The Economic Theory of Regulation: the Case of Agrarian Reform Legislation in Brazil*

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Summary: 1. Introduction; 2. Testing for capture and ideology in the agrarian reform chapter of the Constitution; 3. Refining a measure for ideology; 4. Conclusion.
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This paper uses the votes on agrarian reform legislation during the writing of the Brazilian Constitution in 1988 to test hypotheses about the apparent ideological behavior of the legislators. This test starts out with a simple capture model that explains the legislators' votes based on the preferences and capacity to organize of their constituencies. The second step is to recognize that the relationship between the legislator and his/her constituency has the properties of a principal-agent relationship. This implies that under certain conditions, the legislator may experience some slack, which allows him/her to vote his/her own preferences rather than those of the constituents. The main problem with this approach has ben to find a reasonable measure of the legislators' ideology. Several different measures are attempted in this paper for the case of land reform legislation. The results obtained display the same strenghts and weaknesses as results in the original literature for the USA. Ideology is found to matter, however the measures used remain vulnerable to the criticism that they reflect left out constituent characteristics rather than legislator preferences.

Este trabalho usa votos relativos a reforma agrária durante a Constituinte de 1988 para testar diversas hipóteses sobre o comportamento aparentemente ideológico dos legisladores. O teste começa com um simples modelo de captura onde os votos dos legisladores são explicados com base nas preferências e capacidade de organização das bases dos parlamentares. O passo seguinte consiste em reconhecer que a relação entre os legisladores e suas bases tem as características de uma relação principal-agente. Isto implica que, sob algumas condições, existe espaço para o legislador votar suas próprias preferências em vez daquelas de sua base. O principal problema desta abordagem na literatura tem sido encontrar uma boa medida de ideologia. Neste trabalho, diversas medidas são experimentadas para o caso da legislação de reforma agrária. Os resultados obtidos apresentam as mesmas forças e fraquezas de outros trabalhos na literatura para os EUA. Descobre-se que ideologia tem um alto poder explicativo, porém as medidas usadas permanecem vulneráveis à crítica de que refletem características omitidas das bases em vez das preferências dos legisladores.

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1. Introduction

In 1971 George Stigler published his seminal article, "The economic theory of regulation", arguing that, as a rule, regulation is acquired by the industry and is designed and operated for the industry's own benefit. This paper was a break not only with the view which had generally prevailed until then, in which the purpose of regulation was to look after the public interest, but also with the simple capture theory of economic regulation, which merely recognized the tendency of regulatory rules to favor producer over consumer interests. Stigler viewed the distribution of wealth, which regulation necessarily represents, as a commodity, demanded by constituents and supplied by regulators. This commodity is transacted in the political market, which, as any other market, will distribute more of the commodity to those with the highest demand (Peltzman, 1976). These tend to be numerically compact groups, such as producers, for whom the cost of gathering information about proposed regulation and the costs of organizing to affect that regulation are small relative to each member's individual stake. On the other hand, large diffuse groups, such as consumers, will have small *per capita* stakes in the regulation and thus greater difficulty to mobilize to affect it.

Peltzman (1976) generalized Stigler's basic theory in a mathematical model where a vote-maximizing regulator/politician supplies regulation in such a way to trade-off the support won by favoring the beneficiary group against the opposition generated from the group which is taxed.[1] Basically the regulator chooses the size of the winning group, taking into consideration the probability that its members will grant support as well as the probability that the members of the group which is taxed will offer opposition. These probabilities are a function of the dollar amount transferred to the beneficiary group, the size of the tax on the non-beneficiary group, the cost of organization, and the dollar amount spent by the beneficiaries to mitigate opposition.

The main implication of the Stigler/Peltzman model is clear: the difficulties of translating transfers into votes and taxes into opposition tend to lead the regulator to restrict the size of the winning group. Based on such an economic theory of regulation, a capture model can be specified to empirically test the relationship between economic interests and political influence. This is done through an incidence analysis which:

[1] *Support and opposition are paid with both votes and cash.*

(a) determines how the proposed regulation will affect the gains and losses of specific groups;

(b) assesses what are the abilities of these groups to overcome the free-rider and collective action problems in order to organize and capture the regulatory process.

Because the empirical implementation of the Stigler/Peltzman model is straightforward, it will not be explicitly presented here. However, it should be clear throughout the paper that this is the theory from which derives the specification of the capture model for land reform presented below.[2]

Peltzman's article generated an enormous literature applying his basic model to specific cases of regulation.[3] Most of this literature has been dedicated to American industries. However, the economic theory of regulation is in no way restricted to the regulatory process in that country. Every country in the world engages in regulation of industry in one form or another and thus presents opportunities to test the robustness of this theory. In this paper the case of agrarian reform legislation in Brazil will be analyzed. Agrarian reform can be considered a type of regulation, since it establishes rules within which specific productive activities must operate. Changes in these rules will clearly have a redistributive effect, thus justifying the use of the economic theory of regulation.

This paper has two main objectives. In a first step, it will set forth and test a capture model where legislators maximize votes by determining the shape of agrarian reform legislation in the Brazilian Constitution. This has the general form:

$$Y = f(X) + e \tag{1}$$

where Y is the probability that the legislator will vote favorably for agrarian reform, X is a vector of constituents' characteristics which should proxy their economic interests, and e is an error term.

This specification assumes that the variation in the legislators' votes can be explained solely through considerations of economic interest. To implement this model it is necessary to identify the specific groups which expected to be most affected by the proposed policy, since they will have had the most incentives to pressure policy makers into pursuing their interests. Although

[2] *For the detailed model, see Peltzman (1976).*

[3] *Several examples can be found in Stigler (1988, ch. 3).*

the policy often has important consequences for other groups in society, there are impediments to collective action which make it difficult for large groups, such as consumers, to do the same. Thus, by taking into account which groups are affected by the policy, together with considerations of the strength and organizational capacity of these groups, the model makes predictions of how legislators will behave. It will be shown that in this pure capture model the variables behave as expected, but that nevertheless a large part of the variation in legislator behavior remains unexplained.

