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THE ENDURING NINETEENTH-CENTURY BATTLE FOR ECONOMIC REGULATION: THE INTERSTATE COMMERCE ACT REVISITED*

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I. INTRODUCTION

M_{UCH} of Congressional politics in the late nineteenth century was directed at regulation of the large private corporations that arose in the industrial age. In particular, the railroads were regulated by the passage of the Interstate Commerce Act (ICA) in 1887, and more broadly directed antimonopoly legislation was produced by the Sherman Act in 1890.

Our main thesis is that the coalitions that initiated the "Age of Economic Regulation" were in large part based on long-term, broadly based preferences ("ideologies" if one can bear the expression) concerning the economic structure of the United States. More precisely, measures of a representative's general "left-right" orientation should better predict his voting on a specific regulatory issue than should measures of his constituents' economic interests on the issue. In the process of documenting this thesis, we uncovered two key regularities. First, the heart of the proregulatory coalition was south of the Mason-Dixon line. Confederacy and Border congressmen overwhelmingly favored regulation of the railroads. Second, initial votes on railroad regulation, those occurring prior to 1884, took place in the absence of a well-formed coalition—support for regulation was unstable and not based on long-term preferences.

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The scenario where an issue arises, initially fails to produce systematic voting patterns, but eventually becomes "mapped" into the basic preferences, is, we believe, valid not only for the ICA but also for most other legislation, as much today as a century ago. Coalitions are built gradually over a period of time during which roll call voting becomes increasingly structured along the lines of the basic, long-term preferences.

We argue our thesis largely via an empirical analysis of all House of Representatives roll calls on the regulation of railroads up until the passage of the act. These roll calls cover the period 1878–87.¹

In previous research, Gilligan, Marshall, and Weingast² indicated that the passage of the ICA was dependent on institutional features of American politics, most notably on (1) the need to achieve a compromise between the two houses of a bicameral legislature and (2) the response of voting decisions to changes in the status quo brought about by Supreme Court decisions.³ With reference to the ICA, *Wabash* curtailed the ability of the states to regulate railroads engaged in interstate commerce.

In our opinion, it is clear from reading the floor debates in the Congressional Record that occurred *before Wabash* was handed down on October 25, 1886, that some form of interstate commerce bill was going to be passed.⁴ However, even were *Wabash* fundamental to breaking the House-Senate deadlock on the ICA, the influence of changes in the status quo is not addressed by Gilligan *et al.*'s empirical study, which examined two roll calls. One was a vote pitting the relatively antirailroad Reagan bill against the relatively prorailroad Cullom bill on July 30, 1886. The other was the final passage vote, on January 21, 1887, between the compromise bill produced by a House-Senate conference and the status quo. The problem is that *Wabash* intervened between the two votes. Since both the alternatives and the status quo were changed, there is no natural experiment that allows roll call votes in the House to be used to assess the impact of *Wabash*.

¹ There was also roll call voting on railroad regulation in 1874, prior to the time the manager of the ICA bill, Judge Reagan, returned to Congress. In the interest of brevity, discussion of these votes is omitted here.

² Thomas W. Gilligan, William J. Marshall, & Barry R. Weingast, Regulation and the Theory of Legislative Choice: The Interstate Commerce Act of 1887, 32 J. Law & Econ. 35 (1989).

³ See Pablo Spiller & Rafael Gely, Congressional Control or Judicial Independence: The Determinants of U.S. Supreme Court Labor Relations Decisions, 1949–1987 (1990), for a formal treatment of the interaction between the Court and Congress.

⁴ We are not alone in this opinion. "The common impression that the Supreme Court's Wabash Railway vs. Illinois decision was responsible for action is largely incorrect, since that decision was handed down on October 25, 1886, and by that time both the Senate and House wanted legislation and were determined to have it. The only question was the form of the legislation." Gabriel Kolko, Railroads and Regulation 1877–1916, 33 (1965).

In the Gilligan-Marshall-Weingast model (hereafter the GMW model), institutions channel legislator preferences that are formed by constituency preferences that relate to the economics of railroads.⁵ Specifically, preferences are based on two dimensions, the long-haul price and the short-haul price of railroad services. Seeking high prices on both short and long routes, railroads opposed a ban on pooling agreements and a short-haul pricing constraint (SHPC). Railroads further preferred regulation by commission to legislated rules that would be enforced by the courts. Short-haul shippers and long-haul shippers were united in opposing pooling and regulation by commission but had different preferences on the SHPC. To test the model of preferences, Gilligan et al. construct a set of variables to proxy for the preferences of railroads and shippers and conduct a logit analysis of the roll call votes. Three quantitative economic variables-CAPITAL (railroad capital), ROI (return on railroad investment), and LAND (value of farm land)-and three dummy variables-CENTER (for rail centers), WEST (congressional districts north and west of Chicago), and PARTY (Democrat/Republican)-were employed.⁶ After adding measures of long-term preferences in our reanalysis of the data, we find that the effects of the GMW variables are greatly diminished and that the long-term variables provide a more parsimonious accounting of the voting.

What is meant by long-term or basic preference variables is the presence of linkage or correlation across substantive issues. The existence of such a linkage was nicely captured by Hewitt (a Democrat from New York) during the ICA debate in 1884: "men of business in New York despair of wise legislation upon these great commercial questions from this House. They have seen this House resist the resumption of specie payments. They have seen this House thrust the silver bill down the reluctant throats of an unwilling community; and now they behold this House and this side of it forcing reactionary measures upon the commerce of the country which will paralyze the business of the port which is the throat of the commerce of this country."⁷

⁵ For bibliography and discussion of the constituency interest view of legislator preferences, see Joseph Kalt & Mark A. Zupan, The Apparent Ideological Behavior of Legislators: Testing for Principal-Agent Slack in Political Institutions, 33 J. Law & Econ. 302 (1990).

⁶ The WEST variable is defined by Gilligan *et al.* as congressional districts "North and West" of Chicago. Coded as WEST were some Illinois districts and all of Iowa, Wisconsin, California, and Oregon. A coding more consistent with the definition would have omitted California and included Nebraska and Minnesota. This would produce results less in favor of Gilligan *et al.*, but we have preserved their original coding in our analysis. See Gilligan, Marshall, & Weingast, *supra* note 2, for further details on the variables.

⁷ Cong. Rec. 368 (December 19, 1884).

That is, not going on the gold standard, monetizing silver, and regulating the railroads were all seen as part of a basic "anticommercial" preference. The ties of these preferences to economic interests is evident in Hewitt's reference to "men of business." This nexus granted, however, the rational pursuit of interests on railroads can involve trade-offs of interests over the gold standard and silver coinage. These trade-offs, in turn, are partially encapsulated in the long-term, basic preferences.

