using an OLS regression procedure to estimate each of the four models (with per capita income as an explanatory variable) for each of the six samples (House Democrats, House Republicans, House – all members, Senate Democrats, Senate Republicans, Senate – all members), we tested for cointegration using the Engle-Granger method in order to estimate an Error Correction model. In several cases the residual of the spurious regression is not difference stationary in the Engle-Granger test, so we estimated a lagged transformation model[26]

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_t + \beta_3 x_{t-1} + \beta_4 z_t + \beta_5 z_{t-1} + \varepsilon_t^{LTM} \quad (3)$$

Table 6a: Stationarity Test Results - Augmented Dickey Fuller Tests for Dependent variables

Variables	ADF test				ARCH (1)		Result
	γ	F	ε (r)	ε (μ)	F-stat	res²ε	Series
LCV							
House	-0.78	6.67	0.002	~0	0.19	WN[27]	RW
Repubs.	-1.11	6.31	0.077	~0	8.39	WN	RW
Democ.	-0.68	6.89	-0.016	~0	3.29	WN	RW
Senate	-0.22	1.24	-0.011	~0	0.19	WN	RW
Repubs.	-0.71	5.22	-0.084	~0	0.43	WN	RW
Democ.	-0.43	3.00	0.060	~0	0.04	WN	RW
Critical	τ	φ3	r	DWh-stat	F(1,30)	r	
Value	-3.60<γ<0	7.24			~4.17		

[25] An autoregressive conditional heteroskedasticity (ARCH) model considers the variance of the current error term to be a function of the variances of the previous time periods' error terms. ARCH relates the error variance to the square of a previous period's error.

[26] In our analysis we use the Cochran-Orcutt method. The paper most like ours in terms of design is Lopez and Ramirez (2004). They use Prais-Winsten and cite Griffith, Hill, and Judge (1985) for their reasoning in doing so.

[27] The residual error term should be WN (White Noise, uncorrelated errors). A regression with non-stationary variables leads to autocorrelation indicated by significant autocorrelation in the residual series. This implies that there is information in the residual and something else must affect Y_t in a systematic way.

Table 6b: Stationarity Test Results - Augmented Dickey Fuller Tests for Senate

Variables	ADF test				ARCH (1)		Result
	γ	F	ε (r)	ε (μ)	F-stat	res²ε	Series
Income	-1.085	4.12	0.03	~ 0	0.05	WN	RW
Share H.	-0.32	1.86	-0.02	~0	0.82	WN	RW
Share S.	-0.22	1.24	-0.08	~0	0.86	WN	RW
Control D	NA						
Control R	NA						
All D	NA						
ALL R	NA						
Critical	τ	φ3	r	DWh-stat	F(1,30)	r	
Value	-3.60<γ<0	7.24			~4.17		

Repub. Is DF[28], Misery for Senate is DF, UE rate for Senate is DF, UE rate for Senate is DFc.

Coefficient flexibility produces a better fit than the difference model, which we were forced to use upon discovery that not all variables were stationary in levels. The residual e_t should be WN given difference stationary variables. The LTM is a model with lags for both dependent and independent variables, exactly the result derived from the ECM. There are contemporaneous effects in x_t and z_t, and lagged effects in x_{t-1} and z_{t-1}. The effect of x_t on y_t over two periods is $\beta_2 + \beta_3$. We checked the residual ε_t^{LTM} in (1) for WN and also found that there was no autocorrelation either in equation (3) or the corresponding ε_t^{LTM}[29]. We also found that each model passed the ARCH (1) test for heteroskedasticity in all cases.

[28] The Dickey–Fuller (DF) test reveals whether a unit root is present in an autoregressive model. If the series *y* is (trend-)stationary, then it has a tendency to return to a constant (or deterministically trending) mean. Therefore large values will tend to be followed by smaller values (negative changes), and small values by larger values (positive changes). Accordingly, the level of the series will be a significant predictor of next period's change, and will have a negative coefficient. If the series is integrated positive changes and negative changes will occur with probabilities that do not depend on the current level of the series; in a random walk, where you are now does not affect which way you will go next. DFc adds a constant to the test. The DFc, DFt, & augmented Dickey-Fuller (ADF) procedures remove all the structural effects (autocorrelation) in the time series and then tests using the same procedure. These are merely next steps if the Dickey Fuller test does not meet the requirements of a series not being stationary. If a model is difference stationary random walks, then OLS regressions in differences will then be reliable as suggested by Dickey Fuller tests. This implies that ΔYt=Et, which is the result needed for autocorrelation to not be present. (Enders 1995)

[29] For models with a lagged dependent variable used as an explanatory variable, the proper test for Autocorrelation is the DW-h (Durbin Watson h test).

V. Results

The models that met stationarity and WN criteria are reported in Tables 7a – 7e. In each table we report results for different lag lengths, grouped from 1-3 for House members and 1-6 for Senate members. As our model estimations reveal, Per Capita Income does not have a significant contemporaneous effect on Congressional support for the environment. However, as the lagged structure is introduced, we find that per capita income has a statistically significant impact on average LCV scores. The nature of the models forces us to include a two period impact for all non-dummy variables presented in the model. As a result we present models with the structure presented in equation (3). The impact of Per Capita Income on LCV scores tends to be of opposite sign and similar in magnitude from one lag to the next, whether significant or otherwise. We will report the combined effect if both lags are statistically significant, but only the lag which is significant otherwise.

According to our analysis and reported in Tables 7a, average LCV scores for the entire House of Representatives are not significantly affected by PCI until we introduce a one-year and two-year lag structure. This impact is positive and significant for the two-year lag coefficient, indicating that, over the time period under consideration, increases in PCI led to increases in average LCV score. Further, if we include a two-year lag and three-year lag, we find that the coefficient becomes larger and the t-statistic becomes more significant. According to our analysis and reported in Tables 7b, the average LCV score for House Democrats responds positively to increases in per capita income; the result is statistically significant and the coefficient is larger than the combined (Democrats and Republicans) sample.

