

Accountability Behind Closed Doors? Legislator Power and Voting Procedures*

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Abstract: Accountability is important as a means of punishing wrongdoers, improving public confidence in the political system, and deterring potential lawbreakers. But to what extent is the likelihood of accountability an outcome of group interactions and institutional rules? Is the likelihood of accountability within a legislature contingent on the power of legislators or on the publicity given to scandal? Do voting rules that encourage secrecy help to compensate for power differences between legislators or instead lead to backroom dealings that hurt accountability? The paper proceeds in three parts. In the first, we present a basic game theoretic model of congressional efforts to punish dirty peers in a prototypical lower house of a bicameral Congress. In the second, we test some of our basic findings using data from recent scandals and subsequent efforts to ensure accountability in the Brazilian lower house of Congress, the *Câmara dos Deputados*. In the third, we use an agent-based model to explore some of the theoretical implications of these empirical findings for the smooth functioning of accountability processes in Brazil and beyond.

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We welcome comments and suggestions, but request that the paper not be cited without our express permission. Contact email: pereir12@msu.edu or taylormm@uol.com.br.

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Introduction

Does secret voting help or hurt accountability? This paper explores how voting rules influence the political but non-electoral sanctions imposed by Congress on its own members. This question goes to the heart of the institutional rules that govern political accountability in representative democracies, where members of the legislative body are often asked to take the first stab at judging peers accused of wrongdoing.¹

On the one hand, it may be that secrecy is the enemy of sunshine: secret voting might permit accused politicians to make backroom deals, buy off their peers, and blackmail or otherwise intimidate them so as to guarantee their own political survival. It might also enable corrupt peers to deal leniently with the accused legislator, in the hopes of lowering the bar for future institutional efforts at improving probity within the legislative body. A secret vote is less visible to the public, and may thus diminish legislators' fear of public backlash or electoral penalties. In sum, secrecy may enable politicians, and particularly dirty politicians, to skirt efforts to punish their peers, reducing the fear of retribution from voters or the media.

On the other hand, it could be argued that secrecy serves as an antidote to intimidation, permitting legislators to vote sincerely without fear of reprisals from their peers. After all, even if a legislator is not personally corrupt and additionally, is convinced his accused peer is corrupt, he might nonetheless avoid voting to expel his peer, fearing retribution of some sort.² So it may be that secrecy enables politicians to challenge powerful legislative leaders or party bosses in ways that would be unthinkable in an open vote.

Voting secrecy, however, is mediated by other factors, such as the publicity given to a case in the media and the relative power of the accused politician. The choice of whether to punish a peer may well hinge on how much public attention is focused on the case; other things equal, we might expect that the greater the media exposure, the more likely the political conditions will be propitious to expulsion. An important force in the opposite direction is the power of the accused legislator: other things equal, the more powerful the legislator, the less likely his peers are to punish him.

So how do these factors balance out in practice? This question could obviously be addressed in a number of different institutional contexts. In this paper, we use the test case of the lower house of the Brazilian Congress, which offers an intriguing example because both secret and open voting rules are used in determining whether to expel legislators accused of wrongdoing. The Brazilian Chamber of Deputies (*Câmara dos Deputados*) is composed of 513 representatives from 27 states, drawn from a multiparty system with 15 to 20 political parties typically represented in the lower house. Deputies accused of crimes are tried first in the Ethics Committee, where a simple majority can recommend their expulsion. If

this recommendation is approved, the recommendation goes to the full plenary, where a simple majority is sufficient to expel a dirty representative. Voting in the plenary (i.e., on the Chamber floor) is secret in expulsion votes (*cassação* votes) in Brazil.

By illustrating how the calculations that lie behind such votes are built from individual calculations into institutional accountability processes, this paper sheds light on the contingent nature of accountability, and on some of the determining factors that influence whether non-electoral political sanctions will be imposed. The paper proceeds in three sections. In the first, we present a basic game theoretic model of individual congressional representatives' vote choices when confronting a corrupt colleague. In the second, we test some of these basic assumptions using data from recent scandals and subsequent efforts to enforce accountability in Brazil's lower house of Congress, the Chamber of Deputies (*Câmara dos Deputados*). In the third, we use an agent-based model to explore some of the theoretical implications of these empirical findings for the smooth functioning of accountability processes in Brazil and beyond.