To capture these basic preferences empirically, we use long-term variables created by our D-NOMINATE Euclidean scaling of congressional voting.⁸ The scaling assigns each legislator a coordinate pair representing the legislator's position in a two-dimensional Euclidean space.⁹ Figure 1 contains a plot of the positions of members of the House in 1887. The R symbol denotes Republicans; the S symbol, Democrats from the Confederacy states and Kentucky; and the D, other Democrats.

Each roll call vote is modeled as representing two points in the space, one corresponding to a "yea" vote, the other to "nay." The roll call "cutting line" is the perpendicular bisector of the line joining these two points. A representative is predicted to vote "yea" if and only if his position is on the "yea" side of the "cutting" line. Using all "yea" and "nay" decisions, the positions of roll calls and the legislators are estimated simultaneously. We emphasize that the positions of the legislators are not reestimated for each roll call.

We can easily provide an intuitive understanding of the two dimensions to spare readers the technical details of D-NOMINATE. For both the Forty-eighth and Forty-ninth Congresses, we computed a Southern Democrat support score using all roll calls that were not ICA votes.¹⁰ This score is just the fraction of the time that the legislator voted with the majority of Democrats from the eleven Confederacy states. The support score correlates 0.98 with the horizontal dimension coordinates displayed in Figure 1 and 0.97 with the corresponding coordinates for the Fortyeighth Congress. So the first dimension can be thought of as just (the negative of) a Southern Democrat interest group support score. This major, horizontal dimension can also be thought of as a left versus right

⁸ Keith T. Poole & Howard Rosenthal, Patterns of Congressional Voting, 35 Am. J. Pol. Sci. 228 (1991).

⁹ Specifically, we use the two-dimensional, linear coordinates described in Poole & Rosenthal, *id*.

¹⁰ In contrast to the support score calculation, ICA roll calls were part of the observations used to estimate the coordinates. However, in the Appendix, we show that our results are robust to variation in the set of observations used in estimation.



FIGURE 1.—Euclidean coordinates for representatives in the Forty-ninth Congress.

or antilarge corporation versus prolarge corporation dimension. It can be seen that the (solid) South represented the left in American politics.

The second dimension can be thought of as distinguishing agrarian (up) from urban (down) interests in the North. We cannot get at this aspect of the second dimension just by computing support scores across all non-ICA roll calls since the vast majority of the roll calls cut across the first dimension. But the story can be seen in Table 1, which shows, for the Forty-ninth Congress, the average D-NOMINATE score by region of the country. The averages for the first dimension retell our story about the South. The second dimension averages show the farm belt in the West North Central region at one pole and New England at the other.¹¹

¹¹ More specific confirmation of the hypothesis that the second dimension is urban (negative values) versus agrarian (positive) is difficult since measures of urban and farm variables are unavailable for congressional districts in the 1880s. To check the urban pole, we obtained the population for 1880 and 1890 of the 124 cities with populations over 25,000 in 1890. (The source for this information is the Department of the Interior, Census Office, Report of the Eleventh Census: 180, pt. 1, 370-73 [Washington, D.C.: U.S. Government Printing Office, 1895].) To each district in the Forty-ninth Congress we assigned the population of the largest city wholly or partially contained in the district, zero being assigned to districts without one of the cities. Because the 1880 and 1890 measures are highly correlated, we used the average. Northern cities larger than New Orleans, the largest southern city, were New York, Philadelphia, Chicago, Brooklyn, Boston, St. Louis, Baltimore, Cincinnati, and San Francisco. Their thirty-five representatives in our sample were clearly negative on the second dimension. Negative second-dimension values were found for thirty-one of the thirty-five representatives, with sixteen of them more than one standard deviation from the mean. The four representatives with positive values were well within one standard deviation from the mean. However, our urbanization measure only noisily discriminated along the

TAB	LE 1
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	Number of Representatives Scaled	Mean, First (Horizontal) Dimension	Mean, Second (Vertical) Dimension	Standard Deviation, First (Horizontal) Dimension	Standard Deviation, Second (Vertical) Dimension
New England	26	.399	077	.279	.081
Mid Atlantic	70	.185	017	.358	.145
Confederacy	84	413	009	.261	.119
Border	21	251	009	.256	.121
West	9	.269	005	.217	.065
East North Central	75	.068	.114	.364	.125
West North Central	40	.100	.165	.368	.110
Total	325	016	.034	.417	.142

DISTRIBUTION OF D-NOMINATE COORDINATES BY REGION

NOTE.—The regional groupings are those established by the Inter-University Consortium for Political and Social Research, except that we subtracted Tennessee from the Border states and added it to the solid South to form the Confederacy and combined Mountain and Pacific to form the West. The groups are New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic (Delaware, New Jersey, New York, Pennsylvania); East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Minnesota, Missouri, Nebraska); Confederacy (Alabama, Arkansas, Florida, Georgia, Louisiana, Missispipi, North Carolina, South Carolina, Tennessee, Texas, Virginia); Border (Kentucky, Maryland, West Virginia); West (California, Colorado, Nevada, Oregon). Our West is not the WEST of Gilligan, Marshall, and Weingast. See n. 4 in the text.

Hereafter, we use the horizontal and vertical coordinates as two regressor variables called RATINGS since they are, for all practical purposes, similar to ratings that would be constructed by pro-Southern, on the one hand, and pro-Central, on the other, interests.¹²

second dimension outside the very largest cities. Even excluding the Confederacy and Kentucky, the *R* between the measure (after transformation to the one-fourth power) and the second dimension was only 0.26 (in both all districts and in districts with nonzero urbanization values). Similarly, a "big city" support score was negatively but weakly (for reasons stated in the text) related to the second dimension ($R^2 = 0.17$). Consequently, we have used the second dimension directly in the voting analysis.

¹² We omit further discussion of RATINGS since interest group ratings, such as those of the American for Democratic Action, have been widely used in the economics literature as regressors. For example, see Sam Peltzman, Constituency Interest and Congressional Voting, 27 J. Law & Econ. 181 (1984), or Joseph P. Kalt & Mark A. Zupan, Capture and Ideology in the Economic Theory of Politics, 74 Am. Econ. Rev. 279 (1984). As argued in D. Roderick Kiewiet & Matthew D. McCubbins, The Logic of Delegation: Congressional Politics and the Appropriations Process (1991), at 49–51, and Gary W. Cox & Matthew D. McCubbins, Legislative Leviathan: Party Government in the House (1993), the D. NOMINATE measures are superior to interest group ratings as measures of legislator preferences. The D-NOMINATE coordinates are now being used by other researchers (Thomas

Our Southern support rating or horizontal dimension is particularly significant since Southern representatives voted massively on the proregulation side on the ICA. Indeed, the major proponent of regulation in the House was, for over a decade, Judge Reagan of Texas. The centerpiece of the Gilligan *et al.* analysis, the 134-104 vote favoring Reagan's bill over the Cullom bill, was supported 57-4 by the former Confederacy. The South was pivotal¹³ to any strongly antirailroad legislation.