Table 7a: OLS regression estimation results for House: dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	10.85626	17.12408	0.633976	0.531242
LCV lag	-0.08343	0.186843	-0.44655	0.658636
PCI	0.933263	2.030195	0.459691	0.649287
PCI lag	0.313666	1.992505	0.157423	0.876041
share dem	0.156756	0.279904	0.560035	0.579909
share lag	0.208292	0.346619	0.600924	0.552724
full D	-5.49002	2.477804	-2.21568	0.035016
full R	1.555616	2.863617	0.543235	0.591267
all D	-1.18581	2.794127	-0.42439	0.674521
all R	1.594005	3.016547	0.528421	0.601371

N=38, Adj.R^2=0.73

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	17.62231	17.27546	1.020078	0.316745
LCV lag	-0.03984	0.177247	-0.22476	0.823856
PCI lag	-2.05919	1.871464	-1.10031	0.280911
PCI lag 2	3.249174	1.853547	1.752949	0.09096
share dem	0.168253	0.250372	0.672012	0.507286
share lag	0.093497	0.322447	0.28996	0.774062
full D	-5.1023	2.426226	-2.10298	0.044926
full R	2.409879	2.614594	0.921703	0.364847
all D	-0.16396	2.799351	-0.05857	0.953725
all R	0.431462	2.982138	0.144682	0.886036

N=37, Adj.R^2=0.73

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	17.74799	17.20724	1.031425	0.311841
LCV lag	-0.16916	0.170481	-0.99224	0.330225
PCI lag 2	-2.49967	1.657599	-1.50801	0.143609
PCI lag 3	3.953289	1.712474	2.308525	0.029179
share dem	0.115339	0.244861	0.47104	0.641541
share lag	0.175354	0.289434	0.605851	0.549866
full D	-5.18936	2.33368	-2.22368	0.035068
full R	1.645301	2.485133	0.662057	0.51376
all D	-1.06345	2.611094	-0.40728	0.687136
all R	0.375985	2.810783	0.133765	0.894618

N=36, Adj.R^2=0.76

Table 7b: OLS regression estimation results for House Democrats: dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	24.13626	25.66784	0.940331	0.35509
LCV lag	0.00335	0.18742	0.017876	0.985865
PCI	0.946602	3.006654	0.314836	0.755221
PCI lag	1.138467	2.964026	0.384095	0.70381
share dem	-0.11892	0.418463	-0.28418	0.778366
share lag	0.085815	0.52843	0.162395	0.872161
full D	-8.19304	3.735364	-2.19337	0.036748
full R	1.978732	4.276714	0.462676	0.647172
all D	-0.30555	4.194149	-0.07285	0.942442
all R	3.200923	4.582717	0.698477	0.49064

N=38, Adj.R^2=0.84

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	36.37641	25.66981	1.417089	0.167893
LCV lag	0.033533	0.179702	0.186605	0.853365
PCI lag	-2.69428	2.759421	-0.97639	0.337538
PCI lag 2	4.678576	2.745614	1.704018	0.099862
share dem	-0.08981	0.374411	-0.23986	0.81225
share lag	-0.10599	0.482857	-0.21951	0.827903
full D	-7.43565	3.649042	-2.0377	0.051488
full R	2.930068	3.884287	0.754339	0.457175
all D	1.103118	4.204552	0.262363	0.795033
all R	1.752145	4.47167	0.391832	0.698258

N=38, Adj.R^2=0.85

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	37.44584	26.86318	1.393946	0.175134
LCV lag	-0.04347	0.181011	-0.24017	0.812083
PCI lag 2	-1.78786	2.566133	-0.69671	0.492164
PCI lag 3	4.023368	2.64008	1.523957	0.139592
share dem	-0.18802	0.384195	-0.48938	0.628676
share lag	-0.0243	0.460981	-0.0527	0.958371
full D	-7.2958	3.686208	-1.97922	0.058473
full R	1.966439	3.881831	0.506575	0.616722
all D	-0.35232	4.117481	-0.08557	0.932467
all R	2.139137	4.438142	0.481989	0.633846

N=38, Adj.R^2=0.84

Table 7c: OLS regression estimation results for House Republicans : dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	53.773914	13.6170904	3.949002	0.000482
LCV lag	-0.1012175	0.17543327	-0.57696	0.568579
PCI	0.22647845	1.22281363	0.185211	0.854399
PCI lag	-0.3469579	1.22186491	-0.28396	0.778532
share dem	-0.4135548	0.16410301	-2.52009	0.017713
share lag	0.25021927	0.21569414	1.160065	0.255819
full D	-2.3563732	1.63628714	-1.44007	0.160935
full R	-0.0410084	1.76337446	-0.02326	0.981611
all D	-1.0918008	1.4192815	-0.76926	0.448178
all R	1.46802831	1.70851782	0.859241	0.397504

N=38, Adj.R^2=0.18

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	51.24961	14.16259	3.618661	0.001202
LCV lag	-0.03822	0.175604	-0.21763	0.829354
PCI lag	-1.4835	1.140715	-1.3005	0.204422
PCI lag 2	1.397233	1.14825	1.216836	0.234196
share dem	-0.38497	0.151747	-2.53692	0.017273
share lag	0.221077	0.200316	1.103637	0.27949
full D	-1.69384	1.689737	-1.00243	0.325037
full R	-0.65375	1.797535	-0.36369	0.718922
all D	-1.10885	1.410779	-0.78598	0.438721
all R	1.834346	1.596996	1.148623	0.260786

N=37, Adj.R^2=0.22

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	58.03669	13.66784	4.246224	0.000245
LCV lag	-0.2241	0.165778	-1.35177	0.188091
PCI lag 2	-2.73948	1.012838	-2.70475	0.011898
PCI lag 3	2.738598	1.018506	2.688838	0.012348
share dem	-0.41704	0.143116	-2.91404	0.007244
share lag	0.229179	0.176603	1.297709	0.205783
full D	-2.35498	1.511252	-1.5583	0.131253
full R	-1.02063	1.640273	-0.62223	0.539209
all D	-1.12765	1.324806	-0.85118	0.402442
all R	1.342342	1.462436	0.917881	0.367118

