

A ROLL CALL ANALYSIS OF THE ENDANGERED SPECIES ACT AMENDMENTS

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Public choice economics view legislative process as a transaction in the political market. Interest groups demand regulation in their favor and lobby lawmakers. The lawmakers analyze an assortment of factors and supply legislation to the winning group, thereby maximizing their rent from the political market. This article examines Endangered Species Act (ESA) amendments from a public choice perspective. Congressional voting on the ESA amendments are assessed using a model based on political incentive and ideology. The results show that the lawmakers' voting behavior is correlated with their party affiliation, ideology, and several characteristics of their home state, such as number of endangered species, proportion of urban population, contribution of the natural resources and construction sectors in gross state product, and geographical location.

Key words: Endangered Species Act, interest group theory, logit, voting analysis.

The Endangered Species Act (ESA) of 1973 is sometimes called the most powerful environmental regulation in the United States (Mann and Plummer). It was designed to protect species from becoming extinct. Under the ESA, no person may take any animal species listed as endangered by the United States Fish and Wildlife Service (FWS).¹ The Act's conflict with market-driven economic growth and development has given rise to issues such as the Spotted Owl controversy in the Pacific Northwest and well-known court cases like *TVA v. Hill* (437 U.S. 153 [1978]).

The importance of the ESA is that the number of listed endangered species is large and increasing rapidly and that more than 80% of endangered species have some or all of their habitats on private lands (General Accounting Office). The law, therefore, has impact on the management of many private and public lands. Some provisions of the Act have been challenged in the U.S. Supreme Court.² Thus, the ESA has been at the center

of controversy surrounding environmental regulations in the last two decades. ESA-related legislation, passed or proposed, often sparks debates among landowner organizations, environmental groups, and academicians. These debates tend to be polarizing and the arguments made are often political and uncompromising.

However, the voting behavior of lawmakers on ESA-related legislation has not been a subject of empirical study. This article identifies and analyzes the factors influencing the ESA-related legislation from a public choice perspective, following Stigler, Peltzman (1976), and Becker. More specifically, we try to answer the following questions. What are the political and economic factors that influence the voting behavior of legislators in case of the ESA? Is the voting behavior consistent with public choice theory and existing literature? And, what implications can be drawn from studying the evolution of this powerful environmental legislation? The results may provide important policy implications about the current ESA reauthorization debate and may be generalized for other environmental legislation such as the Clean Water Act and Streamside Management Zone Act. This article begins, in the next section, with a literature review of public choice theory and relevant research. This is followed by a discussion of four major ESA-related amendments analyzed empirically in this article. The subsequent section describes

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¹The ESA defines taking as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

²An example is *Babbitt v. Sweet Home Chap., Coms. for Ore.* (11 S. Ct. 714 [1995]).

methodology, hypothesis, and data used in this study. The remaining sections present empirical findings and conclusions.

Literature Review

Stigler and Peltzman (1976) laid out the foundation for analyzing regulation as a means to capture rents by competing interests. According to Stigler, there are two principal theories of regulation. The public interest theory assumes that decisions by legislators (and other public officials) act in the public interest (i.e., maximizing social welfare). Interest group theory (or capture theory, constituent interest theory), on the other hand, assumes that such decisions are based on the availability of rents and the ability of legislators to maximize them with respect to their own self-interest (Stigler; Zusman; Peltzman 1976; Rausser; Becker).

Based on Stigler's theory of regulation, Peltzman (1976) constructed a model for the political market. In his model the regulator seeks to maximize a majority, which is a function of total number of potential voters, number of voters in the beneficiary group, and probabilities that the voters in the beneficiary group will support and those who are taxed will oppose the proposed legislation. In addition, regulators often seek to benefit few while taxing many because they have an incentive to restrict the size of a winning group and to spread the losses rather than the benefits over a large population (Peltzman; Becker). Becker modeled the competition among interest groups for political influence. His analysis shows that groups that are relatively efficient at producing political pressure are likely to be the winners. Therefore, the principal contributing factor to the success of a pressure group is not the absolute efficiency of the group itself but the efficiency of the group compared to others.

Both public interest and interest group theories have empirical support, although interest group theory has recently fared better than public interest theory (e.g., Kalt and Zupan; Peltzman; Berg and Tschirhart; Noll; Teske, Best, and Minstrom). Sometimes economically efficient choices may coincide with choices in the interest of one or more groups, and there is a need to disentangle economic and political influences. Accordingly, a hybrid theory that allows for the influence of both

interest groups and economic efficiency has been proposed (e.g., Joskow; Noll).