Our emphasis on the South contrasts with much of the earlier literature that focuses on the four railroad lines between Chicago and New York. Voting on the ICA was seen as part of a conflict between shippers at points intermediate between Chicago and the Atlantic coast who were served by only a single line and thus subject to monopoly short-haul prices and shippers west of Chicago who could benefit from long-haul competition. Our analysis suggests that a broader based economic conflict between the South and the North was at least as important as any divergence in interests over short-haul and long-haul prices. We need not, however, introduce a geographic dummy variable since the position of the South is captured by our Euclidean representation of long-term preferences.

The article proceeds, in Section II, with an analysis of roll call voting on the ICA in the Forty-ninth House (1885–87). We demonstrate the regional conflict between the South, at one pole, and New England and the Middle Atlantic states at the other. We then show that this conflict is largely accounted for by the RATINGS which lead to highly accurate classifications of most ICA roll calls. Moreover, the GMW economic variables add little to this analysis. In addition, the RATINGS are able to distinguish abstainers from voters whereas the economic variables offer virtually no explanatory power for abstention.¹⁴ Section III covers all

Romer & Barry Weingast, Political Foundations of the Thrift Debacle, in Politics and Economics in the Eighties [Alberto Alesina & Geoffrey Carliner eds. 1991]; Barry Weingast, Political Economy of Slavery: Credible Commitments and the Preservation of the Union, 1800–1860 [1991]) as regressors. Our analysis could also be conducted directly in terms of D-NOMINATE utilities. The results are similar; they are reported in the original version of this manuscript, available from either author on request.

¹³ By "pivotal," we mean simply that subtracting the Southern votes would, except for final passage, have led to failure on all votes in support of the Reagan bill. Southerners were the steadfast core of support. The *marginal* voters, those who could go either way, were in the North.

¹⁴ While, to save space, the results are not presented here, we view them as important for two reasons. First, a model of preferences should be able to capture indifference as well as strong preferences. Second, in some cases if abstainers had stronger preferences and decided to vote, the outcome could be affected. For details, see our original manuscript, available on request.

ICA-related roll calls prior to the Forty-ninth House. It shows that the period of development of legislation can be viewed as one of building coalitions that are well defined in terms of the basic preferences of the Euclidean representation.^{15,16}

II. PREFERENCES ON THE ICA IN THE FORTY-NINTH CONGRESS

While roll call voting on railroad regulation began in the House in 1874, the ICA was passed only by the Forty-ninth Congress. A summary of all votes directly relevant to the ICA is presented in Table 2. The table shows a distinct regional pattern to the voting. Once the initial four procedural votes were concluded, over 90 percent of the representatives of the Confederacy and Border states voting supported the "proregulation, antirailroad" side. Their slightly lower level of support on final passage probably reflected dissatisfaction with the compromise rather than an objection to regulation. At the other extreme, there was always strong opposition from New England, with the exception of an even split on the "hurrah" vote for final passage. The Middle Atlantic states were also strongly opposed, although somewhat less so than New England. The small West delegation was also against regulation, except for flip-flops on procedural votes. Although divided on the specifics of regulatory policy, the East and West North Central states, unlike New England and

¹⁵ In our analysis, we use the CAPITAL, ROI, LAND, CENTER, and WEST variables as they appear in Gilligan *et al.* We use the recent research by Kenneth C. Martis, The Historical Atlas of Political Parties in the United States Congress, 1789–1989 (1988), to code for political party. These codes are the same as those used by Gilligan *et al.* except that we code Croxton (Virginia), Fisher (Michigan), Ford (Indiana), and Pidcock (New Jersey) as Democrats and Thomas (Illinois) and Wade (Missouri) as Republicans. We further exclude Weaver (Iowa), who belonged to a third party, from all logit runs where party was a variable.

¹⁶ Our roll call votes are, unless otherwise stated, from the Inter-University Consortium for Political and Social Research (ICPSR) files. These were presumably constructed from the Congressional Record, the source given by Gilligan et al. for the two votes they used. On roll call number 191 (described by Gilligan et al. as Reagan vs. Cullom), the ICPSR file and the Record both show C. E. Brown (Ohio) as not voting instead of voting against as shown by Gilligan et al. Similarly, we "corrected" S. O. Fisher (Michigan) to "for" from not voting, and J. R. Thomas (Illinois) to not voting from voting for. On roll call number 239 (final passage), we "corrected" J. L. Beach (New York) to not voting from voting against, R. S. Green (Delaware) and Price (Ohio) to not voting from voting yes, and E. S. Osborne (Pennsylvania) and H. W. Rusk (Maryland) to voting yes from not voting. Also, on this roll call, Gilligan et al. have J. F. King (Louisiana) voting yes. According to the Record, King was "announced" yes. For the Forty-ninth Congress, the ICPSR recorded only actual votes and pairs. In keeping with the practice for later years, we, like Gilligan et al., treated King as yes in this analysis. When we replicated Gilligan et al.'s logits for these roll calls using the corrected data, there were virtually no differences in some coefficients and substantively unimportant differences in others. Consequently, we only report results using the corrected data.

					ROLL	CALL AND	DATE					
	29	152	153	155	177	190	191	192	193	231 Reaga	239 239 11 Bill.	
	Prc	ocedural Vo	tes		H	teagan Bill,	Pre-Wabasl	1		Post-W	Vabash	
Region	March 16, 1886	July 21, 1886	July 21, 1886	July 22, 1886	July 27, 1886	July 30, 1886	July 30, 1886	July 30, 1886	July 30, 1886	January 17, 1887	January 21, 1887	RANGE OF N
New England	37	58	17	19	9	22	5	13	22	0	50	17-25
Mid Atlantic	56	60	80	22	37	39	18	30	54	27	75	44-55
West	100	16	80	14	0	100	0	0	0	13	93	4-9
West North Central	76	74	94	15	45	80	56	88	94	29	87	29–37
East North Central	87	42	88	26	45	88	70	76	96	24	91	49–66
Border	100	42	100	57	100	92	94	4	100	85	6	12-19
Confederacy	100	72	98	86	16	67	93	67	86	67	91	58-72
N Pro	196	147	204	102	126	161	134	158	195	113	230	
N Anti	44	66	24	151	102	57	104	71	41	137	48	
Total N	240	242	228	253	228	218	238	229	236	250	278	
NOTE.—ICA = Int definitions. A summa motion to close debat order the previous qu consider conference r	ry of the ro c: 155—Re c: 155—Re lestion; 191 eport; 239—	nmerce Act. Il calls follo agan motior —Reagan b -final passa.	The pro-Re ws: 29-Rea to take up ill vs. Cullo ge, accept c	eagan vote v gan motion Senate bill; m bill; Yea onference r	vas "nay" c to suspend 177—Hisco pro-Reagan eport.	on roll calls rules and co ock motion, i; 192—reco	177 and 192 onsider bill; Reagan bill mmit Reaga	and ''yea'' 152-Reagai vs. Cullom n bill; 193-	on all othe n motion to (Senate) bil -pass confe	r roll calls. take up Sei I; Yea pro- rences bill;	See Table 1 nate bill; 15 Cullom; 190 231—Crisp	for region 3—Reagan —Reagan, motion to