N=38, Adj.R^2=0.34

Table 7d: OLS regression estimation results for Full Senate: dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	12.34661	13.90012	0.888238	0.38288
LCV lag	0.229299	0.178774	1.282622	0.21139
PCI	2.672428	2.218889	1.204399	0.239714
PCI lag	-1.62397	2.130305	-0.76232	0.453004
share dem	0.529552	0.278112	1.904095	0.068468
share lag	-0.48987	0.346952	-1.41191	0.170302
full D	5.254034	2.779896	1.890011	0.070405
full R	0.351437	3.020273	0.116359	0.908297
all D	-0.00441	3.135359	-0.00141	0.998889
all R	-2.82593	3.120883	-0.90549	0.37385

N=35, Adj.R^2=0.60

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	17.19983	14.35453	1.198217	0.242532
LCV lag	0.27623	0.184448	1.497609	0.147273
PCI lag	-0.00113	2.871548	-0.00039	0.999689
PCI lag 2	0.926829	2.832306	0.327235	0.746328
share dem	0.557942	0.291811	1.911996	0.067886
share lag	-0.55379	0.364704	-1.51846	0.141963
full D	2.809097	3.332781	0.842869	0.407624
full R	2.235018	3.226252	0.69276	0.49511
all D	1.924848	3.851246	0.499799	0.621768
all R	-4.18433	3.733059	-1.12089	0.273428

N=34, Adj.R^2=0.56

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	16.81913	14.18085	1.186045	0.247713
LCV lag	0.278526	0.181855	1.53158	0.139266
PCI lag 2	-1.15961	1.962713	-0.59082	0.560403
PCI lag 3	2.150732	1.997741	1.076582	0.29283
share dem	0.534711	0.300537	1.779187	0.088429
share lag	-0.5315	0.362786	-1.46506	0.156443
full D	2.129442	2.522496	0.844181	0.407264
full R	2.203185	2.891724	0.761893	0.453866
all D	2.140895	3.312669	0.646275	0.524498
all R	-5.13461	3.399491	-1.5104	0.144558

N=33, Adj.R^2=0.57

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	12.1262	13.05301	0.928996	0.362973
LCV lag	0.214331	0.154868	1.383953	0.180254
PCI lag 3	-4.42184	1.748505	-2.52893	0.019118
PCI lag 4	5.659921	1.788429	3.164744	0.004489
share dem	0.584499	0.253932	2.301797	0.03119
share lag	-0.48866	0.328442	-1.4878	0.150997
full D	2.23508	2.052629	1.088887	0.287989
full R	1.624465	2.466982	0.658483	0.517061
all D	-0.02405	3.339369	-0.0072	0.994318
all R	-6.33627	2.86037	-2.21519	0.037406

N=32, Adj.R^2=0.71

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	14.82231	13.87608	1.068191	0.29756
LCV lag	0.069699	0.180125	0.386951	0.702686
PCI lag 4	-2.64221	2.150761	-1.2285	0.232849
PCI lag 5	4.21365	2.318033	1.81777	0.083396
share -dem	0.21281	0.315744	0.673995	0.507666
share lag	-0.17103	0.408458	-0.41872	0.679674
full D	2.344876	2.17283	1.079181	0.292747
full R	0.468396	2.694903	0.173808	0.863681
all D	-1.04653	3.832522	-0.27307	0.787471
all R	-6.89535	3.077697	-2.24042	0.036005

N=31, Adj.R^2=0.6

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	19.83528	13.90481	1.426506	0.169147
LCV lag	0.151666	0.187767	0.807732	0.428748
PCI lag 5	2.678154	1.859225	1.440468	0.165207
PCI lag 6	-1.26257	1.985486	-0.6359	0.532053
share dem	0.31623	0.293045	1.079118	0.293378
share lag	-0.44002	0.351208	-1.25286	0.224707
full D	2.307513	2.222113	1.038432	0.311461
full R	0.874763	2.747274	0.318411	0.753474
all D	0.414367	3.585785	0.115558	0.909155
all R	-7.1135	3.103387	-2.29217	0.032876

N=30, Adj.R^2=0.68

Table 7e: OLS regression estimation results for Senate Democrats: dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	17.1849	29.0503	0.591557	0.559459
LCV lag	0.269277	0.178174	1.511316	0.143246
PCI	4.732816	4.705332	1.005841	0.324129
PCI lag	-2.57362	4.508741	-0.57081	0.573226
share dem	0.306182	0.586532	0.522022	0.60625
share lag	-0.7906	0.73588	-1.07436	0.292922
full D	11.22779	5.914412	1.898377	0.069249
full R	4.299613	6.478293	0.663695	0.51296
all D	-0.2482	6.628375	-0.03744	0.970428
all R	-7.65056	6.611758	-1.15711	0.258162

N=35, Adj.R^2=0.69

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	25.75918	29.74559	0.865983	0.395074
LCV lag	0.312488	0.181318	1.723427	0.097673
PCI lag	0.231375	6.015993	0.03846	0.969639
PCI lag 2	1.674535	5.939708	0.281922	0.78042
share dem	0.374033	0.611137	0.612029	0.546274
share lag	-0.86883	0.769874	-1.12853	0.27025
full D	6.912251	7.006337	0.986571	0.333695
full R	7.538597	6.917819	1.089736	0.286651
all D	2.851347	8.093678	0.352293	0.727693
all R	-9.93065	7.86097	-1.26329	0.218621

N=34, Adj.R^2=0.67

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	25.46709	28.71739	0.886818	0.384356
LCV lag	0.316913	0.175838	1.8023	0.08462
PCI lag 2	-3.7804	4.05547	-0.93217	0.36093
PCI lag 3	5.877578	4.121017	1.426244	0.167231
share dem	0.284022	0.617906	0.459652	0.650081
share lag	-0.79865	0.752467	-1.06137	0.29954
full D	4.722378	5.21178	0.906097	0.37428
full R	7.468323	6.137723	1.21679	0.236023
all D	3.829826	6.809996	0.562383	0.579296
all R	-12.8115	7.028723	-1.82273	0.081371