These theories have been tested in the utility industry (e.g., Nelson), oil industry (e.g., Becker), transportation (e.g., Teske, Best, and Minstrom), agriculture (e.g., Gardner 1983, 1987; Bullock 1992a, 1992b; Rausser and Foster), and forestry (Kalt; Mehmood and Zhang). Nelson found that the existing rate structure in the electric utility industry is consistent with the Ramsey theory of regulation, as opposed to Stigler-Peltzman version of the capture theory. Becker, Gardner (1983, 1987), Kalt, Mehmood and Zhang, and Teske, Best, and Minstrom, on the other hand, found evidence supporting the capture theory. Two articles by Ando (1997, 1999) are, to our knowledge, the only interest group analyses of ESA-related issues from a public choice perspective. Ando (1999) did not find any evidence of competition among pressure groups in order to hasten or delay the listing of an endangered species. Although Stigler-Peltzman-Becker models of regulation emphasize the importance of legislators' self-interest in determining their behavior, the influence of legislators' ideology has gained much prominence in recent empirical studies (Peltzman 1983; Hird).

Although there has been no empirical research on ESA votes, the economic literature contains numerous voting studies. Early works considered legislators either as "delegates," who vote according to voters' wishes, or "trustees," who use their own ideology for voting decisions (Coates and Munger). Recent studies have focused more on the notion of "delegates," claiming that the use of legislators' own ideology is tantamount to "shirking." However, some of these studies have found ideology as a significant factor in voting behavior and concluded that the Stigler-Peltzman theory of politics was erroneous (e.g., Kau and Rubin; Peltzman 1983; Kalt and Zupan; Poole and Romer). On the other hand, Coates and Munger argue that studies on ideology and shirking are often flawed because they are not tied to a model of behavior. Hird examined House and Senate votes on Superfund and found that legislator behavior represents their environmental and liberal ideology as well as narrowly defined self-interest. On the other hand, several studies on environmental legislation voting (e.g., Crandall; Pashigan; Ackerman and Hassler) have found self-interest rather than ideology determines

Table 1. A Summary of House Roll Call Votes on the ESA

Year	Issue	Proposed by	Results
1973	Endangered Species Act passage	Dingell (D-MI)	Passed 390–12
1978	Amendment to exempt Tellico Dam	Duncan (R-TN)	Passed 231–157
1978	Establish a two-step review process for federal projects seeking exemption		Passed 384–12
1987	Removal of Leopard Darter from the endangered species list	Watkins (D-OK)	Rejected 136–273
1987	Delay of Turtle excluder device to be used by Gulf shrimpers	Ortiz (D-TX)	Rejected 147–270
1987	Amendment to allow the Secretary of the Interior to consider the health and safety of humans when deciding whether to proceed with federal projects that affect endangered species and their habitat	Packard (R-CA)	Rejected 151–266
1987	Reauthorization and amendments to provide protections for species awaiting to be listed, endangered or threatened plants on public or private lands, and increase civil and criminal penalties for violation of the law		Passed 399–16
1994	Amendment to require the government to ignore the presence of endangered species when appraising land to be designated wilderness	Tauzin (D-LA)	Passed 281–148

Source: Congressional Quarterly.

voting on environmental issues. Jackson and Kingdon contend that use of voting indices common in this stream of research tends to overestimate ideology and underestimate the impacts of other economic factors. In our study, we use the Stigler–Peltzman framework as theoretical background and select explanatory variables designed to capture economic and political incentives. We also investigate the impacts of ideology in legislator behavior therefore keeping both “delegate” and “trustee” options open.

ESA-Related Amendments

Several votes in the U.S. House of Representatives have been directly on issues concerning the ESA since its passage in 1973. These were mostly votes on proposed amendments to the ESA. “Vote” used in this paper means actual roll call votes. House members sometimes engaged in voice votes on the ESA, and since voting by individual members was not recorded in those instances, empirical analysis of those votes is impossible. The same problem is encountered in case of the Senate. Although amendments passed by the House have to be ratified by the Senate, in these cases the passage was achieved by voice votes, making similar analysis impossible.

Table 1 summarizes all House roll call votes on ESA amendments. This list was compiled from various issues of the *Congressional Quarterly Almanac*. Four amendments were chosen for empirical analysis based on their importance and potential impacts on the ESA. Furthermore, in a few cases the opposition to the issue in question was small and resulted in almost all of the members voting in support.³ Empirical analysis of such voting will inevitably produce insignificant estimates. The Packard amendment in 1987 was not chosen for analysis because it generated very little debate (*Congressional Quarterly* 1987).⁴ The first of the four votes analyzed in this study was on an amendment to exempt the Tellico Dam project from the Act and was taken in 1978. The construction of the dam was stalled because it was feared that the project threatened the Snail Darter (*Percina tanasi*), an endangered fish species. This sparked the first large battle on the ESA (Mann and Plummer). In *TVA v. Hill* (437 U.S. 153 [1978]), the Supreme Court had held that the project must be stopped.