In a second step, the model will be expanded to take into consideration an important development of the literature, in which it has been hypothesized that, in addition to the capture elements, legislative behavior is also influenced by the ideology of the political actor.[4] The model will now have the following general specification:

$$Y = f(X, I) + e \tag{2}$$

where I is a variable which attempts to measure the "ideology" of the legislator.

In this literature, ideology has a very specific meaning, which may differ from the usual definition of the term. A legislator's ideology in this context is taken to be a legislator's "personal definitions of the public interest, pursued as a consumption good that yields satisfaction in the form of moral sentiments" (Kalt & Zupan, 1990:104). That is, ideological behavior occurs when a legislator, instead of pursuing the constituents' interest, as is always the case in the pure capture model, votes based on his/her own view of the issue in question. Because there is satisfaction to be gained from having one's own opinions imposed towards the solution of a problem, this ideological behavior is considered to have the properties of a consumption good and can thus be analyzed using regular microeconomic theory. Monitoring of the actions of the legislators by the constituents is very costly, and thus there is significant slack in the principal-agent relation between them. It is this slack that allows the legislators to indulge in on-the-job consumption by voting on issues according to their own preferences rather than those of the constituents.

Although it seems intuitive that ideology does play a role in legislator behavior, the assertion that its effect is sufficiently important to be considered in an economic analysis has been controversial (Peltzman, 1984:181-211). The

[4] *This literature began with Kalt & Zupan (1984). See also Kalt & Zupan (1990).*

principal objection has been concerned with the variables used to measure ideology and the interpretation of what these variable truly represent. The results of the capture plus ideology model estimated in this paper are similar to those found in other studies applying the same methodology. Ideology was found to be significant and to considerably improve the explanatory power as compared to the pure capture model. However, the measures used to proxy that variable remain subject to the criticism that they may simply be measuring left out economic variables instead of ideology. Some attempts are then made to mitigate the risk of this happening. These problems will be explored below, through the case study of voting on agrarian reform legislation in the Brazilian Constitution of 1988.

2. Testing for Capture and Ideology in the Agrarian Reform Chapter of the Constitution

The Brazilian Constitution of 1988 was written by the Congress rather than by a group of individuals specifically and exclusively selected for that purpose. This implied that the pressures from interest groups that permeated the regular congressional sessions extended themselves to the writing of the Constitution. If, on the one hand, this fact was of grave consequences for the quality of the resulting charter, it provides an excellent opportunity for the study of the interplay between legislators and interest groups.

The issue of agrarian reform is particularly well suited for an examination of the effects of capture and ideology. Not only is it the case that the groups affected are clearly identifiable for a capture analysis, but also agrarian reform is an extremely ideological issue, over which people frequently have their own personal prescriptions as to how and/or whether it should be done. *Ex ante*, it is ambiguous which effect should predominate. On the one hand, the fact that the votes were determining the Constitution, that is, the fundamental rules which would underline all agrarian reform policies, supports the hypothesis that elements of capture should play the most important role. It would be necessary and worthwhile for groups which stood to lose or to benefit from a progressive treatment of the issue in the Constitution to pressure the congressmen to act in their favor. On the other hand, agrarian reform, like few other specific issues, has stirred passions and emotions in Brazil, perhaps because it deals with something as fundamental as land and the right to property.

In order to sort these issues out, the first step is to start with the following pure constituent-capture model:

$$Reform_i = \beta_0 + \beta_1 Lati_i + \beta_2 Owner_i + \beta_3 Grilo_i + \beta_4 Worker_i + \\ + \beta_5 Conflict_i + \beta_6 Rep_i + \beta_7 Sen90_i + e_i \quad (3)$$

This model derives from the economic theory of regulation described above, which assumes that legislators maximize constituent support and will thus cast their votes by taking into consideration the amount of support gained and lost by doing so. It is specified by performing an incidence analysis to determine which are the parties affected by the proposed agrarian reform legislation.[5] Fortunately, this task is not difficult, since the direct effects of an agrarian reform on these groups is relatively straightforward. In what follows, the variables in the model above will be described.

The dependent variable, *Reform*, is based on the four main votes on agrarian reform issues in the Constitutional Congress. More specifically, it is the frequency with which a legislator voted favorably on an agrarian reform related issue. Thus a vote against the Centrão project in the first round of the Constitutional Congress (which was voted twice), a vote to maintain the possibility of expropriation of productive properties in the first round, and a vote to suppress the paragraph protecting productive properties in the second round, all count as a favorable vote.[6] Abstentions are counted as 0.5, though there were few of these. The frequency is calculated following Kalt and Zupan (1984:285), thus:

$$Reform_i = \text{Ln}\left[(r_i + 0.5)/(n_i - r_i + 0.5)\right] \quad (4)$$

where r_i is the number of favorable votes, n_i is the number of votings, out of the four, in which the congressman participated, and $i = 1, 2, 3, \cdots, 561$,

[5] *The existence of logrolling (vote-trading) can be ruled out for the votes on agrarian reform. There were various attempts by the party leaderships to negotiate agreements concerning this issue, however they all failed drastically (Silva, 1987, ch.11).*

[6] *See Silva (1987) for details on the votes. The proposed legislation, which was the focus of the four votes used, is easily identified as either pro or anti-reform, thus it becomes irrelevant whether a legislator is voting against land reform or in favor of private property. In a pure capture model what he/she takes into consideration is the wealth distribution which the legislation will cause to the constituents and how that will affect the support gained and lost.*

the number of congressmen for whom all data was available.[7] The variance estimator for *Reform* is:

$$Var_i = 1/(r_i + 0.5) + 1/(n_i - r_i + 0.5) \tag{5}$$

The most important and visible effect of an agrarian reform program is to take land away from certain owners and to redistributed it to people without land. Consequently, the most obviously affected group are the landowners who would lose land and the rural workers who would be settled on that land. Because the reforms specifically targeted land which was not being put to an economic use, it was particularly the owners of latifundia who stood to lose. However, even the owners of smaller and more productive farms had reason to oppose the reforms. In the first place, due mainly to scare tactics and misinformation, they held the belief that they too were prone to expropriation. Additionally, and more correctly, they feared that an agrarian reform would both reduce the price of their land and increase the wages of rural labor.