N=33, Adj.R^2=0.68

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	20.29602	29.1237	0.69689	0.49317
LCV lag	0.237928	0.165571	1.437012	0.164785
PCI lag 3	-6.54902	3.959599	-1.65396	0.112335
PCI lag 4	9.12163	4.058376	2.247606	0.034958
share dem	0.358732	0.573511	0.625501	0.538077
share lag	-0.84069	0.751359	-1.1189	0.275253
full D	5.557754	4.651506	1.194829	0.244876
full R	6.766427	5.727803	1.18133	0.250085
all D	1.135481	7.558297	0.15023	0.881952
all R	-14.3842	6.515407	-2.20773	0.037992

N=32, Adj.R^2=0.68

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	26.56349	30.8065	0.862269	0.39828
LCV lag	0.175006	0.183086	0.955865	0.350015
PCI lag 4	-1.28331	4.655405	-0.27566	0.785503
PCI lag 5	4.214023	4.985617	0.845236	0.407507
share dem	-0.16355	0.71206	-0.22969	0.820555
share lag	-0.55399	0.895522	-0.61863	0.542815
full D	5.783735	4.849065	1.192752	0.246269
full R	5.311649	6.127512	0.866852	0.39582
all D	0.39325	8.549337	0.045998	0.963747
all R	-14.9096	6.892989	-2.163	0.042225

N=31, Adj.R^2=0.71

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	33.39249	29.21723	1.142904	0.266576
LCV lag	0.189395	0.180376	1.05	0.306241
PCI lag 5	6.998037	3.841247	1.821814	0.083474
PCI lag 6	-4.12709	4.036502	-1.02244	0.31878
share dem	-0.18887	0.632678	-0.29852	0.768386
share lag	-0.71025	0.748468	-0.94894	0.353975
full D	5.098003	4.731603	1.077437	0.29411
full R	5.83474	5.944512	0.981534	0.338055
all D	0.661185	7.644425	0.086492	0.931935
all R	-16.7639	6.681788	-2.50889	0.020834

N=30, Adj.R^2=0.74

Table 7f: OLS regression estimation results for Senate Republicans: dep. var. = average adjusted LCV score

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	29.87642	12.66808	2.358401	0.026481
LCV lag	0.370573	0.210817	1.757798	0.091022
PCI	1.113735	1.489381	0.747784	0.461567
PCI lag	-1.3617	1.434215	-0.94944	0.351486
share dem	-0.03522	0.200896	-0.17533	0.862235
share lag	0.073423	0.233627	0.314274	0.75592
full D	-0.52801	1.930122	-0.27356	0.786668
full R	-1.59074	2.029506	-0.78381	0.440516
all D	-0.68663	2.102536	-0.32657	0.746709
all R	2.197241	2.104122	1.044256	0.30636

N=35, Adj.R^2=0.27

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	35.26336	12.22379	2.884813	0.008146
LCV lag	0.28689	0.21343	1.344192	0.191456
PCI lag	0.079518	1.833627	0.043367	0.965768
PCI lag 2	-0.37088	1.828894	-0.20279	0.841011
share dem	-0.00178	0.201273	-0.00886	0.993002
share lag	0.032712	0.236594	0.138262	0.891187
full D	-1.21623	2.161951	-0.56256	0.578951
full R	-1.14085	2.055168	-0.55511	0.583956
all D	-0.05421	2.492456	-0.02175	0.982826
all R	1.927899	2.414198	0.798567	0.432373

N=34, Adj.R^2=0.19

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	35.29434	11.80221	2.990485	0.006535
LCV lag	0.288344	0.207563	1.389187	0.17808
PCI lag 2	1.734914	1.215883	1.426876	0.167051
PCI lag 3	-2.10425	1.245644	-1.68929	0.104676
share dem	0.040158	0.196819	0.204038	0.840119
share lag	0.003153	0.226528	0.013919	0.989014
full D	-0.52172	1.626824	-0.3207	0.751334
full R	-1.02532	1.73212	-0.59194	0.559662
all D	-0.35264	2.029569	-0.17375	0.863581
all R	2.903531	2.09836	1.383714	0.179729

N=343, Adj.R^2=0.26

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	30.58702	12.93183	2.36525	0.027253
LCV lag	0.337671	0.220439	1.531815	0.139823
PCI lag 3	-2.04452	1.340098	-1.52565	0.141346
PCI lag 4	1.768493	1.385543	1.27639	0.215128
share dem	0.021154	0.202596	0.104414	0.917787
share lag	0.074164	0.249226	0.297576	0.768819
full D	-1.09623	1.611077	-0.68043	0.503329
full R	-1.0787	1.813928	-0.59468	0.558127
all D	-1.38978	2.481612	-0.56003	0.581116
all R	1.872119	2.126876	0.88022	0.388255

N=32, Adj.R^2=0.23

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	30.94764	11.56318	2.676394	0.014129
LCV lag	0.190834	0.202553	0.942142	0.356833
PCI lag 4	-4.15398	1.357001	-3.06114	0.00593
PCI lag 5	3.947665	1.393893	2.832114	0.009983
share dem	-0.17653	0.21173	-0.83375	0.413807
share lag	0.375745	0.261917	1.434594	0.166128
full D	-1.38553	1.473946	-0.94001	0.357899
full R	-2.20572	1.742224	-1.26604	0.219365
all D	-3.31088	2.514223	-1.31686	0.202076
all R	1.747998	1.944615	0.898891	0.378902

N=31, Adj.R^2=0.37

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	37.17704	14.61816	2.543209	0.019357
LCV lag	0.194901	0.274113	0.711024	0.48528
PCI lag 5	-1.80201	1.651949	-1.09084	0.288313
PCI lag 6	1.489521	1.62293	0.917797	0.369661
share dem	0.089615	0.2492	0.359612	0.722907
share lag	-0.01093	0.275297	-0.03972	0.968712
full D	-0.76206	1.769318	-0.43071	0.671288
full R	-1.33588	2.146276	-0.62242	0.5407
all D	0.123423	2.817104	0.043812	0.965489
all R	2.648285	2.408867	1.09939	0.284656

N=30, Adj.R^2=0.12

However, with Republicans (Table 7c) the one-year and two-year lag structure does not appear to be statistically compelling. The response of Republicans' average LCV scores to Per Capita Income appears in the two-year and three-year lag model, though the effects virtually cancel each other out, indicating that overall there is no effect.