³ For example, in the initial passage of the ESA only twelve votes are in opposition.

⁴ Often in the heat of debate votes are taken on proposed amendments that have little or no importance in the issue at hand and thus, do not generate much discussion among legislators. The Packard amendment appears to be such a vote.

The sponsor of the amendment was John J. Duncan, R-TN, whose district contained the dam. He argued that the project did not threaten the Snail Darter since a large number of the fish had been transplanted into another river (Congressional Quarterly). The amendment was adopted by a vote of 231–157.

The second vote was a 1987 amendment proposed by Wes Watkins, D-OK, to remove a fish species called Leopard Darter Minnow (*Percina Pantherina*) from the threatened species list. Watkins' district contained the site for the proposed Lukfata Dam and the site was a habitat for the species. Watkins argued that biologists had found the species to be far more abundant than previously thought. Walter B. Jones, D-N.C., opposed the amendment, arguing that there existed an established procedure for removing a species from the list and that it was not wise for the Congress to interfere with it. The amendment was then rejected 136–273 (Congressional Quarterly).

The third vote was also on an amendment proposed in 1987. Solomon P. Ortiz, D-TX, proposed a two-year delay of the use of a device designed to exclude sea turtles by Gulf of Mexico shrimpers. The Gulf shrimpers argued that due to its heavy weight (about 40 lbs.), the device would endanger crewmen and sharply reduce their catch. Estimates of the loss varied from 30% of a catch by the shrimpers to less than 5% by some environmental groups (Congressional Quarterly). John D. Dingell, D-MI, opposed the amendment, and he indicated that the tuna fishermen raised similar arguments against efforts to protect Porpoises and that their fear of losses never materialized. The amendment was finally rejected by a vote of 147–270 (Congressional Quarterly).

The fourth vote was taken in 1994 and involved both the ESA and property rights. William Tauzin, D-LA, proposed an amendment to ignore the presence of any endangered species or land-use restrictions when appraising private property for the purpose of wilderness designation. The practical significance of the amendment is that the value of private property will increase if the presence of endangered species and land-use restrictions are ignored. It was also important from a philosophical point of view, as it was the first time such a bill was proposed. The proposed amendment sparked debates in the House. In the end, the amendment was

passed by a vote of 281–148 (Congressional Quarterly).

Hypothesis and Data

This study uses the traditional roll call analysis model and logistic regression techniques to analyze the actual voting of the four ESA-related amendments in the House.⁵ The dependent variable VOTE is binary, taking the value of “1” for a vote of “yes.” The independent variables include House members' party affiliation (PARTY), ideology (CC), state location (SOUTH and NE), number of endangered species in the members' election district (SPECIES), and the demographic and economic characteristics of the district (URBAN, NATRES, and CONS). PARTY is a dummy variable representing “1” for republicans. CC is a voting index, which represents the percent of times each member has voted with the so-called “Conservative Coalition.”⁶ SOUTH and NE are regional dummies taking the value of “1” in case of southern and northeastern states respectively.⁷ The variable

⁵ In logistical regression, the probabilities for each outcome are,

$$P(Y_i = 1) = P_i = \frac{e^{X_i\beta}}{1 + e^{X_i\beta}}$$

$$P(Y_i = 0) = 1 - P_i = \frac{1}{1 + e^{X_i\beta}}$$

The likelihood function for the model is,

$$L = \prod_{i=1}^n P_i^{y_i} (1 - P_i)^{(1-y_i)}$$

The marginal effects for each independent variable can be calculated as

$$\frac{\delta P_i}{\delta X_i} = P_i(1 - P_i)\beta$$

where, P_i and $(1 - P_i)$ are the probabilities that the dependent variable takes the value “1” and “0,” respectively, and β is the estimated coefficients.

⁶ We have tried using the League of Conservation Voter index. However, it had an average correlation coefficient of -0.68 with PARTY, -0.45 with South, 0.40 with NE, and -0.43 with SPECIES. This resulted in insignificant and unexpected estimates. The variable CC is also correlated with PARTY in three cases, but not with any other variables in all cases. Nevertheless, it is important to note that voting indices of any kind is not necessarily an accurate measure of ideology (Hird). Because such indices are based on past voting behavior, they also contain impacts of the legislators' self-interest and the interests of the constituents (Hird).