TABLE 2

VOTING ON ICA ROLL CALLS BY REGION: PERCENTAGE OF THOSE VOTING TAKING PRO-REAGAN POSITION

the Middle Atlantic region, showed strong support for some form of regulation, as indicated by the two votes on passage (no. 193 and no. 239).

There are two important exceptions to this pattern. Support for bringing the ICA matter to the floor, on vote number 152, was broad but mixed. Although Reagan made the motion, there were substantial Border and Confederacy defections. These defections were repeated, to a lesser extent, the following day on vote number 155. Somehow, over the next five days, Reagan managed to turn the tables in favor of his bill.

The overwhelming support the South provided on the key votes for the Reagan bill was more than a matter of Democrats opposing Republicans. Consider the critical Reagan versus Cullom vote. On this vote, Southern (Confederacy and Border) Democrats provided near unanimous support (69-2) to Reagan. Central Democrats were equally loyal (40-1). But New England, Middle Atlantic, and West Democrats defected. Only a minority (10-14) sided with Reagan. Conversely, although New England, Middle Atlantic, and West Republicans voted nearly unanimously (1-56) for the Cullom bill, there were substantial defections to Reagan from Southern (2-3) and Central (11-27) Republicans.

The strong differences between the parties intraregion and the strong differences between regions intraparty indicate, in a straightforward and dramatic fashion, why aggregate constituency variables cannot adequately address the data. Congressional districts, particularly in this period, were not sorted into Democratic and Republican fiefdoms on the basis of their economic characteristics. Turnover outside the South was extremely high. The Democrats made a net gain of seventy (of 325) seats in the 1882 elections and were, after small losses in the intervening years, to gain another seventy-five in 1890. Turnover was, of course, even higher than the net gains. In the 1884 elections, for example, Republicans won forty-three seats previously held by Democrats, but the Democrats partially offset these losses by gaining eighteen seats from Republicans. Change in party control of a district would be likely, on a vote like Reagan versus Cullom, to have a dramatic effect on the roll call vote although aggregate economic characteristics were likely to have been relatively stable.

The bottom line to the preceding analysis is that the poles of voting were constituted, not by short-haul shippers in Ohio versus long-haul shippers in Iowa, but by the South versus New England. The opposition of the South to New England, in turn, may perhaps be rooted more in the general economic conditions of the regions than in the specifics of rail transportation. General differences in roll call voting behavior between regions and parties are indeed captured by the RATINGS plotted in Figure 1. Our basic empirical technique involves three types of logit equations: first, RATINGS by themselves; second, replicating GMW, the constituency variables by themselves; and third, RATINGS and GMW jointly.¹⁷

The constituency variables used by Gilligan *et al.* were, as stated above, CENTER, WEST, ROI, CAPITAL, LAND, and PARTY. They presented estimates with and without PARTY. In the full logit models with these variables and RATINGS, the largest magnitude of a *t*-value for PARTY was only 0.94. Since including this "insignificant" variable tends to lower the "significance" of the other GMW variables, we exclude PARTY from our presentation of results. The variable PARTY is correlated with RATINGS, and its effects on ICA roll calls are all captured by RATINGS. The relative impact of the RATINGS and constituency variables is indicated by the classification analysis shown in Table 3. The ex post classifications of RATINGS by themselves are typically better, often substantially so, than the GMW variables alone, although GMW has a slight edge on one roll call. Moreover, when both GMW and preference variables are used together, the five GMW variables only slightly improve classification.

The RATINGS variables are particularly powerful predictors on the three closest votes, the Hiscock substitute (no. 177), Reagan versus Cullom (no. 191), and Crisp's move to consider (no. 231).¹⁸ On these three votes, the GMW variables classify only 73–81 percent whereas the preference variables classify 91–94 percent. With constituency and preference variables combined, the range is 90–96 percent.¹⁹ Much of the reason for the superior performance of preference variables is that they capture the support for regulation in the South.²⁰

¹⁷ As an alternative to logit, we also estimated linear probability models with White standard errors used to correct for heteroscedasticity and errors in variables. See the Appendix.

¹⁸ On nonclose votes, "protest" voting may make the Euclidean model less applicable. See Keith T. Poole & Howard Rosenthal, The Spatial Mapping of Minimum Wage Legislation, in Alesina & Carliner eds., *supra* note 12, for an example concerning final passage of minimum wage bills.

¹⁹ Note that classifications can decline as variables are added to a logit specification.

²⁰ The improvement of the RATINGS model over the marginals is far more modest on those votes where the majority exceeded 80 percent (nos. 29, 153, 193, and 239) and the two early procedural votes (no. 152 and no. 155). This is not surprising since we have generally found that nonclose votes, particularly final passage votes, fit the spatial model relatively noisily. This is because disappointed "extremists" of both the right and left may reject the final package. Similarly, procedural votes may confound preferences on, say, the ICA, with preferences about the relative priority with which various bills should be considered. Note that procedural votes do not appear to be votes where constituency interests are expressed since the GMW constituency variables do very poorly on these two votes.