Per capita income does not significantly impact the average LCV score for the Senate as a whole until we introduce a three-year and four-year lag structure. The combined coefficient is positive (1.238) and statistically significant, indicating that increases in per capita income were associated with increases in the overall LCV scores for Senators, 3-4 years later. The size of the LCV response is smaller in the Senate than in the House. Also, we report a significant income effect with a four-year and five-year lag specification; though the estimated net impact is slightly larger the statistical significance is much lower than that reported in the three-year and four-year lag specification. As reported in Tables 7e, Senate Democrats' average LCV scores respond positively to Per Capita Income with a three-year and four-year lag specification. The four-year coefficient is quite large indicating a larger response among Democrat Senators than that of Democrat House members. As with the full Senate model, another important lag specification is the five-year, six-year lag. This result is positive and statistically significant as well.

The estimated Senate Republican model indicated a negative response to increases in per capita income (-0.206) and this response is delayed (4 and 5-year lags) over that of the full Senate or their Democratic counterparts (3 and 4-year lag structure). In short, over the time frame under investigation, we observe a statistically significant link between per capita income and political support for the environment (as proxied by LCV scores), with legislative response to changing per capita income subject to a pronounced time lag. This result -- that economic conditions do affect the voting of legislators as proxied by LCV scorecard ratings - - is consistent

with Lopez and Ramirez (2004) and Shipan and Lowry (2001) though they use inflation and inflation and unemployment, respectively, as their measures of economic conditions.

The share of Democrats in the chamber is a significant indicator of LCV support in the House Republican specification under all estimated lag structures. The first lag result is negative and significant and the coefficient becomes smaller as the Per Capita Income variable is lagged by a greater number of years. This result is believable as Republicans may be under greater pressure from either constituents or interest groups to vote consistently against pro-environment legislation when their numbers, and thus overall ability, to affect policy outcomes may be diminishing. An alternative theory is that moderate Republicans are more likely to lose their re-election bids than 'hard-line' Republicans; the Republicans that survive over time are those that represent safe (i.e., firmly Republican) seats. This suggests less cooperation may be given in times when one party maintains a stronger hold on the House or Senate. This same result does not hold for Senate Republicans. We expect Senators to not be as responsive as their House counterparts in terms of changing LCV scores for reasons discussed previously. As Republicans in the Senate only face reelection every six years, the constituent pressure House Republicans are under to vote in a more extreme manner appears to be as critical for Senate Republicans. The Share of Democrats had no effect on the Full House, House Democrats, or Senate Democrats. However, for the full Senate sample, the share of Democrats has a positive and significant impact on average LCV scores. That is, as the number of Democrats increases relative to the number of Republicans, the average LCV score increases. This is a readily understandable result. The average Democrat's LCV score is much higher than the average Republican's LCV score; if there are more of Democrats in the legislative chamber, the overall chamber will have a higher average score.

Next we examine the effect of two chamber control by either party. If Democrats hold a majority of seats in both chambers average LCV scores are lower for the entire House and House Democrats. This result may appear odd, but there is a ready explanation.

Public choice economists view the legislative process as a political market, in which interest groups attempt to influence the production of legislation that has pecuniary and non-pecuniary consequences for them and politicians compete to provide these groups with relevant legislation in order to capture pecuniary and non-pecuniary rewards called rents. If majority-party legislators know that their environmental agenda faces little opposition then politically-vulnerable individual members of the majority party may be able to shore up their political positions by deliberately voting against their party's pro-environment legislation. This will, of course, result in lower average LCV scores

Even if a party has control of the House or Senate, it may not hold the Presidency. In fact this occurred relatively seldom in the time frame of our sample, a total of six years for Democrats (1977-1980, 1993-1994) and four years for Republicans (2002-2006). The only result that shows up significant is for the Senate (Democrats and full sample). This result is negative and quite strong. This indicates that if Republicans hold control of the Congress and Presidency the average LCV score is lower and the effect becomes larger as we introduce more lags in the Per Capita Income variable structure.

VI. Discussion

The motivation for conducting this analysis was to explore empirically whether economic conditions in the macro-economy affect the level of political support for pro-environment legislation. That is, we looked for empirical evidence regarding the possible existence of a political EKC. Using adjusted mean LCV scores as our barometer of political support for the

environment, we searched for evidence of linkages with per capita income. With respect to the closest analog to the EKC literature, we found evidence of a statistically-significant relationship between political support for pro-environment legislation and per capita income.

One interpretation of this result is that it fails to reject the hypothesis that the United States is characterized by an EKC. Such an interpretation would be consistent with the findings of a number of previous researchers, albeit sometimes in a multi-national context (Selden and Song 1994; Grossman and Krueger 1995; Cole et al. 1997; Torras and Boyce 1998; Panayotou 1993; Cropper and Griffiths 1994; McPherson and Nieswiadomy 2005). While these findings suggest that there *may be* a political EKC in the U.S., LCV scorecard ratings do not exist over a sufficiently long period of time to capture the familiar inverse U-shaped curve we see in the EKC literature. To search for empirical confirmation of this structure would require a researcher to develop a different measure of political support for the environment, characterized by readily available data going back into time, to see if indeed the U.S. has followed the traditional Kuznets relationship with respect to voting patterns. As we indicated previously, we believe that LCV scores do not capture aspects of the policy process that are important to outcomes. However, we confess to not knowing how critical this flaw may be, in the context of the issue under investigation.

It is plausible to suggest that the impact of worsening economic conditions on political support for environmental legislation is understated by the LCV metric we analyze. It is possible, if not likely, that worsening economic conditions have a moderating influence on the structure and scope of environmental legislation that get introduced in the first place, much less the bills that make it to floor votes in the two chambers. We are not able to track this aspect of

political support for the environment at the present time, so it remains an intriguing avenue of future research.