⁷ The southern states include Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Northeastern states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

SPECIES represents the number of species listed as “endangered.” URBAN contains the percent of urban population, while NATRES and CONS include the percent contribution of natural resources and construction sectors in the gross state products.⁸ In addition, since SPECIES is an approximate of costs associated with ESA, a squared term for the variable is included in one set of estimates to further investigate the possible non-linear nature of its impacts.

As legislators are often lobbied by different interest groups, they make their decisions by analyzing the pros and cons in order to maximize returns from voting. Since there are only two major parties in the U.S. (with a minuscule number of independent legislators), party affiliation is important. Republicans are supposedly more conservative on economic issues than Democrats, hence they are expected to support a free market approach and less government intervention in environmental matters. All four votes analyzed are on issues that identify with the “conservative agenda” in American politics. Therefore, the coefficient for PARTY variable was expected to be positive. The voters and the legislators in the southern states are typically more conservative, and the coefficient for the regional variable, SOUTH, was therefore expected to be positive as well. On the other hand, voters and lawmakers from the northeastern states tend to be more liberal and therefore more sympathetic to environmental causes. For this reason, the second regional variable, NE, is expected to be negative.

The number of endangered species in the home state and other characteristics of the state, such as population distribution, and contribution of the natural resources and construction sectors to the state economy, are also relevant. The more species listed as endangered in a state, the higher the cost for the state to comply with the ESA. Thus, the legislators from a state with many endangered species are more likely to support these amendments. Accordingly, the coefficient for the variable SPECIES was expected to be positive.⁹ The coefficient for the variable URBAN is expected to be negative

because environmentalists are often urban dwellers who do not have much to lose from restrictive regulations. Industries in the natural resources and construction sectors are the ones most likely to be in conflict with the ESA. The Spotted Owl and Tellico Dam controversies are two good examples of such conflict. Therefore, the coefficients for both NATRES and CONS were expected to be positive. However, conflicts often invite intensive lobbying from the opposition. Therefore, if the environmental interests have more influence on any particular voting through effective lobbying, then NATRES may end up being negative.

Wherever possible, district-level data were used in this study. However, for the Tellico dam exemption model, all data were state level as election district-level data were not available. In case of the leopard darter removal and turtle excluder device models, data for URBAN, NATRES, and CONS were district-level while those for SPECIES were state-level. In case of the California desert protection model, however, district-level data were used for all four of these variables.

Data for VOTE, PARTY, and CC were collected from the *Congressional Quarterly Almanac* for the respective years. State-level data for SPECIES were collected from the FWS publication *Endangered and Threatened Wildlife and Plants*, while those for district-level were collected from the web site for Endangered Species Protection Program database.¹⁰ In order to obtain district-level data for NATRES and CONS county data for these two variables were first compiled from the Department of Commerce publication *County Business Patterns*. These county data were then aggregated into election districts according to the make-up of districts described in the census reports for election districts. In case the county is split between two or more districts, county data were evenly divided and aggregated into each one of them. Urban population data for the election districts were also collected from these census reports. State-level data for URBAN were collected from the Bureau of the Census while those for NATRES and CONS were collected from the U.S. Department of Commerce.

⁸ Natural resources sector includes agriculture, fishing, mining, lumber and wood products, and paper products industries.

⁹ Only listed animals were included in SPECIES. While the endangered species list does include plants, almost all of regulations, controversies, and restoration efforts are aimed at endangered animals. Therefore, endangered plants were omitted from SPECIES.

¹⁰ The address for this web site is: <http://www.epa.gov/esppl/database.htm>.

Table 2. Descriptive Statistics for Dependent and Independent Variables

Variables	Tellico Dam		Leopard Darter		Turtle Excluder Device		CA Desert Protection	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
VOTE	0.5465		0.3164		0.3464		0.6498	
PARTY	0.3395		0.4088		0.4088		0.4101	
SOUTH	0.2884		0.3025		0.3025		0.3226	
NE	0.2581		0.2402		0.2402		0.2235	
SPECIES	9.2302	9.1088	13.4434	13.0191	13.4434	13.0191	3.2143	3.7983
URBAN	73.4493	12.8905	73.9603	22.7767	73.9603	22.7767	75.0593	22.0173
NATRES	7.2343	5.6659	0.2884	0.6546	0.2884	0.6546	0.2241	0.4946
CONS	4.6984	1.2881	0.7562	1.0051	0.7562	1.0051	0.6667	0.9480
CC	46.9674	29.5018	56.9769	31.9076	56.9769	31.9076	60.1037	31.0592

Note: Recall that data for SPECIES for the first three models were state-level. The California desert protection model, however, uses district level data for SPECIES, which explains the drop in the mean.