In order to measure the interest of the landowners, the most obvious procedure would be to use information on the size and strength of organizations which represented their interests, like the UDR (Rural Democratic Union), CNA (National Agricultural Association), SRB (Brazilian Rural Society) and OCB (Brazilian Cooperative Association). All of these participated in the Congressional Congress to put pressure against the reform; however, it was specially the UDR that was directly dedicated to combating it.

Unfortunately, it has not been possible to obtain data at the state level measuring the strength and organizational capability of these organizations, for example number of associates, number of offices and size of budget. Therefore, in order to capture the level of the interest of landowners in each state, the variable used will be the percentage of total area in farms which was classified as a latifundium by Incra (National Institute for Colonization and Agrarian Reform).[8] This classification states that any farm above 600 modules, the minimum area needed for a family to make a living in each region,

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[7] *The summing of 0.5 to both nominator and denominator is done to adjust for the possibility of* $r_i = 0$ *and* $r_i = n_i$.

[8] *Note that in Brazil both senators and representatives are elected at state level, thus allowing state level data to be used. This is fortunate since most studies of legislator behavior either use only the votes of senators or have to use state-wide data for representatives elected by districts.*

is a latifundium by dimension, and any farm below 600 modules that doesn't reach the minimum regional levels of productivity is a latifundium by exploration. The variable *Lati* is thus obtained by dividing the sum of the area in latifundia by dimension and by exploration by the total area in farms in each state. Since it was only latifundia which were expropriated, it is expected that the higher the percentage of latifundia in a state the more opposed a congressman would be to agrarian reform.[9]

Other variables which could also have been used were a Gini coefficient, the population density of the rural areas, and the value of production per hectare in 1985, the closest census year. However, all of these variables are highly correlated and present a problem of multicollinearity if used simultaneously. Since all of them turned out to have the expected sign and were all significant when used without the other collinear variables, *Lati* was chosen for being the one which most directly measures the danger of an expropriation to landowners.

Another variable which will be used to measure the interest of the landowners, and specifically their ability to influence the votes, is a dummy variable which equals 1 if the congressman is a landowner himself.[10] This variable, called *Owner*, should capture in part the congressman's personal interest in not having his own property expropriated, which is a rather remote possibility. But more importantly, it should indicate that those particular congressmen most likely had strong connections with other landowners and would be natural representatives of their interests. Thus the variable *Owner* is expected to show opposition to agrarian reform.

A third variable which measures interests against the reforms is concerned with the large number of properties obtained and held through false titles known as *grilos*. Because of the uncertain situation of property rights in many regions it has been common for individuals to obtain land through false titles. Especially during the frontier stages this practice has been common. It involves not only physical force to secure the land from others who might be claiming it, such as long time squatters, but also the legal expertise and ability to work the system. Often individuals, known as *grileiros*, specialize in acquiring land through these fraudulent means and selling it to bona fide

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[9] *The area in latifundia is from Incra,* Cadastro rural 1992. *The total area in farms is from IBGE,* Censo Agropecuário do Brasil, *1985.*

[10] *This data is available in Diap (1988).*

farmers or settlers. There are two reasons why *grilos* very frequently lead to conflict. In the first place, the land often already belongs to an absentee owner who eventually tries to claim it back, or it is occupied by squatters who have to be removed. Second, if a certain plot of land is idle and is known to be a *grilo*, landless workers will feel justified in invading it, as they know their chances of having the land expropriated in their favor is much higher.

If an agrarian reform program were passed, the land that was found to be a *grilo* would certainly receive special attention as potential for expropriation. Therefore, the owners of such land would have incentives to support the anti-reform effort. The interests at stake are certainly large enough. In 1984 there were more than 5 million hectares of *grilos* in Brazil with only six states having none (Cedi, 1986:81). In São Paulo, for example, the most developed state and the one with the most modern agriculture, there were more than 100 thousand hectares of recognized *grilos*. On the other hand, it is true that the *grileiros* are not a unified group which could pursue its interests in an organized manner, and it may be the case that the variable *Grilo* is a proxy for the existence of unproductive land in the state, which already is captured by *Lati*.[11]

The people directly benefited by an agrarian reform would be the rural workers who would receive land. Additionally, since it was perceived that wages would increase with a reform, even those workers who remained as sharecroppers or wage earners should expect to benefit. Ideally, the best way to measure these interests would be to have a variable which expressed the strength of Contag (National Confederation of Agricultural Workers, the rural workers' union) and MST (Movement of Landless Workers). Both of these groups have participated throughout the years in the campaign for an agrarian reform, the first being the main voice of the rural workers and the second, though working independently, by causing much confusion and attracting attention through land invasions. Both participated actively in the Constitutional Congress, including by filling the auditorium with crowds of people.

Unfortunately, once again this data could not be obtained, and in order to capture the pressure in favor of an agrarian reform the variable used is *Worker*, which measures the number of rural workers per hectare in each state. Naturally, it is expected that the higher the density of rural workers,

[11] *Note however that* Lati *and* Grilo *have a correlation of only 0.13, whereas* Lati *and* Prod *(the value per hectare of agricultural production in 1985) have a correlation of -0.64.*

the more pressure a congressman will have to vote in favor of agrarian reform, since the workers' unions and other worker interest groups must be stronger in these states.

Another variable which should reflect interests in favor of agrarian reform is *Conflict*, the number of settlers involved in land conflicts (Cedi, 1986:81). It has been previously seen that the main justification for agrarian reform since the early 80's has been social justice. Since it is the case that conflicts are the most visible manifestations of the injustices arising from the extreme concentration of landownership, it is expected that the higher the level of conflicts, the more support there will be for an agrarian reform. This is not to say that the pressure on legislators would originate from the workers involved in the conflicts. As the case of the PNRA (National Program for Agrarian Reform) has shown, this segment has not been capable of providing significant political support or opposition when compared to other groups such as landowners. However, conflicts for land are a very sensitive political issue that involve more than those directly affected. Particularly local officials and politicians are generally quick to try to find suitable solutions once the problems become well exposed in the media. Having realized this, the MST has generally adopted the practice not only of invading and persistently re-invading land after being kicked out, but of invading offices of the land agencies and of other officials involved in the process.