The Senate responds less quickly than the House does to changing economic conditions (as proxied by income) but why is this so? These different results for the House and Senate may an artifact of the different electoral constraints facing congressmen and Senators. The entire House is up for election every two years but only one-third of Senators face elections each time the House members face elections. Consequently, it seems plausible to suggest that House members are likely to respond more quickly than Senators to changing economic conditions, in terms of their environmental policy support. It may also be caused by turnover in the House and Senate. If and as voter preferences change in favor of more environmental legislation the electorate may elect new members who more closely match their changing preferences. A third alternative is that economic conditions impose a constraint on the ability of legislators to vote for environmental protections. In this scenario, legislators are not responding purely to constituent preferences, but rather to exogenous economic forces. A congressman may prefer to vote in favor of environmental legislation but may not be able to do because his constituents care more about their improving their economic circumstances than additional environmental protections. When those economic circumstances improve sufficiently, his constituents won't object to the legislator voting in support of pro-environment legislation. That is, the legislator's preferences may be driving the LCV scoring, as opposed to the changing preferences of his voters and contributors, and if the constituents face an ever improving economic situation they will allow the congressman to vote his own preferences on environmental issues. Our analysis is aggregated at such a level that disentangling the underlying reason for our reported results will require further analysis.

It is worth returning to our previously-made observation that, in both nominal and real terms, Democrats' LCV scores have risen in both the House and Senate since the early 1970s. While Republicans' LCV scores have declined over time in nominal terms, in real terms they have stayed fairly constant. While researchers have noted this strong party difference (e.g., Snyder and Groseclose 2000; Shipan and Lowry 2001; Lopez & Ramirez 2004), there is no developed consensus on why this difference exists or on why the divergence between the two major political parties has increased over time. The information revealed in Figures 2 and 3 improves our understanding of the divergence aspect somewhat, by identifying increasing real scores among Democrats as the driver of the increasing divergence between the parties. However, we do not know why the average LCV score among Democrats has risen so much over time. Further, it is clear from Figures 2 and 3 that short-term events have had significantly impacted the time-trends in real LCV scores for either party. When Republicans gained majority-party control of both the House and Senate in 1994, there was no significant movement in the scores for either party. Likewise, when Democrats re-gained control of both legislative bodies in the mid-2000s, there was no pronounced movement in LCV scores. This suggests that political support for environmental legislation is determined by something other than which party controls legislative outcomes[30].

There is, of course, much political posturing that takes place. Each party's leadership counts votes closely, so when any bill makes it to a floor vote, the roll-call result can be forecast with a relatively high degree of certainty. With respect to those pro-environment bills that make it to a floor vote but have no chance of passing, some members of the House and Senate have a strong incentive to vote in support as a means of burnishing their pro-environment political

[30] Given the large differences between nominal and adjusted LCV scores Figures 2 and 3 indicate that LCV scores overstate the impact of party. This finding is consistent with Groseclose et al. (1999) that in the context of ADA and ACA (nominal)scores overstate the importance of party.

credentials *even if they would have voted against the bill if the vote was close*. When the bill has no hope of actually receiving enough votes to be enacted, the political cost of voting in support is extremely low, while the political benefit may be non-trivial (Gruber 2001). It is possible that some portion of the time-trends reported in Figures 2 and 3 reflect political posturing. But a more nuanced understanding would require a close comparison of votes on bills that ultimately passed and became law against votes on bills that ultimately did not pass.

Closing comments and future research

In this dissertation, I have used a Public Choice analytical framework to analyze several important questions in natural resources policy. By clarifying how supply and demand side forces impact natural resource policy, I extend the line of inquiry of a number of previous researchers including Amy Ando, Jason Shogren, David Laband, Daowei Zhang and Bruce Yandle. This reflects a growing recognition that the self-interested behavior of legislators and bureaucrats is as relevant to environmental policy decision-making as it is to any other public sector decision-making. As the empirical evidence mounts that organized groups petition legislators to provide specific policy outcomes in the environmental arena that may run counter to the public welfare, the opportunity exists to explain why, how, and how much the environment will be impacted. Are the empirical findings specific to our environmental policy applications narrowly or do they provide insight into other aspects of public sector production? If so, what impacts on policy outcomes do these insights yield? In answering these questions, some areas of future research are suggested.

First, in Chapter four our analysis showed a marked disparity in LCV scores for Democrats and Republicans. This difference has existed since the inception of the LCV, but has grown more pronounced over time. The interesting question is what is driving this divergence in legislative voting behavior in this particular area? If voter preference is driving demand for environmental legislation then why don't all congressmen offer a similar amount? Obviously, the districts could be comprised of two distinct preference sets for environmental legislation, but this would still not explain why Democrat districts are becoming more pro-environment while

Republicans stay relatively constant during that same time. As well, it would not explain Senatorial divergence on the environmental issue.

Interestingly, as the average LCV score among Democrats approaches 100 if my hypothesis about this divergence being interest group driven is correct, we should see campaign contributions from environmental interests to Democrats plateau to a certain degree as their money is no longer as impactful on the margin. These environmental interest groups likely will start to pursue other avenues to advance their agenda if the above is true.

Second, continued analysis of the importance of economic conditions on environmental policy is necessary. Chapter four provides an analysis of the exogenous economic conditions on congressional voting with respect to the environment. A next logical step will be for an analysis of *individual* congressmen and their responsiveness or lack thereof to economic conditions in their respective legislative jurisdictions. Are some congressmen more rigid than others when it comes to voting in favor of environmental legislation? Does this imply an ideological component to certain legislator's votes or merely a response to specific well heeled environmentally interested constituencies or voters at large? Also, is the manner/degree to which the political response to environmental legislation affected by economic conditions influenced by the type of legislation? For instance, do economic conditions influence voting on endangered species legislation more or less than voting on funding for toxic waste clean-up?