					ROLI	l Call and E	ATE				
	29	152	153	155	177	190	161	192	193	231	239
Model	March 16, 1886	July 21, 1886	July 21, 1886	July 22, 1886	July 27, 1886	July 30, 1886	July 30, 1886	July 30, 1886	July 30, 1886	January 17, 1887	January 21, 1887
GMW	86	58	68	73	73	82	81	85	6	77	82
RATINGS	86	6 6	68	84	94	87	92	16	88	16	84
GMW + RATINGS	88	67	68	86	94	88	8	94	16	60	84
Marginals	82	60	68	60	55	72	56	69	83	55	83
Nore.—ICA = Into side. See Table 2 for a	erstate Comr	nerce Act. G f the roll call	MW model s.	= the Gillig	an-Marshall-	Weingast moo	lel. The mai	ginals give t	he percentag	ge voting on	the majority

CLASSIFICATION ON FORTY-NINTH HOUSE ICA ROLL CALLS BY MODEL: PERCENTAGE CORRECTLY CLASSIFIED BY LOGIT ESTIMATION

TABLE 3

the roll calls. 5 Summary s đ 101 7 1 aULC 3

Much the same story is told by chi-square tests based on the likelihood function. When added to the GMW variables, the preference variables are always highly "significant," even on those votes where classifications do not improve substantially on the marginals. Indeed, the probability that the coefficients of these two variables are both zero is infinitesimally small for all votes in the RATINGS comparisons. In contrast, when the GMW variables are added to the preference variables, the null hypothesis is accepted at the 0.01 level for six of the eleven roll calls. Clearly, long-term preferences predominate over the GMW measures of constituency preferences.²¹

For Reagan versus Cullom and final passage, the two roll calls chosen by Gilligan *et al.*, we display the estimated coefficients in Table 4. For both roll calls, the first column pertains to the estimation where the only regressors are the RATINGS. The negative coefficient on the first dimension indicates proregulation support from the economic left. The positive coefficient on the second indicates rural-agrarian support. The fact that the second dimension has a greater coefficient than the first should not be overemphasized as the standard deviation of second-dimension coordinates is only a third that of first-dimension coordinates. (See Table 1.) The postbellum preference distribution was largely one-dimensional. Excellent classifications on ICA roll calls can in fact be obtained solely by use of the first dimension. (See the Appendix.) The results (omitted to save space) for "RATINGS" on other ICA roll calls are similar to those in Table 4.

When we turn to the GMW constituency model—the second column for each roll call—we find precisely estimated coefficients for all variables except CENTER. But when this model is combined with the RATINGS, the RATINGS retain their significance while several of the GMW variables do not. In the Reagan versus Cullom vote, LAND and WEST are not significant at conventional levels. In the final passage vote of the compromise versus the status quo, LAND, CAPITAL, and CENTER are not significant. On the whole, constituency variables make some small increment to the explanatory power of a long-term preference model.

The pattern shown in Table 4 holds generally across the other roll calls. Chi-square tests for inclusion of variables show that, when added to the GMW variables, the preference variables are always highly significant. In

²¹ For similar conclusions on minimum-wage voting, see Poole & Rosenthal, *supra* note 18. For a broader set of comparisons, see Keith T. Poole & Howard Rosenthal, The Political Economy of Roll Call Voting in the "Multi-party" Congress of the United States, 1 Eur. J. Pol. Econ. 45 (1985). For strip-mining, see Keith T. Poole & Thomas Romer, Ideology, "Shirking," and Representation, Public Choice (in press).

TABL	.E 4
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	Reagan	VS. CULLOM (No. 191)	Final	Passage (No.	239)
Coefficient	RATINGS	GMW	Both	RATINGS	GMW	Both
Constant	.050	3.686**	3.564**	1.725	3.162**	3.011**
	(.287)	(.546)	(1.218)	(.195)	(.519)	(.581)
First dimension	-10.951**		-13.160**	-1.614**		-1.054*
	(1.687)		(2.533)	(.436)		(.505)
Second dimension	17.023**		15.821**	6.782**		7.324**
	(3.314)		(3.985)	(1.438)		(1.878)
CENTER		404	-2.250*	• • •	426	.198
		(.455)	(1.187)		(.441)	(.501)
WEST		-3.603**	823	• • •	-2.535**	-1.894**
		(.711)	(1.115)		(.653)	(.705)
CAPITAL		- 5.996**	-3.352*		-3.332**	-1.146
		(.918)	(1.852)		(1.035)	(1.128)
ROI		228**	203**	• • •	133**	104**
		(.040)	(.084)		(.034)	(.038)
LAND		4.642**	2.142		4.358**	1.392
		(.929)	(2.021)		(1.186)	(1.308)
Log likelihood	-40.767	-112.726	-30.036	-104.456	-115.621	-98.775

LOGIT ESTIMATES FOR THE GMW ROLL CALLS

NOTE.—Asymptotic standard errors are given in parentheses. See Tables 2 and 3 for N's and percent correctly predicted. Our Gilligan-Marshall-Weingast (GMW) columns differ from the results in GMW (1989, table 2). Slight differences reflect our corrections to the data. However, typographical errors seem to have led them to misreport (for the uncorrected data) the standard error of LAND in Cullom vs. Reagan (correct result = 0.72) and the coefficient of CAP in the final vote (correct result = -2.82). The N in GMW is the correct N for Reagan vs. Cullom before our corrections to the data; this N is incorrect for the final passage vote.

* Significant at the .05 level (one-tail test).

** Significant at the .01 level (one-tail test).

contrast, when the GMW variables are added to the preference variables, the chi-square is always much smaller in magnitude and is only significant at the .01 level for five of the eleven roll calls.

Another weakness is the negative signs on the CAPITAL and ROI variables on the final vote regardless of the specification. Although Gilligan *et al.* allow that "we should observe railroads to favor the compromise,"²² the probability of voting for the compromise is decreasing in the railroad variables and is in fact below 0.5 for districts in Connecticut and Rhode Island, two states with exceptionally high values of ROI.

III. BUILDING THE HOUSE COALITION FOR RAILROAD REGULATION

In this section we briefly trace the history of roll call voting on railroad regulation in the decade prior to enactment. As a guide for our discussion, we utilize Table 5, which displays the dates of the roll calls, the "margin-

²² Gilligan, Marshall, & Weingast, supra note 2, at 56.

als" (percent voting on majority side), the classification percentages for both one-dimensional and two-dimensional D-NOMINATE models, and a brief summary of content. We find that the earliest votes were not "ideological" in that they did not map well into the basic space. However, by the opening of the Forty-eighth Congress, voting on the ICA was dominated by "basic" preferences. Moreover, the economic variables add little to our understanding of the voting.

This pattern is consistent with results for minimum wage²³ and other issues.²⁴ Early on, perhaps in part because legislators are still acquiring information that affects their indirect preferences and perhaps in part because stable coalitions have not been formed, voting on issues generally is not highly "ideological." But the vast majority of issues eventually become "mapped" into the basic space. Once that happens, there is likely to be little to be gained from searching for correlates of roll call voting in constituency economic variables. By the Forty-eighth Congress, the railroad "mapping" had occurred.