Because of this perception of conflicts as a manifestation that injustices are present and that corrections are needed, the variable *Conflict* is expected to be positively related to support for an agrarian reform. To see that this is a valid argument, note that the decision by policy-makers to implant a large scale agrarian reform program in 1985 through the PNRA, as well as in other occasions, was greatly influenced by the high incidence of conflicts throughout the country. That is, whenever the level of land conflicts in the country starts to increase, there is usually talk of agrarian reform. Therefore, it is expected that this effect will be stronger than the one in the opposite direction, which arises from the pressure of landowners in areas of high conflict potential, who fear a reform would target them with priority.

The final variables in the capture model for agrarian reform are dummies which distinguish whether the legislator is a senator or a representative. Furthermore, the senators are separated into two groups, those elected in 1982 and facing reelection in 1990, and those elected in 1986 and facing reelection

in 1994. These two types composed one third and two thirds of the senators, respectively. The variables are thus called *Sen*90 and *Rep*, with the left out category being the senators whose term would end in 1994. It is possible to pool the votes of senators and representatives because in the Congressional Congress both types voted simultaneously, as opposed to most regular legislative sessions, where they vote separately and in sequence. Despite the fact that the vote of a senator and that of a representative had the same value in the Constitutional Congress, it is expected that, because they are elected and operate (in their regular congressional tasks) under different rules, each kind will have a different susceptibility to the pressure of interest groups and the electorate. The major reason for this difference is that senators remain for eight years in office while representatives stay for half that time. Since legislators are assumed to be maximizing votes for their reelection, the distance to the next election can be used as an (imperfect) measure of the susceptibility of legislators to interest group and voter pressure. Because during election periods more recent events tend to outweigh those in the past, legislators will be relatively more insulated from those pressures the furthest away they are from the next election.

According to this logic, during the writing of the Constitution legislators facing reelection at different times should be expected to behave differently. This hypothesis is tested by dividing the senators into the group whose reelection was closer and coincided with that of all the representatives, *Sen*90, and those whose reelection was set four years later. If the proximity of the next election does in fact influence a legislator's permeability to voters and interest groups, then the two types of senators should be expected to vote differently.

Additionally, senators and representatives are subject to different rules concerning their elections and should thus also vote differently. Another difference besides the length of the mandate is that there is a fixed number of three senators per state, while the number of representatives is proportional to the population. Since most states consequently have a large number of representatives and only three senators, it is generally the case that the former can be elected with the votes from particular areas within a state, while the latter will need to compete throughout the entire state in order to be elected. Because of this need for a broader support base, senators will be more difficult to capture by individual interest groups than representatives, since they must carefully balance the support gained and lost in other areas, geographical and political, due to the adoption of any given position.

The fact that senators are more insulated from interest groups says nothing about the sign of the variables *Sen*90 and *Rep*, since there are interest groups on both sides of the issue. However, since the anti-reform groups were considerably wealthier, better organized and more compact numerically than the pro-reform groups, it is expected that they would be the most effective groups at exerting pressure. Thus representatives should be more inclined to vote against agrarian reform than senators, and senators facing reelection in 1990 should do so more than those facing reelection in 1994. The difference between the *Sen*90 and the representatives depends on which effect predominates, that of reelection proximity or that of different rules for reelection. This remains an empirical issue which will be determined by the data.

Before going on to the results of the regressions, it is necessary to discuss the role of the voters in the legislators' voting decision. It is clear that legislators do not react only to interest groups, which provide resources for a reelection, but also to voters, whose votes serve the same purpose. In the model used in this paper, however, only interest group variables are included. This is due to the fact that there is no state level data for any measure or proxy of the voter's interest in agrarian reform. Perhaps the only possibility for such data would be to conduct a nationwide survey of the position of voters in each state, concerning agrarian reform.

Nevertheless, the fact that the voter's interest is left out of the model may not present much of a shortcoming. Denzau and Munger (1986) present a model which focuses on the relative effects of interest groups and voters on the behavior of legislators. They show that even when voters are unorganized and noncontributing they can have an important effect on the relation between interest groups and legislators. This occurs because legislators will require a higher "supply price" to undertake activities which depart from their voter's preferences. The size of this constraint of unorganized groups on the legislators will depend on the level of voter information and awareness. The two extreme assumptions which bracket the various possible levels of voter involvement are that of rational ignorance, where voters rationally do not invest time and effort informing themselves on the various issues and legislator actions, and that of civics class/full information, where voters are absolutely informed. The model shows that under the first assumption legislators will pay attention only to interest group preferences and ignore those of the voters. Under the second assumption the opposite would occur, with the legislators catering only to the

voters since the resources provided by the interest groups are ineffective in changing the electorate's votes.

It is argued here that in Brazil in general, and relative to the issue of agrarian reform in particular, the level of voter information was closer to that of rational ignorance, with the large unorganized group of general voters not greatly constraining the legislators' relationship with the interest groups. It has been mentioned above that agrarian reform was a highly visible and polemic issue during the Constitution. However, that was the result of the actions of the interest groups which were actively participating in the process. Public opinion towards agrarian reform, though, was never well defined and reacted differently according to how the issue was framed. Whereas the existence of vast idle farms together with thousands of landless peasants generated support for the reform, the idea of expropriating productive farms, and turning them into less productive family farms, had the opposite effect. The way in which the agrarian reform debate formulated itself, with nobody actually stating to be against it, and, instead, the main contention occurring through complex technical and legalistic terms, served as a form of insulation from this volatility of public opinion. With this, the issues at stake became much less dramatic and elicited less attention from the general public. Note also that since the vast majority of the Brazilian population is in an urban setting, as well as most of the informed voters, the issue of agrarian reform had a limited direct appeal to most of the electorate. Thus it can be concluded that the constraints on legislators from their geographical constituencies would be weak, and that therefore the absence of a variable to capture that effect in the model in this paper does not pose much of a limitation.

Column 1 in table 1 contains the results of an OLS regression of *Reform* on the variables described.[12] This is a pure constituent-capture model for the issue of agrarian reform in Brazil, since all the variables represent ways through which the legislator's decisions are affected by interest groups.