Empirical Findings

Table 2 lists descriptive statistics for the dependent and independent variables in all four models. As mentioned earlier, CC was correlated with PARTY in the leopard darter removal, turtle excluder device, and California desert protection votes. The degrees of correlation averaged at 0.68 in these three cases. Correlation between PARTY and CC is not surprising since both of them capture some impacts of the legislators’ ideology. However, since CC is relatively more likely to isolate impacts of ideology and PARTY is important for measuring the impacts of party affiliation, we decided to use both of the variables in one set of estimates. Other than that, correlation coefficients were all smaller than ± 0.45, except that for the variables NATRES and CONS in the Tellico Dam exemption amendment, which was 0.65. Since these two variables were not highly correlated in other amendments, we decided to keep them for consistency.

The results for the four models are presented in tables 3–6. Each table contains three sets of estimates analyzing a particular vote. The first set includes each of the independent variables except for CC. In order to investigate the non-linearity in SPECIES, squared terms of the variable were included in the second set. The third set adds the measure for ideology, CC, in the model. Log-likelihood ratio tests for each of the models are significant at 1%.

Table 3 presents the estimates for the Tellico Dam exemption model. In case of the first set of estimates, the variables PARTY and SOUTH are positive and significant at the 1% level, confirming that Republicans

and House members from the southern states are more likely to support intensification of economic development. Southern states have a tradition of resisting increased government control and supporting property rights. Moreover, Tellico Dam is located in the South, and TVA spans across several southern states. This project created many jobs and had large economic impacts across these states. So it is not a surprise that the Tellico Dam amendment received wide support from southern legislators.

As expected, the coefficient for URBAN is negative and significant at the 10% level. This means that House members from relatively urban states are more likely to oppose the amendment in order to please their more urban-based voters. The coefficient for CONS is positive and significant at the 5% level, implying that House members from a state that has a significant contribution to its economy from the construction sector are more likely to support the amendment. Tellico Dam was a big construction project. The fact that such a project was in jeopardy due to the presence of a species of fish was likely to encourage the legislators from these states to support the amendment.

The number of species in the endangered list variable has the expected sign but is not significant. The vote was taken in 1978, when the endangered species list was relatively short for most states and was just starting to grow. One explanation for the non-significance of this variable is that there just is not enough sample variation in the measure as can be seen in the sample standard variation for SPECIES. It is therefore understandable that the number of species listed in each state had not yet become a

Table 3. Logit estimates for the Tellico Dam Exemption Model

Variables	1		2		3	
	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)
Constant	-0.3906 (-0.3640)		-0.6917 (-0.6350)		-0.8844 (-0.7950)	
PARTY	1.3376*** (5.4790)	0.3284 (0.0598)	1.3497*** (5.4380)	0.3313 (0.0608)	1.3379*** (5.3820)	0.3284 (0.0609)
SOUTH	1.5509*** (4.6970)	0.3807 (0.0804)	0.3840 (0.8070)	0.0942 (0.1167)	0.3984 (0.8380)	0.0978 (0.1166)
NE	-0.2804 (-0.8500)	-0.0688 (0.0811)	-0.0681 (-0.2020)	-0.0167 (0.0828)	-0.0830 (-0.2460)	-0.0204 (0.0829)
SPECIES	0.0024 (0.1460)	0.0006 (0.0039)	0.2765*** (3.3350)	0.0679 (0.0203)	0.2779*** (3.3610)	0.0682 (0.0203)
SPECIES ²			-0.0077*** (-3.3670)		-0.0078*** (-3.4160)	
URBAN	-0.0217* (-1.6970)	-0.0053 (0.0031)	-0.0258** (-1.9870)	-0.0063 (0.0032)	-0.0249** (-2.1690)	-0.0061 (0.0032)
NATRES	-0.0139 (-0.4140)	-0.0034 (0.0082)	0.0226 (0.6480)	0.0056 (0.0086)	0.0242 (0.6910)	0.0059 (0.0086)
CONS	0.3201** (2.0570)	0.0786 (0.0382)	0.1887 (1.2500)	0.0463 (0.0370)	0.1819 (1.2090)	0.0446 (0.0369)
CC					0.0034** (2.1029)	0.0008 (0.0010)
No. of obs.	430		430		430	
Log-likelihood Restrict.	-240.1319 -296.1901		-234.3672 -296.1901		-233.9828 -296.1901	
Log-likelihood Chi-squared value		112.1022***		123.6458***		124.4147***

* Significant at 10%.
 ** Significant at 5%.
 *** Significant at 1%.

significant factor at that point. As we shall soon find out, the results changed a few years later and the number of species listed would become a significant factor. The coefficients for another regional variable NE and the variable NATRES are not significant.