IV. CONCLUSION

Our study differs from the earlier literature in two important respects.

First, we see the South as the root of the proregulatory coalition. This contrasts not only with Gilligan *et al.* but also with their predecessors. Benson seems simply puzzled that the former postmaster general of the Confederacy, Judge Reagan, was the key promoter of the ICA. Kolko suggests that southern merchants were opposed to regulation and makes no comment on the broad support for regulation in the South.

If one scans the debate on the ICA in the *Congressional Record*, the emphasis in the earlier literature is understandable. Almost all the House debate was devoted to a comparison of competitive Chicago–New York long hauls versus monopoly short hauls. Discussion of southern routes, particularly in the deep South, was virtually absent. This absence is consistent with the view that a purpose of debate is persuasion. There was no point in wasting time convincing the "solid" South.

There are clues as to the sources of Southern commitment. Kolko claims that the Southern Railway and Steamship Association was the only successful pool in the decade prior to passage of the ICA.²⁵ More-

²³ Poole & Rosenthal, *supra* note 18.

²⁴ Keith T. Poole & Howard Rosenthal, Spatial Realignment and the Mapping of Issues in American History, in Agenda Formation (William Riker ed. 1993).

 $^{^{25}}$ Kolko, *supra* note 4, at 10. See also John J. Binder, The Sherman Antitrust Act and the Railroad Cartels, 31 J. Law & Econ. 443 (1988), and Henry Hudson, The Southern Railway and Steamship Association, 5 Q. J. Econ. 70 (1890).

		Торс		Adiourn debate on hill	Consider bill	Closed rule vote on hill			Consider bill	Do not consider hill			Discharge hill (two-thirds needed)			Consider Reagan's substitute	Consider substitute with five-minute rule	Ban discrimination
ing, 1878–85	CLASSIFICATION	Two Dimension		68	68	99	:		71	88			81			72	87	88
COMMERCE VOT	D-NOMINATE (One Dimension		64	63	58			61	88			77			99	82	88
INTERSTATE		Marginals		58	54*	57			*09	73			61			54*	59	58*
		DATE		May 11, 1878	May 28, 1878	December 11, 1878			February 2, 1881	March 1, 1881			June 5, 1882			April 9, 1884	December 16, 1884	December 17, 1884
		CONGRESSIONAL ROLL CALL	Forty-fifth Congress:	168	191	266	Forty-sixth	Congress:	370	417	Forty-seventh	Congress:	187	Forty-eighth	Congress:	20	199	200

TABLE 5

206 December 17, 1884 58* 88 90 Ban discrimination 207 December 18, 1884 56* 90 91 Table recommit on discrimination 208 December 18, 1884 56* 90 91 Table recommit on discrimination 208 December 18, 1884 51 93 93 Previous question 210 December 18, 1884 51 92 Separate but equal 211 December 18, 1884 51 92 Separate but equal 211 December 19, 1884 51 92 Parvious question 212 December 19, 1884 51 92 Parvious question 211 December 19, 1884 64 89 92 Rebates 212 December 20, 1884 66 81 83 Short-haul pricing constraint 215 December 20, 1884 92 83 Short-haul pricing constraint 22 216 December 20, 1884 59 83 Short-haul pricing constraint 22 2	203 204 205	December 17, 1884 December 17, 1884 December 17, 1884	5 51 54	90 23 23	91 93 72	Substitute for discrimination Substitute for discrimination Passenger prices
208 December 18, 1884 51 93 92 Separate but equal 209 December 18, 1884 51 93 93 Previous question 210 December 18, 1884 51 92 93 93 Previous question 211 December 19, 1884 51 92 90 90 Limit debate to five minutes 212 December 19, 1884 64 89 92 Rebates 213 December 19, 1884 64 89 92 Rebates 213 December 19, 1884 66 81 83 Short-haul pricing constraint 214 December 20, 1884 92 93 87 Short-haul pricing constraint 216 December 20, 1884 92 93 87 Short-haul pricing constraint 216 December 20, 1884 92 92 92 Short-haul pricing constraint 216 December 20, 1884 92 93 97 Short-haul pricing constraint 221 January 7, 1885 59	206 207	December 17, 1884 December 18, 1884	58* 56*	88 06	- 6 - 6 - 6 - 6	Ban discrimination Table recommit on discrimination
210 December 18, 1884 51 92 Ban color discrimination 211 December 19, 1884 73 90 90 Limit debate to five minutes 212 December 19, 1884 73 90 90 Limit debate to five minutes 213 December 19, 1884 64 89 95 96 Kill by adjourning 215 December 19, 1884 66 81 83 Short-haul pricing constraint 216 December 20, 1884 92 92 Short-haul pricing constraint 216 December 20, 1884 92 92 Short-haul pricing constraint 216 December 20, 1884 92 92 93 87 Short-haul pricing constraint 217 January 7, 1885 59 92 92 94 State court jurisdiction 223 January 8, 1885 57 87 91 91 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	208 209	December 18, 1884 December 18, 1884	51 63	33 <i>3</i> 3	93 23	Separate but equal Previous question
212 December 19, 1884 64 89 92 Rebates 213 December 19, 1884 64 89 92 Rebates 215 December 19, 1884 66 81 83 Short-haul pricing constraint 216 December 20, 1884 96 96 96 83 Short-haul pricing constraint 216 December 20, 1884 92 92 Short-haul pricing constraint 221 January 7, 1885 59 83 87 Short-haul pricing constraint 222 January 7, 1885 59 92 94 State court jurisdiction 223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	210 211	December 18, 1884 December 19, 1884	51 73	92 90	92 9	Ban color discrimination I imit debate to five minutes
213 December 19, 1884 96 96 Kill by adjourning 215 December 20, 1884 66 81 83 Short-haul pricing constraint 216 December 20, 1884 92 92 92 Short-haul pricing constraint 211 January 7, 1885 59 92 92 Short-haul pricing constraint 221 January 7, 1885 59 92 94 State court jurisdiction 223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	212	December 19, 1884	3	89	92	Rebates
213 December 20, 1884 66 81 83 Short-haul pricing constraint 216 December 20, 1884 92 92 92 92 Short-haul pricing constraint 221 January 7, 1885 59 83 87 Short-haul pricing constraint 222 January 7, 1885 59 92 94 State court jurisdiction 223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	213	December 19, 1884	8	96	96	Kill by adjourning
210 Decention 20, 1004 92 92 500rt-haul pricing constraint 221 January 7, 1885 59 83 87 Short-haul pricing constraint 222 January 7, 1885 59 92 94 State court jurisdiction 223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	212	December 20, 1884	99 59	81 80	8 8	Short-haul pricing constraint
222 January 7, 1885 59 92 94 State court jurisdiction 223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	221	January 7, 1885	59 59	92 83	92 87	Short-haul pricing constraint Short-haul pricing constraint
223 January 8, 1885 57 87 88 Establish commission 224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	222	January 7, 1885	59	92	94	State court jurisdiction
224 January 8, 1885 58 90 91 Establish commission 225 January 8, 1885 68 73 81 Passage	223	January 8, 1885	57	87	88	Establish commission
225 January 8, 1885 68 73 81 Passage	224	January 8, 1885	58	90	91	Establish commission
	225	January 8, 1885	68	73	81	Passage

* Indicates that the majority position was opposed to that of the majority of Democrats. Otherwise, the majority position was supported by a majority of Democrats. See Table 2 for a summary of roll calls.