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[12] *Since* n_i *varies among the legislators, it is necessary to correct for heteroscedasticity. This is done by weighting the OLS regression using the variance of the* Reform *variable, that is, of the frequency of votes in favor of the reform.*

Table 1

Dependent variable: *Reform*	1. Constituent capture model	2. Capture plus *Age*	3. Capture plus *Index*	4. Capture plus *Defender*
Constant	1.15	5.05	1.25	5.30
	(2.66)	(3.24)	(1.18)	(3.14)
Lati	-1.13	-1.31	-0.32	-1.44
	(1.98)	(2.31)	(0.82)	(2.44)
Owner	-0.96	-0.90	-0.27	-0.75
	(4.97)	(4.70)	(2.09)	(3.54)
Grilo	-0.0001	-0.0001	-0.0001	-0.0001
	(0.98)	(0.61)	(0.66)	(0.65)
Worker	2.50	2.23	2.53	3.20
	(1.67)	(1.50)	(2.52)	(2.13)
Conflict	0.002	0.001	0.006	0.007
	(0.39)	(0.26)	(2.01)	(1.31)
Rep	-0.67	-0.83	-0.64	-0.91
	(2.61)	(3.18)	(3.65)	(3.42)
Sen90	-0.79	-0.78	-0.45	-0.55
	(1.68)	(1.68)	(1.45)	(1.05)
Age		-0.12	-0.05	-0.17
		(2.15)	(1.37)	(2.70)
Age^2		0.001	0.0005	0.001
		(1.74)	(1.29)	(2.50)
Index			0.77	
			(25.66)	
Defender				1.49
				(9.10)
R^2	0.07	0.09	0.59	0.26
N	561	561	561	420

Note: t-statistics in parenthesis.

All the variables have the expected sign, and all but *Grilo* and *Conflict* are statistically significant at conventional levels of confidence. The higher the proportion of latifundia in a state, the more probable a congressman was to vote against agrarian reform.[13] Also, those congressmen who were landowners

[13] *The use of production per hectare, rural population densities and Gini coefficients, instead of* Lati, *gave the same sign and similar levels of statistical significance.*

themselves, and were thus likely to be involved with other landowners and act as their representatives, voted against the reform.

The results are also consistent with the hypothesis that the senators whose reelection was furthest away (*Sen*94) voted differently than both the representatives (*Rep*) and the senators with closer reelection (*Sen*90). Being less susceptible to interest group pressure, that group voted more in favor of agrarian reform. The results also indicate that the senators with reelection in 1990 did not vote differently than the representatives, all else constant, since when the *Rep* was the left out variable *Sen*90 was not significant.[14] This indicates that the permeating effect of the upcoming elections overweighed the insulating effects of the different election rules for senators, as compared to those for representatives.[15]

The variable measuring the area of land with dubious titles in each state was negatively related to agrarian reform but not at a statistically significant level. The coefficient of the conflict variable, which measures the support for agrarian reform stemming from the need to end the destabilizing effects of land disputes, was also not statistically significant. Finally, the higher the density per hectare of rural workers, the more sympathetic the congressman of that state to vote in favor of agrarian reforms.

Note that despite the fact that the variables performed relatively well, the model explains very little ($R^2 = 0.07$) of the variation of the votes. This is a common problem of constituent-capture models of this kind. It is precisely the fact that these models "do not do very well as predictors and explainers" (Kalt & Zupan, 1990:104), which has lead to the attempt at adding ideology to the motivations behind the policy-makers' choices. Doing so, however, is not without controversy. In the first place, the measurement of ideology, as will be discussed below, presents several problems. Second, the low R^2 in the model can very well be caused by left out variables or the unsuitability of the measures used. As mentioned above, data on landowners' associations and rural workers' unions were not available, and other less specific proxies were

[14] *This equivalent regression with* Rep *as the left out variable is not shown in the table.*

[15] *It can be argued that the different voting behavior of both types of senators is due to a cohort effect, since those elected in 1982, during the military regime, can be expected to be more conservative. The average index for measuring the legislators voting behavior (see text below), with a lower number indicating a more conservative position, was 0.31 for the 1982 senators, 0.89 for the 1986 senators, and 0.83 for the representatives. This indicates that there was a cohort effect, though it does not rule out the effect of reelection proximity. Note also that this explanation assumes that ideology matters.*

used. Also, one can never really know all the groups which have an interest in a topic and certainly an important relevant variable may be left out.

Nevertheless, the hypothesis that the relation between legislators and constituents is slack enough to permit the expression of ideology in the form of voting according to an individual's perception of the public interest is theoretically compelling. Intuitively, it seems clear that legislators may have strong feelings concerning agrarian reform which may influence their votes. This possibility will be tested in two ways. The first is based on the stylized fact that individuals become more conservative as they age. As Rodrigues (1987:133) notes, "the usual supposition is that there is an increase of conservatism and reduction of radicalism as one passes from a lower age bracket to an older one". In his analysis of the performance of the congressmen in the Constitution as a whole, he found that this relation between age and ideology did hold, though not very strongly. For the issue of agrarian reform in particular, it is expected that the relation will be stronger, since it involves issues of equity, which is often the basis for more progressive ideologies.

If, in fact, age can be used as a proxy for ideology, it would be the case that, all else constant, the older congressmen would oppose an agrarian reform more than the younger ones. This hypothesis is tested in column 2 of table 1, where the variables Age and Age^2 have been added to the pure capture model. The inclusion of age squared allows for the possibility that the effect of age, rather than being linear, may vary through time.

Column 2 shows that the above relation between age and votes or agrarian reform was, in fact, present. The negative and significant coefficient for age, and positive and significant (at a 10% level of confidence) for age squared can be interpreted in two ways. One way is to see this result as showing the existence of a life cycle effect where congressmen become more opposed to agrarian reform as they age, but at decreasing levels as time progresses. However, since the sample is a cross-section and not a time series, a more appropriate interpretation may be that older congressmen, who had lived through more failed attempts at agrarian reform, especially those during the 60's and 70's would have a higher tendency to have lost faith in the effectiveness of this prescription as a solution. Both interpretations do, however, acknowledge that ideological factors have influenced the congressmen's votes, since there is no apparent reason why interest groups would discriminate according to age when capturing legislators.