In the second set of estimates, signs and significance are consistent, except that the variables SOUTH and CONS become not significant. However, the more important result from this set is the negative sign and significance of the squared term for species. This means that on a marginal basis, increase in the number of listed species has a decreasing impact on legislators' voting choices. This result remains consistent throughout the four models. The third set of estimates adds the ideological variable CC in the model. The variable is positive and significant at the 5% level, implying conservatives are more likely to support this amendment. The sign and significance of CC remains consistent in all

four models, thus confirming the conservative nature of the issues involved in these four votes.

Table 4 presents the results for the leopard darter removal model. Signs for variables are largely similar to the previous model. In the first set of estimates, PARTY and URBAN are significant at 1% while SOUTH is significant at 5%. These results follow the same reasoning as in the previous model. The variable NE is negative and significant at 1 percent implying northeastern regional influence has played an important role in this vote.

Unlike in the previous case, the coefficient for SPECIES turns out to be significant at the 5% level, indicating that the number of species becomes important as the list of endangered species grows. The voting on Leopard Darter removal took place in 1987 and by then the endangered species list had grown much longer for some states.

Table 4. Logit Estimates for the Leopard Darter Removal Model

Variables	1		2		3	
	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)
Constant	0.1579 (0.3280)		-0.2271 (-0.4190)		-1.0777* (-1.7580)	
PARTY	0.9297*** (3.9990)	0.1855 (0.0457)	0.9034*** (3.8650)	0.1797 (0.0459)	0.2150 (0.0610)	0.0042 (0.0681)
SOUTH	0.5331** (2.0570)	0.1064 (0.0518)	0.0170 (0.0410)	0.0034 (0.0835)	0.2809 (0.6470)	0.0545 (0.0841)
NE	-1.0137*** (-2.7550)	-0.2022 (0.0715)	-0.8927** (-2.3680)	-0.1776 (0.0733)	-0.8309** (-2.1880)	-0.1611 (0.0723)
SPECIES	0.0200** (1.9800)	0.0040 (0.0020)	0.1088* (1.8720)	0.0217 (0.0115)	0.0828* (1.5990)	0.0161 (0.0115)
SPECIES ²			-0.0018* (-1.6240)		-0.1301 (-1.0860)	
URBAN	-0.0241*** (-4.1280)	-0.0048 (0.0011)	-0.0248*** (-4.2330)	-0.0049 (0.0011)	-0.0217*** (-3.6290)	-0.0042 (0.0011)
NATRES	-0.1534 (-0.7660)	-0.0306 (0.0400)	-0.0940 (-0.4720)	-0.0187 (0.0396)	-0.0514 (-0.2540)	-0.0100 (0.0392)
CONS	0.1804 (1.4700)	0.0360 (0.0244)	0.1741* (1.5821)	0.0346 (0.0243)	0.1192 (0.9570)	0.0231 (0.0241)
CC					0.0210*** (3.2580)	0.0041 (0.0012)
No. of obs.	433		433		433	
Log-likelihood Restrict.	-232.4962 -270.2457		-231.2848 -270.2457		-225.7389 -270.2457	
Log-likelihood Chi-squared value	75.4989***		77.9217***		89.0134***	

* Significant at 10%.
 ** Significant at 5%.
 *** Significant at 1%.

It is therefore likely that the legislators from these states supported the amendment.

As in the previous model, the second set of estimates confirms the presence of non-linearity in the SPECIES variable, and the final set of estimates demonstrates the importance of ideology in this voting. In addition, in the second set the variable CONS is positive, as expected, and significant at the 10% level.

Table 5 shows the results for the turtle excluder device model. Signs are largely similar to the two previous models, except for the variable NATRES, which is positive but not significant. In case of the first set of results, coefficients for PARTY, SOUTH, SPECIES, and URBAN variables are all significant at the 1% level. These results are consistent with the previous models. The second and third sets of estimates are similar to the previous cases as well.