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over, after the post–Civil War Congress failed to deliver on Radical Republican promises of federal aid to rebuild lines destroyed in the war,²⁶ Southern railroads increasingly fell under the control of Northern capital.²⁷ Reagan was particularly dissatisfied with concessions made to the railroads in his home county.²⁸ Thus, for the South, railroad regulation could be argued not only on the basis of lower prices but also on the basis of redistribution from North to South.

A committed South led debate to focus on appeals to the representatives of the northern states formed from the Northwest Territory and the Louisiana Purchase as well as on Middle Atlantic Democrats. For these representatives, constituency preferences were likely to be ambiguous. Within a given congressional district, shippers had hauls of different lengths. Some could avail themselves of competitive water transportation as well as the rails. Some could, at a cost, transship and seek less expensive transportation while others might be "captive shippers."²⁹ Some had hauls that were mainly intrastate. Similarly, small, short railroads did not always have the same interests as the large trunk lines.³⁰ As Bauer, Pool, and Dexter have argued in the context of tariffs, multiple constituency interests would leave representatives substantial discretion in voting.³¹ Unless constituency economic interests were strongly one-sided on the issue, the constituency might be better served by siding with, say, the "antimonopoly" group on the ICA issue in expectation of reciprocation on other matters. In looking at the rhetoric employed in hours of debate on the ICA, we suspect that determining constituency interests on the matter was not easy for many representatives. This perspective is consistent with our second major finding, that the RATINGS model is superior to the "economic" constituency variables as a description of voting behavior. When the basic preferences are controlled for, the roll call data fail to provide strong support for the theoretical model of Gilligan et al.

Defenders of "constituency interests" might argue that our strong results simply reflect differences in measurement. Having access to about

 26 Mark W. Summers, Railroads, Reconstruction, and the Gospel of Prosperity: Aid under the Radical Republicans, 1865–77 (1984).

²⁷ John F. Stover, The Railroads of the South, 1865–1900: A Study in Finance and Control (1955).

²⁸ Lee Benson, Merchants, Farmers, and Railroads: Railroad Regulation and New York Politics, 1850–1887 (1955).

²⁹ P. V. Garrod & Walter Miklius, "Captive Shippers" and the Success of the Railroads in Capturing Monopoly Rent, 30 J. Law & Econ. 423 (1987).

³⁰ See remarks by Dean of Massachusetts, Cong. Rec. 3395 (May 11, 1878).

³¹ Raymond Bauer, Ithiel de Sola Pool, & Lewis Anthony Dexter, American Business and Public Policy: The Politics of Foreign Trade (1963).

nine hundred recorded votes in the career of a typical representative, we can precisely estimate "ideology." In contrast, Gilligan *et al.* used data aggregated at the state level. Disaggregation at the level of congressional district might be of some moderate help, but such measurements would still fail to account for the switch in voting behavior that ensues with a switch in party control. As a result, in line with the suggestion of Peltzman, we would need economic variables that reflect party support constituencies.³² Such measurements will be very difficult to obtain, particularly for nineteenth-century congressional districts.

We believe, however, that there is a more fundamental problem than measurement in testing constituency interest models with roll call voting data. More generally, pursuing constituency interests implies coalition behavior that, we believe, leads to extremely patterned voting that can be represented in a low-dimensional Euclidean space. For example, Fere-john shows that the coalition behind food stamps, like that behind the ICA, required years to build.³³ Moreover, the coalition agreed on a linkage between food stamps and agricultural price supports. Analysis of voting on isolated price support roll calls in terms of constituency interests is therefore likely to be contaminated by a long-term log roll. Simply measuring constituency interests for a particular roll call is too isolated an approach for many cases.³⁴

The finding of Euclidean structuring of coalitions is not an artifact of the D-NOMINATE method; no such structuring is found, for example, in the 1851–52 Congress, when the political system was in near chaos. Moreover, the coalitions are not strictly party coalitions. Note that Figure 1 shows considerable internal party differentiation. Nor are the coalitions always the same, since cutting lines shift in the space. Nonetheless, coalitions largely satisfy the constraints implied by a Euclidean model of voting.

Our remarks are not intended to diminish the convincing theoretical case made by Gilligan *et al.*³⁵ The short-haul pricing constraint was the core of years of House debate on railroad regulation, and the economic aspects of the bill must have been subject to intense bargaining before any formal votes were taken. Our position is simply that these concerns were not manifest in roll call voting, which seems far more responsive

³² Peltzman, *supra* note 12.

³³ John Ferejohn, Logrolling in an Institutional Context; The Case of Food Stamps, in Congress and Policy Change (Gerald C. Wright, Jr., *et al.* eds. 1986).

³⁴ On this point, we merely echo Morris P. Fiorina, Representatives, Roll Calls, and Constituencies (1974). See also Poole & Rosenthal, *supra* note 21.

³⁵ Gilligan, Marshall, & Weingast, supra note 2.

to "ideological" positions that are used to structure coalitions. Thus, an important lesson of our study of the ICA is that the Euclidean model needs to be used as a control in testing political-economic theories of regulation with roll call data.

A critical step for those theories to take is to model the process by which a given economic issue is "mapped" into the basic preferences. The power of the basic preferences in classification on critical votes leading to legislation is all the more striking given our finding of lack of classification on early votes. The increase in the power of the Euclidean model as an economic issue ripens is an important regularity that has yet to be adequately accounted for.

APPENDIX

CLASSIFICATIONS ON ICA ROLL CALLS

In this Appendix, we treat two methodological issues. The first arises in that ICA votes entered the estimation of the legislator coordinates. The second is that these coordinates are estimated, rather than observed.