Another way of testing for ideology, and the one typically used in the literature, is to use a rating scale such as that of the ADA (Americans for Democratic Action). This scale is based on a selected series of votes which is designed to measure the legislator's ideological leanings. The measure used in this study is that of Diap (Intersindical Department for Parliamentary Consultation), whose evaluation of the congressmen was based on 20 votes during the Constitutional Congress, all related to issues relevant to the social rights of workers.[16] Note that these votes are not directly related to any agrarian reform issue.[17] Following Kalt and Zupan (1984:228), these votes were used to make an index which measures the frequency of votes in favor of workers' rights (see footnote 118). This variable, called *Index*, presents a measure of the position of each congressman along the ideological spectrum, with a lower number representing a more conservative position.

Column 3 in table 1 shows the results of the capture model including age and *Index*. This variable was positively related to agrarian reform at a very high level of significance. Thus, if this variable can be assumed to be a pure measure of the legislators' ideology, the latter is an important influencing factor in the decisions when voting. The less conservative the legislator the higher the support for agrarian reform. As has been the case with other studies using similar rating scales (Kalt & Zupan, 1984), *Index* added considerable explanatory power to the model, increasing the R^2 from 0.09 to 0.58.

The above methodology of using rating scales such as the ADA and the Diap measures has been very controversial.[18] The major criticism has been that these measures are not good proxies for ideology because they are in fact measuring other constituent interests that are not included in the model. This view argues that legislators' votes on the issues which make up the rating scales are influenced by their constituents' interests: not those constituents concerned specifically with agrarian reform and identified in the capture model, but all constituents of that legislator. Therefore, since these broad interests may be correlated with those concerning agrarian reform, the rating scale variable also influences the votes on the issue being examined. If this is the

[16] *The fact that Diap (1988) has its own political agenda is not a problem. The literature typically uses such a non-disinterested measure for legislator ideology. All that is necessary is that the issues which make up the* Index *not be directly related to those which make up* Reform.

[17] *Examples of the issues voted are: rights to strike, constitutional stability to public servants, six hour shifts, guaranteed floor for the minimum salary etc.*

[18] *The main criticism has been due to Peltzman (1984).*

case, then *Index* is not measuring the legislator's ideology, but instead interests of his/her constituents which were not suggested by the incidence analysis of the original capture model. Since the same interests which captured the legislators for worker's rights issues may have certain preferences for agrarian reform, it might be these preferences which are being reflected by *Index* instead of ideology.

In the next section two attempts will be made to determine whether *Index* can be interpreted as ideology or whether it is simply a proxy for left out constituent interest. However, before this, it will be noted that if *Index* is in fact such a proxy, one would have expected it to be correlated to the variables included in the capture model, whereas if it is closer to a pure measure of ideology it should be considerably orthogonal and not affect them very much. Since both the coefficients and the levels of significance of *Lati*, *Owner*, *Conflict*, *Sen90* and *Worker* are all greatly affected, the conclusion is that the data does indicate that *Index* is at least partly representing constituent interest variables not included in the capture model. This issue will be further examined next.

3. Refining a Measure for Ideology

Before turning to the task of separating the pure ideology from the constituent interest in the variable *Index*, a preliminary test will be attempted employing the strategy suggested in Kalt and Zupan (1984:290-1), of using the voting on non-economic issues in the place of the rating scale. The rationale behind this is that, on votes which deal more with socio-ethical questions than they do with pocketbook issues a legislator is more likely to be expressing his/hers own preference. Such issues are less likely to be the concern of interest groups thus allowing the legislator more independence. Also any constituent interest in such non-pocketbook issues should be less likely to be correlated with the capture variables.

Ideally the issues used for this test should have no direct effect on the income of any particular group, so as not to be correlated with any of the capture variables. There were several issues voted in the Constitutional Congress which approximate these conditions, having more ideological content than a pecuniary one. Examples of these are the votes to institute a death penalty, to decriminalize abortion, to prohibit the commercialization of blood, and to break relations with countries which practice racism. The votes on these

issues could be used either separately in the place of *Index*, or transformed into a frequency as was done to *Reform* and *Index*.

Unfortunately the data on these votes could not be obtained, and a less suitable vote had to be used. This was the vote on an issue which was called "defender of the people". A bill was presented in the Constitutional Congress proposing the creation of an office seat to be filled by a citizen who commands respect from the public, indicated by society and chosen by the Congress, who would act as a type of ombudsman in charge of overseeing that the powers of the State would respect the rights assured in the Constitution. This bill was voted in the Constitutional Congress and was not approved. It is imperfect for the purpose of this test, because it is not absolutely free from the influence of interest groups, particularly workers' interests, and may thus be correlated with the interests concerned with the agrarian reform. Nevertheless, it does contain enough socio-ethical content to warrant its use as a preliminary test while better data is not available. The variable *Defender* is thus a zero-one variable indicating those who voted in favor of creating the office of a "defender of the people".[19] Since some congressmen were absent and a few abstained from voting, those observations were dropped and the sample was reduced to 420.

Column 4 in table 1 shows the results of the regressions with this new sample, dropping *Index* and adding *Defender*. This variable, which has no direct relationship to agrarian reform, has considerable explanatory power and increases the R^2 significantly from the pure capture model. Note also that its effect on the coefficients of the other variables indicate that it is more orthogonal to those variables than was *Index*. These results provide added support to the theory that ideology plays a sufficiently important role in legislator behavior to warrant attempts to account for it in models explaining that behavior. The fact that an issue which is (relatively) void of pocketbook influences and which has a high ideological content, such as "defender of the people", adds so much power to a pure capture model, points to the possibility that the rating scale variable *Index* measures, at least in part, the tendency of legislators to vote ideologically.