Third, the most fertile area for future scholarly contribution is the co-sponsorship literature. Bill consideration has been largely ignored by political scientists and economists. Fully 90-95% of the bills that are considered by the national legislature each year never make it to a floor vote. This fact alone indicates that there is an incredible amount of activity that congressmen are engaging in; researchers apparently have little to no idea what goes at this

critical stage of political decision making. Do Congressmen sponsor legislation differently if the bill is likely to fail? For instance, does a congressman co-sponsor a bill knowing it will never see the floor in order to extract rents from those groups interested in the legislation ~~passing~~? Are there indicators of which bills will succeed to the floor and those that won't? For instance, if a bill is sponsored by the committee chair of Appropriations does his bill stand a greater chance than if that same bill is sponsored by a 1st year congressman? What factors influence the timing of co-sponsorship of specific bills? Do the answers to these questions provide clearer evidence of logrolling behavior in the Congress? Chapter three was merely a small first step in the public choice analysis of bill co-sponsorship behavior.

References

Anderson, W.L. & Mizak, D.A. (2006). “Politics of environmental law: Political ideology, elitism, or urban-rural interests? Public Choice, 129, 131-157.

Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C. S., et al. (1995). “Economic growth, carrying capacity, and the environment.” *Ecological Economics*, 15(2), 91-95.

Barrett, S. & Graddy, K. (2000). "Freedom, growth, and the environment," Environment and Development Economics, vol. 5(4), pages 433-456..

Baumol, W.J. & Oates, W.E. (1988). “The Theory of Environmental Policy.” Cambridge University Press.

Becker, G.S. (1983). “A theory of competition among pressure groups for political influence." *Quarterly Journal of Economics*, 98, 371-400.

Bender, B.H. & Lott, J.R. (1996).” Legislator voting and shirking: A critical review of the literature.” *Public Choice*, 87 (1/2), 67-100.

Bronars, S. G. and Lott, J.R. (1997) “Do campaign donations alter how a politician votes? Or do donors support candidates who value the same things that they do”? *Journal of Law and Economics,* 40 (2), 317-50.

de Bruyn, S.M., van den Bergh, J.C., Opschoor, J.B., (1998). “Economic growth and emissions: reconsidering the empirical basis of environmental Kuznets curves.” *Ecological Economic,* 25, 161–175.

Buchanan, J.M. & G, Tullock. (1962). “The Calculus of Consent.” Ann Arbor: University of Michigan Press.

Campbell, J.E. (1982). “Cosponsoring Legislation in the U.S. Congress.” *Legislative Studies Quarterly,* VII(3), 415-422.

Cropper, M., & Griffiths, C. (1994). The interaction of population growth and environmental quality. *AEA Papers and Proceedings*, 84 (2), 250–254.

Dix, Manfred and Santore, Rudy. (2003) “Campaign Contributions with Swing Voters.” *Economics and Politics*, 15(3), 285-301.

Dougan, W.R. & Munger, M.C. (1989). "The Rationality of Ideology." *Journal of Law & Economics* ,32 (1), 119-42.

Downs, A. (1957). "An economic theory of democracy." New York: Harper & Row.

Enders, W. (1995) 1at Edition. "Applied Econometric Time Series" Michigan State: Thompson Books/Southwestern.

Erikson, R.S . (1988) "The puzzle of mid-term loss." *The Journal of Politics,* 50(4), 1011-1029

Fowler, J.H. (2006). "Legislative cosponsorship networks in the US House and Senate." *Social Networks,* 28, 454-465.

fscvl.org "Maryland LCV: Economy cited in lower environment scores for Maryland lawmakers". http://fscvl.org/news/maryland-lcv-economy-cited-in-lower-environment/?searchterm=economy%20cited. June 12, 2008

Gershtenson, J., Smith, B.W., & Mangum, W.R. "Friends of the Earth? Partisanship, party control of Congress, and the environmental legislation in Congress." *Politics and Policy*, 34(1), 66-92.

Grier, K.B. and M.C. Munger. (1986). "The Impact of Legislator Attributes on Interest-Group Campaign Contributions." *Journal of Labor Research*, 7, 349-361.

Groseclose, T., Levitt, S.D., & Snyder, J.M. Jr. (1997). "Comparing interest group scores across time and chambers: Adjusted ADA scores for the U.S. Congress." *American Political Science Review,* 93(1), 33-50.

Grossman, G.M. & Krueger, A.B. (2007). "Economic growth and the environment." *Quarterly Journal of Economics,* 110,353-377.

Gruber, D.L. (2001). "Voting preferences and the environment in the american electorate." *Society and Natural resources,* 14, 455-469.

Hall, R.L. (1992). "Measuring legislative influence." *Legislative Studies Quarterly*, 17 (2), 205–231.

Harbaugh, B., Levinson, A. and Wilson, D. (2002). Reexamining the Empirical Evidence for an Environmental Kuznets Curve. *Review of Economics and Statistics*, 84(3), 541-551.

Hird, J.E. (1993). " Congressional voting on superfund: Self interest or ideology?" *Public Choice*, 77, 333-357.

Hussain, A & Laband, D.N. (2005). "The tragedy of the political commons: evidence from U.S. senate roll call votes on environmental legislation." *Public Choice*, 124 (3-4), 353-364.

Jackson, J.E. & J.W. Kingdon. (1992). “Ideology, interest group scores, and legislative votes.” *American Journal of Political Science*, 36, 805-823

Jacobson, Gary C. (1978).“The Effects of Campaign Spending in Congressional Elections,” *American Political Science Review,* 172, 469-491

Kalt, J. & M, Zupan. (1984). “Capture and ideology in the economic theory of politics.” *American Economic Review*, 74 (3), 279-300.

___ (1988). “ The political economy of protectionism: Tariffs and retaliation in the timber industry.” Trade policy issues and empirical analysis. R.E. Baldwin, ed. Chicago IL: University of Chicago press.

Kau, J. B. & Rubin, P.H. (1979). "Self-Interest, Ideology, and Logrolling in Congressional Voting" Journal of Law & Economics, 22(2), 365-384.

Kau, J. B. & Rubin, P.H. (1993). "Ideology, Voting, and Shirking" Public Choice ,76(1-2), 151-72.