I. Alternative Samples for Estimation of Legislator Coordinates

The legislator coordinates used in the text of this article were estimated, via the two-dimensional linear model,³⁶ using each legislator's entire roll call voting record, including any ICA votes that occurred during his term of office. To test whether the use of ICA votes influenced the analysis, ideally one would like to reestimate the entire model excluding ICA votes. Our supercomputer program does not have this capability. We do have a one-dimensional algorithm (FORTRAN code available from the authors) that can be used on mainframe computers or personal computers running OS2. This algorithm can be used on an arbitrary bloc of roll calls. We selected the first 176 roll calls from the Forty-ninth Congress. Of these, 161, including four ICA roll calls, with over 2.5 percent of those voting voting in the minority, were retained for the estimation. On these roll calls, 323 representatives voted twenty-five times or more and were retained for analysis.

For these 323 representatives, Tables A1 and A2 present results that allow comparison, for the seven subsequent ICA roll calls, of the use of the first D-NOMINATE dimension as a RATING (see text) versus use of the "161" one-dimensional coordinates.

It can be seen that the results are similar both in terms of classification and the ability of the GMW variables to improve the likelihood. The D-NOMINATE coordinates classify slightly better than the "161." We conjecture that this is not due to the inclusion of the seven ICA votes but simply to the much larger number of total votes included for each representative. Using votes from a representative's entire career should give better estimates of basic preferences than votes from a relatively short sample period. There were over three hundred roll calls

³⁶ Poole & Rosenthal, *supra* note 8.

	T/	ABLE AI					
CLASSIFICATION ON FORTY-NINTH HOUSE ICA RC	DLL CALLS BY	(Model: Pei	CENTAGE CO	rrectly Cla	ssified by L	ogit Estima	LION
			ROLL	CALL AND D	ATE		
Model	177 July 27 1886	190 July 30_1886	191 July 30-1886	192 July 30-1996	193 July 30, 1896	231 January	239 January
	71, 1000	0001 1000	0001 000	0001 .00	0001 .00	1/, 100/	21, 100/
RATINGS—FIRST DIMENSION RATINGS—FIRST DIMENSION "161"	66 67	83 83	87 87	86 24	84 82	88	83
GMW + RATINGS—FIRST DIMENSION	93	1 00	6	56	6	с С	48
GMW + RATINGS—FIRST DIMENSION "161"	92	87	92	8	6	61	85
NoTE.—ICA = Interstate Commerce Act. GMW model = C estimation. "First dimension '161'" is the same RATING est further details.	illigan-Marsh imated solely TA JARE STATISI	from 161 non- from 161 non- BLE A2 rrcs FOR ICA	odel. "First di ICA votes. Se ROLL CALLS	mension`` is the Table 2 for	ie RATING fr a summary of	om the full D. the roll calls	NOMINATE See text for
			Rol	L CALL AND	DATE		
	177	190	161	192	193	231	239
Incremental Variables	July 27, 188	July 6 30, 1886	July 30, 1886	July 30, 1886	July 30, 1886	January 17, 1887	January 21, 1887
GMW when full model uses RATING FIRST DIMEN- SION D-NOMINATE	5.4	35.3	59.3	61.1	57.2	12.5	18.2
GMW When full model uses KATING FIRST DIMEN-	6.6	36.1	59.6	49.2	57.0	9.0	16.8

NoTE:--See notes to Table 4 and Table A1. ICA = Interstate Commerce Act. GMW refers to the Gilligan-Marshall-Weingast model. See Table 2 for a summary of the roll calls.

	Reagan vs	5. CULLOM (N	No. 191)	Final	Passage (No. 2	39)
Coefficient	RATINGS	GMW	Both	RATINGS	GMW	Both
Constant	.502**	1.182**	.700**	.797**	1.030**	.969**
	(.012)	(.069)	(.052)	(.022)	(.058)	(.062)
	(.012)	(.063)	(.057)	(.024)	(.052)	(.059)
First dimension	917**	• • •	831**	196**		114*
	(.042)		(.048)	(.050)		(.056)
	(.035)		(.052)	(.048)		(.057)
Second dimension	.980**	• • •	.661**	.707**	• • •	691**
	(.122)		(.150)	(.149)		(.184)
	(.141)		(.175)	(.156)		(.208)
CENTER	•••	066	124	•••	062	.009
		(.072)	(.050)		(.061)	(.062)
		(.077)	(.053)		(.068)	(.074)
WEST		696**	122		373**	265**
		(.108)	(.077)		(.086)	(.089)
		(.122)	(.107)		(.100)	(.106)
CAPITAL		-1.223**	384**		401**	145
		(.138)	(.105)		(.132)	(.140)
		(.131)	(.127)		(.137)	(.168)
ROI		043**	012**		020**	016**
		(.005)	(.004)		(.005)	(.005)
		(.005)	(.004)		(.005)	(.005)
LAND		.996**	.316*		.542**	.212
		(.152)	(.121)		(.131)	(.149)
		(.163)	(.152)		(.122)	(.157)
<i>R</i> ²	.702	.375	.737	.125	.108	.169

TABLE A3

LINEAR PROBABILITY ESTIMATES FOR THE UNING KOLL CA
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NOTE.—GMW refers to the Gilligan-Marshall-Weingast model. Asymptotic standard errors are given in parentheses. For each coefficient, the upper standard error is the conventional ordinary least squares standard error. The lower figure is the White standard error. See Tables 2 and 3 for N's and discussion of data.

* Significant at the .05 level (one-tail test), based on White standard error.

** Significant at the .01 level (one-tail test), based on White standard error.

per Congress in the 1875–90 period. A representative serving three terms would have had about nine hundred opportunities to vote. The estimation cannot be greatly influenced by whether the total of forty ICA roll calls are included in the estimation.

It is also the case that GMW makes greater improvements to the log likelihood when competing against only a one-dimensional model than against the twodimensional model. This reflects correlation between the GMW variables and the RATING represented by the second dimension.

II. ERRORS IN VARIABLES

The legislator coordinates we use as right-hand-side variables in our logit estimations are not direct observations of positions but estimates. This generates an errors-in-variables problem. Our own view is that the GMW variables, being based on proxies available in government data and being statewide aggregates, have at least as severe an errors-in-variables problem as the D-NOMINATE measures. We thus see ourselves on safe ground in adding our variables to their original logits, which also failed to address errors in variables. As a check, however, we estimated linear probability models of the votes via ordinary least squares (OLS) and then computed White standard errors.³⁷ The White procedure offers a joint correction for the heteroscedasticity engendered by the errors in variables and for the heteroscedasticity engendered by running a regression on a limited dependent variable. Inspection of Table A3 will show that the OLS-White procedure leads to quite similar qualitative conclusions as the logit analysis.

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³⁷ Halbert White, A Heteroskedasticity-consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity, 48 Econometrica 817 (1980).

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