In order to try to disentangle which part of *Index* measures left out constituent variables and which, if any, measures legislators' concern with public interest, the methodology in Kalt and Zupan (1984 and 1990) and Peltzman

[19] *The data is found in Diap (1988).*

(1984) will be followed. The idea is to "pry open the black box of ideology" (Kalt & Zupan, 1984:290) by estimating the variable *Index* as a function of a series of very broad social, demographic, and economic variables, which should measure the characteristics of each legislators' constituents. The idea is that, if the major constituent interests that influenced the legislators' votes on the issues which made up *Index* can be accounted for, the residual of the estimation can be considered a legislator-specific ideological factor. In other words, the fitted variable $\widehat{Index}$ should represent how the constituents of a state would prefer their representatives to vote. Thus, the residual, which equals *Index* minus $\widehat{Index}$, can be seen as how far legislators deviated from their constituents' preferences, and can be interpreted as ideology.

The variables used to estimate *Index* are purposefully very broad, since there is no way of discerning which specific issues might be relevant. The typical variables used are (all at state level): income *per capita*, age and education of the voters, manufacturing employment share, urbanization, and regional dummies. Additionally, variables which measure the ideological preferences of the constituents' are used. In Brazil, as should be expected, the correlation of the demographic variables was extremely high. Income and education, for example had a correlation of 0.90, income and urbanization 0.88, income and manufacturing 0.70, and education and urbanization 0.88. Thus, in order to avoid multicollinearity, the only social-demographic variable used was *Income*, which should act as a summary variable for all other variables due to the high correlations.

Also added are two dummy variables which equal 1 if the legislator belongs to a party on the Left (PT, PCdoB, PCS, PSB, and PDT), on the Right (PFL, PDS, PL and PDC), with the left out category being those legislators in a more central position (PMDB and PTB).[20] The party variables should not only reflect the constituents' ideological preferences, but also latent demographic-economic characteristics (Kalt & Zupan, 1990:111). That is, when voters chose a member of a certain party, they are expressing a preference for a certain pattern of political behavior by the legislator, all else constant. Additionally, it may be the case that the demographic-economic situation of a state influences which parties the voters prefer. Regional dummies were added to account for

[20] *This classification follows the survey in Rodrigues (1987:103), through which the legislators stated their ideological position themselves.*

regional differences. Table 2 displays the results of the estimation of the variable *Index*.[21] Since there was no data available for the Northern region at state level, those observations were dropped, and the sample fell to 500.

Table 2

Dependent variable: *Index*	Estimation of rating scale index
Constant	1.19
	(4.57)
Income	0.16
	(3.46)
Left	1.39
	(6.68)
Right	-2.53
	(13.31)
South	-0.22
	(0.77)
Southeast	-0.48
	(1.62)
Center-West	-1.35
	(3.59)
R^2	0.45
N	500

Note: t-statistics in parenthesis.

The variable *Income* was positive and significant, showing that legislators from states with higher levels of income, education, urbanization, manufacturing employment, and age tended to vote less conservatively on the issues regarding workers' rights, which were the basis of *Index*. Additionally, legislators from the Northeastern region, which is the left out dummy variable for region, are less conservative than those from the Southeast and Center-West, but not statistically different from those of the South region, all else con-

[21] *This regression was also a weighted OLS, using the variance of the votes which compose* Index *to correct for heteroscedasticity.*

stant.[22] The party variables, as expected, show that legislators who belonged to parties classified as being on the left had a higher rating scale than those in the center and those belonging to parties on the right a lower one.

The purpose of this regression was to obtain the fitted value of the transformed rating scales, $\widehat{Index}$, as well as the residual which is hereafter called *Ideo*. By decomposing *Index* into $\widehat{Index}$ and *Ideo*, it is assumed that, to a certain degree, the constituent interest component in *Index*, that is, in the votes on workers' rights issues, has been isolated in the former, and the ideological component in the latter. The problem with this approach is that there may still be variables left out from the model used to explain *Index*. In the regression above, the R^2 was of only 0.45, indicating that very probably there are left out variables.[23] However, even with a higher explanatory level, one can never be quite sure if there are still important variables left out. If that is the case, then much of the residual, that is being labeled as ideology, will still be constituent interest. This is perhaps the greatest problem which the literature on capture and ideology must overcome if it is to proceed further than it already has. Nevertheless, it should be expected that at least to some extent the measure of ideology has been refined in *Ideo*.

The next step is to return to the original capture plus ideology model and to substitute the purified ideology measure *Ideo* for the previous measure supposedly contaminated by constituent interests. To allow a comparison of the different models, the same capture plus *Age* and capture plus *Index* specifications are presented with the new sample size in columns 1 and 2 of table 3. Columns 1 and 2 tell the same story as did the larger sample including the Northern region observations; the addition of *Index* to the capture plus *Age* model adds significant explanatory power but appears to be highly correlated to the other variables. In column 3, *Index* is dropped and *Ideo*, the rating scale supposedly purged from constituent interest, is added. *Ideo* is highly

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[22] *This does not mean that the legislators from the Northeast were less conservative overall. Because their states have lower incomes and the coefficient on* Income *is positive, their average value of* Index *was lower than that of legislators from other states. Also, the proportion of legislators belonging to a party on the right was higher in the Northeast than in other regions. In other words, controlling for income and party, the Northeast legislators were less conservative on workers' rights issues than those of the Southeast and Center-West.*

[23] *Using only* Income *as a socio-demographic variable in the regression above is a limitation of this study. However, ignoring the multicollinearity and adding voter age, voter education, percent of population which is urban, share of manufacturing employment, and share of agricultural employment did not affect the results that follow, though it did nullify the significance level of* Income.

significant and positive, indicating that those congressmen who voted more liberally (conservatively) for workers' rights issues than their constituents would have preferred, which is interpreted here as possession of liberal (conservative) ideology, were more (less) likely to favor agrarian reform. Notice also