Table 6 presents the results for the California desert protection model. Except for NATRES all have expected signs. In the first set of results, the coefficients for PARTY and SPECIES are significant at the 1% level, while those for NE and URBAN at the 5% level. These results are similar to previous models and follow the same explanation. The variable NATRES is negative and significant at the 5% level. As mentioned earlier, in the presence of intense lobbying activities from the environmental interest, this variable could end up with a negative sign. In the second and third sets, non-linearity in the species variable and the influence of ideology are again apparent.

In every model, marginal effects are calculated for the variables in each set of estimates. These marginal effects are partial derivatives of probabilities calculated at the mean of independent variables. The marginal effects quantify the impacts of

Table 5. Logit Estimates for the Turtle Excluder Device Model

Variables	1		2		3	
	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)
Constant	-0.3311 (-0.6970)		-0.7736 (-1.4420)		-2.1938*** (-3.4810)	
PARTY	0.6715*** (2.9730)	0.1455 (0.0486)	0.6394*** (2.8130)	0.1382 (0.0489)	0.7911** (-2.2280)	0.1655 (0.0742)
SOUTH	0.7458*** (2.9490)	0.1616 (0.0549)	0.1537 (0.3730)	0.0332 (0.0891)	0.3296 (0.7600)	0.0690 (0.0906)
NE	-0.4868 (-1.4310)	-0.1055 (0.0732)	-0.3411 (-0.9710)	-0.0738 (0.0757)	-0.2441 (-0.6760)	-0.0511 (0.0753)
SPECIES	0.0336*** (3.4620)	0.0073 (0.0021)	0.1356** (2.3610)	0.0293 (0.0124)	0.0969* (1.6340)	0.0203 (0.0124)
SPECIES ²			-0.0021* (-1.8080)		-0.0013 (-1.0540)	
URBAN	-0.0185*** (-3.2800)	-0.0040 (0.0012)	-0.0193*** (-3.4070)	-0.0042 (0.0012)	-0.0139** (-2.3580)	-0.0029 (0.0012)
NATRES	0.0681 (0.3710)	0.0148 (0.0397)	0.1305 (0.6990)	0.0282 (0.0404)	0.2194 (1.1370)	0.0459 (0.0404)
CONS	0.1022 (0.8570)	0.0221 (0.0258)	0.0960 (0.7980)	0.0026 (0.0260)	0.0005 (0.0200)	
CC					0.0337***	0.0071
No. of obs.	433		433		433	
Log-likelihood Restrict.	-245.1498 -279.3727		-243.5069 -279.3727		-229.0396 -279.3727	
Log-likelihood Chi-squared value		68.4457***		71.7316***		100.6661***

* Significant at 10%.
 ** Significant at 5%.
 *** Significant at 1%.

the explanatory variables. For example, 1% increase in the number of listed endangered species is likely to increase support for the California desert protection amendment by approximately 7% (table 6). On the other hand, the marginal effects of the SPECIES variable are much lower in the first three votes. This result reflects the difference in the measurement of the variable, which is at the state level in the first three votes and at the district level in the fourth votes.¹¹ We would argue that when it is measured at the state level, an errors-in-variables bias is introduced, which attenuates the estimated results.

In order to measure the performance of the models in predicting the voting behavior, percentage of correct predictions can be calculated. For example, in case of the Tellico dam exemption voting, the model correctly predicts 318 (141 for “no” and 177 for

“yes”) of the 430 outcomes, an overall success rate of 74%. In case of the two specific outcomes, the model correctly predicts 72% of the “no” votes and 75% of the “yes” votes. The leopard darter removal and turtle excluder device models perform very well in predicting “no” votes, while the performance is rather lackluster in predicting the “yes” votes. In case of the California desert protection voting, however, the model performs well in predicting both outcomes. In order to demonstrate the explanatory power of the model, randomly assigned ratios of “yes” and “no” votes can also be calculated. That is, if there were no explanatory variables and outcomes were assigned according to their ratios, 45% of the “no” votes and 55% of the “yes” votes will be correctly predicted in the Tellico Dam exemption model. Comparing this to the percent correct measure demonstrates the increase in the explanatory power of the model due to the addition of the

¹¹ We thank an anonymous referee for suggesting this observation.