Kessler, D. and K. Krehbiel (1996). “Dynamics of cosponsorship.” *American Political Science Review,* 90(3), 555–566.

Koger, G. (2003). “Position taking and cosponsorship in the US house.” *Legislative Studies Quarterly*, 28(2), 225–246.

Krehbiel, K. (1995). “Cosponsors and wafflers from A to Z.” *American Journal of Political Science*, 39(4), 906–923.

Krueger, A. (1974)."The Political Economy of the Rent-Seeking Society." *American Economic Review,* 64, 291-303.

Levitt, S.D. (1996). “How do Senators Vote? Disentangling the role of voter preferences, party affiliation, and senator ideology. *American Economic Review*, 86(3), 425-441.

LCV.org “Environmental Groups announce Top 2008 Electoral Targets.” http://www.lcv.org/newsroom/press-releases/environmental-groups-announce-top-2008-electoral-targets.html. April 4, 2008.

Lopez, E.J. & Ramirez, C.D. (2004). “Party polarization and the business cycle in the united states.” Public Choice , 21(3), 413-430.

_____ (2008). “Mr. Smith and the economy: the influence of economic conditions on individual legislator voting.” *Public Choice*, 136, 1-17.

McPherson, M.A., Nieswiadomy, M.L. (2005). Environmental Kuznets curve: threatened species and spatial effects. *Ecological Economics*.,55, 395–407.

Mehmood, S., and D. Zhang (2001). "A Roll analysis of endangered species act amendments." *American Journal of Agricultural Economics,* 83(3), 501-12.

Michaels, P.J. "Global Warming Fantasies Meet Financial Contraction." October 9, 2008. *CATO.org*

Murray, Alan. "Will Social Responsibility harm business." May 18, 2005. *Wall Street Journal*.

Nelson, J.P. (2002). "Green voting and ideology: LCV scores and Roll-Call Voting in the U.S. Senate, 1988-1998." *The Review of Economics and Statistics*, 84(3), 518-529.

Olson, M. 1969. "The Rise and Decline of Nations." New Haven: Yale University Press.

Orndorff, M. 2007. "Timber tax breaks pushed by Davis," *Birmingham News*, July 8: 17A.

Peltzman, S. (1976). "Toward a more general theory of regulation." *Journal of Law and Economics,* 19,211-240.

Peltzman, S. (1984). "Constituent interest and congressional voting." *Journal of Law and Economics,* 27,181-210.

Poole, K. (2007) "Changing Minds? Not in Congress!" *Public Choice*, 131,435-451.

Poole, K. and T. Romer (1993). "Ideology, shirking, and representation." *Public Choice*, 77, 185-196.

Poole, K.T. & Rosenthal, H. (1996). "Are legislators ideologues or they agents of constituents?" *European Economic Review*,40, 707-717.

Rawls, P.R. and Laband, D.N. (2004) "A public choice analysis of endangered species listings." *Public Choice*, 121,263-277.

Riddel, Mary. (2003) "Candidate eco-labeling and senate campaign contributions." *Journal of Environmental Economics and Management,* 45,177-194.

Ringquist, E.J. (2004) "Lies, damned lies, and campaign promises? Environmental legislation in the 105th congress." *Social Science Quarterly,* 85(2), 400-419.

Seldon, T.M. & Song, D., (1994). "Environmental quality and development: is there a Kuznets curve for air pollution emissions?" *Journal of Environmental Economics and Management*, 27, 147–162.

Shafik, N. (1994). "Economic development and environmental quality: an econometric analysis" *Oxford Economic Papers* 46 (1994), 757–773.

Shipan, C.R., & Lowery, W.R. (2001).“Environmental policy and party divergence in congress.” *Political Research Quarterly*, 54 (2), 245-263.

Snyder, J.M & Groseclose, T. (2000). Estimating party influence in congressional roll-call voting. American Journal of Political Science, 44(2), 187-205.

Stern, D.L., Common, M.S., & Barbier, E.B. (1996). Economic growth and environmental degradation: the environmental Kuznets curve and sustainable development. *World Development*, 24, 1151–1160.

_____ (2004). "Diffusion of Emissions Abating Technology," Rensselaer Working Papers in Economics 0420, Rensselaer Polytechnic Institute, Department of Economics.

Stigler, G.J. (1971). "The theory of economic regulation." *Bell Journal of Economics,* 2,3-21.

Stratmann, T. (1998). “The market for congressional votes: Is timing of contributions everything?” *Journal of Law & Economics*, 41, 85-113.

_____. (2000). “”Congressional voting over legislative careers: Shifting positions and changing constraints. *American Political Science Review*, 94(3), 665-676.

Thomas, S. and B. Grofman. (1991). “The effects of congressional rules about bill cosponsorship on duplicate bills: Changing incentives for credit claiming. *Public Choice,* 75, 93-98.

_____. (1992). “Determinents of legislative success in house committees.” *Public Choice,* 74, 233-243.

Torras, M., and J.K. Boyce (1998). “Income, Inequality, and Pollution: A reassessment of the Environmental Kuznets Curve.” Ecological Economics, 25(2), 147-160.

TIME.com “ The Road Ahead.” http://www.time.com/time/printout/0,8816,1118376,00.html# Nov. 09, 2005

Tullock, G. (1965). “The Politics of Bureaucracy.” Washington D.C. Public Affairs Press.

Tullock, G. (1967). “The Welfare Costs of Tariffs, Monopolies and Theft'.”*Western Economic Journal*, 5, 224-232.

Westley, Christopher A. “Essays on extremism in public choice economics.” Graduate Dissertation, Auburn University, August 14, 2000.

White, H. “A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity.” *Econometrica*, 48, 817-838.

Wilson, R.K. and C.D. Young (1997). "Cosponsorship in the United States congress." *Legislative Studies Quarterly,* 22(1): 25–43.

Wooldridge, J.M. (2006) 3rd Edition. "Introductory Economics: A modern approach." Michigan State: Thompson Books/Southwestern.

Zhang, D. and D. N. Laband. (2005). "From Senators to the President: Solve the Lumber Problem or Else." *Public Choice,* 123(3-4): 393-410.