Table 3

Dependent variable: *Reform*	1. Capture plus *Age*	2. Capture plus *Index*	3. Capture plus *Ideo*	4. Capture plus $\widehat{Index}$
Constant	6.24	2.14	7.13	1.95
	(3.54)	(1.77)	(4.32)	(1.31)
Lati	-1.75	-0.89	-2.55	-0.28
	(2.46)	(1.87)	(3.87)	(0.47)
Owner	-1.05	-0.27	-0.74	-0.64
	(5.03)	(1.88)	(3.80)	(3.77)
Grilo	-0.002	-0.001	-0.002	-0.0002
	(2.19)	(1.44)	(2.87)	(0.25)
Worker	0.63	1.92	0.32	3.06
	(0.32)	(1.48)	(0.18)	(1.93)
Conflict	0.01	0.01	0.02	0.001
	(1.61)	(2.20)	(2.72)	(0.10)
Rep	-1.03	-0.84	-1.10	-0.97
	(3.33)	(4.10)	(3.91)	(3.91)
Sen90	-1.19	-0.70	-1.33	-0.65
	(1.95)	(1.72)	(2.39)	(1.30)
Age	-0.18	-0.06	-0.16	-0.07
	(2.76)	(1.45)	(2.68)	(1.38)
Age^2	0.002	0.001	0.001	0.001
	(2.37)	(1.31)	(2.35)	(1.05)
Index		0.77		
		(24.99)		
$\widehat{Index}$				0.62
				(16.14)
Ideo			0.44	
			(9.74)	
R^2	0.12	0.61	0.26	0.43
N	500	500	500	500

Note: t-statistics in parenthesis.

that *Ideo* appears to be more orthogonal to the other explanatory variables than *Index*, not affecting their coefficients or significance as much as that variable. Especially *Lati*, *Owner*, *Grilo* and *Worker* are less collinear with *Ideo* than with *Index*. This shows that those constituent interests in *Index* which were collinear with these variables were at least partly purged from *Ideo* and isolated in $Index\widehat{}$. This is confirmed in column 4, where $Index\widehat{}$ substituted *Index*. Note that *Lati* then loses significance and even changes sign, and that *Worker* and *Conflict* are also greatly affected. As expected, $Index\widehat{}$ is positive and highly significant, which indicates that in fact constituent interests were highly correlated to preferences on agrarian reform.

The results above indicate that the supposed measure of ideology has been substantially refined. This measure has acted as predicted in the theory, with those legislators who are found to have a large preference for voting their own beliefs doing so in the predicted direction. These results provide some evidence that legislators do actually shirk when voting, that is, they take advantage of the slack in the relation to their constituents in order to vote their own beliefs. These results must be taken with care, however, since the variable *Ideo* may still represent, to a large degree, constituent interests that the estimation of $Index\widehat{}$ was not able to identify. Although *Ideo* was more orthogonal to the other variables than *Index*, it did nevertheless present some collinearity. Trying to place a tag on residuals has always been a tricky task.

4. Conclusion

The analysis of the voting of the agrarian reform legislation in this paper provides contributions in two different areas. The first was to examine that event through a different perspective and with a different set of instruments than most of the previous treatments of the subject. In particular, different models were tested so as to identify which variables affected the decisions of policy-makers in votes which were, to a large extent, determining the chances that an agrarian reform would be implemented in the future, and if so, its shape and chances of success.

The second contribution was to apply the capture and ideology literature to a new case study. This literature has made a big impact in the study of regulation and, though it still presents several unsolved problems, it has brought

into debate important questions concerning the way in which social scientists can model political decisions (Grier, 1993). By using this methodology for analyzing the elaboration of agrarian reform legislation in the Brazilian Constitution of 1988, this paper has found the theory to present both strengths and limitations similar to those of previous case studies. This is in itself an important result, given that this paper dealt with a case study in a country other than America, showing the theory to be robust, in its positive and negative aspects, to a considerably different institutional setting.

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Appendix

Descriptive statistics[24]

Data for table 1 columns 1–2	*N*	Mean	Standard deviation	Minimum	Maximum
Reform	561	-0.06	1.93	-2.20	2.20
Lati	561	0.57	0.16	0.30	0.88
Owner	561	0.19	0.39	0.00	1.00
Grilo	561	195.73	516.49	0.00	2,796.70
Conflict	561	14.72	18.49	0.00	64.41
Sen90	561	0.03	0.17	0.00	1.00
Rep	561	0.88	0.33	0.00	1.00
Worker	561	0.09	0.05	0.01	0.26
Age	561	49.69	9.68	25.00	80.00
Index	561	0.78	1.82	-3.91	3.71

[24] *The complete database in electronic medium is available upon request from the author. E-mail: bmueller@guarany.cpd.unb.br*

Data for table 1 column 4	*N*	Mean	Standard deviation	Minimum	Maximum
Reform	420	0.02	1.83	-2.20	2.20
Lati	420	0.57	0.16	0.30	0.88
Owner	420	0.17	0.37	0.00	1.00
Grilo	420	479.67	481.93	0.00	2,796.70
Conflict	420	13.85	17.67	0.00	64.41
Sen90	420	0.03	0.16	0.00	1.00
Rep	420	0.87	0.34	0.00	1.00
Worker	420	0.09	0.05	0.01	0.26
Age	420	49.88	9.69	25.00	80.00
Index	420	0.93	1.85	-3.91	3.71
Defender	420	0.44	0.50	0.00	0.00

Data for table 2	*N*	Mean	Standard deviation	Minimum	Maximum
Index	500	0.82	1.86	-3.71	3.71
Income	500	4.47	2.77	2.96	13.63
South	500	0.17	0.38	0.00	1.00
Southeast	500	0.36	0.48	0.00	1.00
Center-West	500	0.11	0.31	0.00	1.00
Northeast	500	0.36	0.48	0.00	1.00
Left	500	0.10	0.30	0.00	1.00
Right	500	0.36	0.48	0.00	1.00
Center	500	0.54	0.50	0.00	1.00

Data for table 3	*N*	Mean	Standard deviation	Minimum	Maximum
Reform	500	-0.03	1.94	-2.20	2.20
Lati	500	0.55	0.15	0.30	0.84
Owner	500	0.21	0.41	0.00	1.00
Grilo	500	102.99	134.08	0.00	581.18
Conflict	500	14.28	19.33	0.00	64.41
Sen90	500	0.03	0.16	0.00	1.00
Rep	500	0.88	0.32	0.00	1.00
Age	500	49.53	9.68	25.00	80.00
Worker	500	0.10	0.05	0.01	0.26
Index	500	0.82	1.86	-3.71	3.71
Ideo	500	-0.21	1.74	-8.27	7.02
Index$\widehat{\ }$	500	1.32	1.85	-2.29	6.58