Table 6. Logit Estimates for the California Desert Protection Model

Variables	1		2		3	
	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)	Coefficient (<i>t</i> -Value)	Marginal Effects (St. Error)
Constant	0.8287 (0.9660)		-0.1604 (-0.1700)		-4.7674*** (-3.5390)	
PARTY	2.4200*** (7.5000)	0.4073 (0.0578)	2.3863*** (7.3220)	0.4206 (0.0563)	1.3222** (2.4520)	0.2181 (0.0912)
SOUTH	0.3234 (1.0020)	0.0544 (0.0542)	0.3622 (1.0970)	0.0638 (0.0580)	0.9101** (1.9870)	0.1501 (0.0757)
NE	-0.7852** (-2.3350)	-0.1322 (0.0582)	-0.7518** (-2.2080)	-0.1325 (0.0609)	-0.6255* (-1.7627)	-0.1032 (0.0724)
SPECIES	0.3938*** (4.0390)	0.0663 (0.037)	0.6827*** (4.5450)	0.1203 (0.0250)	0.5146** (2.5030)	0.0849 (0.0345)
SPECIES ²			-0.0268*** (-3.1650)		-0.0143 (-0.9180)	
URBAN	-0.0188** (-2.0760)	-0.0032 (0.0016)	-0.0102 (-1.0530)	-0.0018 (0.0017)	-0.0028 (-0.2200)	-0.0005 (0.0021)
NATRES	-0.7234** (-1.9100)	-0.1218 (0.0647)	-0.6355* (-1.8460)	-0.1120 (0.0611)	-0.3891 (-1.1250)	-0.0642 (0.0573)
CONS	0.2156 (0.9650)	0.0363 (0.0369)	0.2622 (1.2280)	0.0462 (0.0371)	0.4574* (1.7850)	0.0755 (0.0406)
CC					0.0992*** (8.3550)	0.0164 (0.0024)
No. of obs.	434		434		434	
Log-likelihood	-178.0763		-175.0188		-108.4030	
Restrict.	-281.0537		281.0537		-281.0537	
Log-likelihood						
Chi-squared	205.9547***		212.0697***		345.3014***	
value						

* Significant at 10%.
 ** Significant at 5%.
 *** Significant at 1%.

independent variables. Similar analyses for the three remaining models remain largely consistent.

Conclusions

This study uses a roll call analysis to analyze the determinants of legislators' vote on ESA amendments. The results imply that economic and political incentives and ideology influence legislators' voting behavior in a predictable manner. Consistent with the theories of public choice, legislators vote on ESA amendments based on the number of potential voters in the group lobbying for the legislation, the amount of transfer to the beneficiaries, and the impact the losers may have. The empirical analysis provides evidence that legislators have incentives to support different interests, based on their own

ideology and the characteristics of the constituents. The model used in this article could be applied to other studies on the voting of environmental legislation.

The empirical results show that ideology is one of the most important factors in voting on the ESA. This is evident from the strong significance of Conservative Coalition index and the party variable in all four models. Lawmakers' past voting record on conservative issues is a predictable indicator of future voting. Since environmental issues are often highly contentious, liberal or conservative characteristic of legislators matters. Conservatives are more likely to oppose stricter environmental regulation. Sign and significance of the variable CC provides evidence in support. The lawmakers' affiliation with a political party can also be somewhat indicative of their support for certain ideology. Their efforts to become legislators is representative of their efforts to actively promote

these interests. These results are consistent with the stream of research on the impacts of ideology on voting behavior.

The number of species listed as endangered was also found to be a significant factor. This is consistent with Ando (1997). The higher the number of listed species, the higher the cost to protect them. A substantial number of listed species also means an increased risk of restrictive regulations, hence a decrease in property rights. Therefore, the probability of opposing the ESA increases with the number of listed species. Increase in the number of listed endangered species is found to have a decreasing marginal effect on legislators' voting choices. The increase in magnitude of the coefficient and marginal effects for SPECIES when it is measured at the district level (in the California desert protection case) is consistent with the idea of a possible errors-in-variable bias when it is measured at the state level for the three previous votes. The true importance of the variable becomes evident when it is measured at the election district level.

Finally, urban dwellers are more likely to support environmental legislation such as the ESA, and significant regional differences in attitude toward the ESA are found. Contributions to the GSP by the natural resources and construction sectors represent different interests that could conflict with the ESA. The higher the contribution by these sectors to the GSP, the more important they are in the economy of the district. Therefore, the probability of opposition to environmental regulation by the legislators from these districts also increases.

Our findings are consistent with the Stigler-Peltzman framework that economic incentives do matter in politics and with more recent studies on ideology. Constituents' interests appear to have a significant impact on voting. Therefore, providing more incentive to property owners and changing the perception of the ESA as a pure "stick" to these owners can be important in future amendments of the ESA. Recent developments in the ESA appear to be moving toward this direction as the federal government is now leaning toward creating incentives for private landowners to help in endangered species conservation (Zhang). Such policies are likely to gather support from politicians and property owners and may prove to be helpful in conserving endangered species.

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