I. The Expulsion Game

In this first section we briefly describe a game of incomplete information about whether or not to expel a legislator for corruption, which we refer to as the "expulsion game." We suppose a simple game with three players: Nature, the Ethics Committee and the Floor of the lower house. Nature first makes three independent moves. The first is to determine the composition (c) of the Ethics Committee and the Floor, which are composed of some mix of clean ("non-corrupt"), dirty ("corrupt"), and tainted players (somewhat corrupt "contingent consenters"). The second and third moves relate to the accused legislator: the certainty (κ) of the charges against him (e.g., how credible the accusations of wrongdoing are) and his power as a legislator (π). The fourth move is taken by the Ethics Committee, which votes whether or not to recommend expulsion. If it votes not to recommend expulsion ($\sim\varepsilon$), the game ends. If it recommends expulsion (ε), the final move is a floor vote on whether to approve the expulsion or not (ε' , $\sim\varepsilon'$).

[Figure 1 about here]

The game becomes significantly more complex when we move to the individual level, however, because there are fifteen members of the Ethics Committee and 513 members of the lower house, each of whom can be clean, dirty or tainted. Further, although the accused legislator has no turn in the model presented here, his ability to retaliate (or not) in a subsequent phase of the game is assumed to have an effect – through the power and certainty variables – on the willingness of the Ethics Committee and the Floor to expel. Further, these payoff calculations are further altered by a factor γ related to voting procedure: γ is an open vote; $\sim\gamma$ is a secret vote.

The individual calculus of each member of the Ethics Committee and Floor is given with their beliefs and preferences with regard to:

- 1) dealing with the accused legislator on congressional business in the future,
- 2) being personally tainted in the public eye by the vote on whether to expel,
- 3) whether the Congress' institutional reputation would be tainted,
- 4) the likelihood of potential revenge by the accused legislator.

These beliefs and preferences vary in accordance with c , κ , π , and γ . Each legislator type is expected to have slightly different preferences, even under equivalent values of γ , and these play out through κ and π . Clean legislators would rather not be stained personally or institutionally, and their preferences in this regard are much stronger than those of tainted or dirty peers, leading them to give more credence to the same amount of information about their peers' wrongdoing.

$$\kappa_{clean} > \kappa_{tainted} > \kappa_{dirty}$$

A central initial assumption is that there will be multiple rounds of play. This means that the accused legislator may be able to exact retaliation, either directly (upon being elected back into the post he was removed from), or indirectly (through surrogates), after the expulsion vote has taken place. This inter-temporal threat is expected to influence his peers' voting strategies. Dirty legislators fear being caught far more than their clean peers, and thus are constantly concerned with the possibility of revenge by the accused.

$$\pi_{dirty} > \pi_{tainted} > \pi_{clean}$$

The payoffs for each type of legislator are listed in Table 1.

[Table 1 about here]

The question this poses is one of voting procedure: other things equal, what choice will each deputy make under different voting procedures? Will open voting procedures lead to more fear of retribution from the implicated Representative I, or will deputies be more concerned with retribution by the voting public? How do such considerations balance out in the face of different voting procedures? In the aggregate, will different compositions of each body lead to different results under each voting procedure? With these central questions in mind, we now turn to an empirical test of the model drawing on data from actual corruption investigations in the Brazilian Chamber of Deputies.

2. An Empirical Test: The Brazilian Chamber of Deputies (2003-2006)

Brazil's Congress offers a particularly interesting test of the importance of voting rules in accountability processes. The country has suffered through many

corruption scandals, and since the return to democracy in the 1980s, many have occurred within the Congress and specifically, within the lower house, the Chamber of Deputies. Partly in response to these scandals, in 2002 the Chamber created its Ethics Committee (*Conselho de Ética e Decoro Parlamentar*) to judge deputies accused of acts that broke Chamber rules; corruption has been the central focus of the Ethics Committee ever since.

The congressional term (2003-2006) immediately following the creation of the Ethics Committee was marked by a series of legislative corruption scandals, including most notoriously, three interrelated scandals: the “bingo” scandal, the “post office” scandal, and the *mensalão* – or big monthly allowance – scandal. All of these scandals brought indications that congressional votes were being unduly influenced by corruption: deputies were receiving money or being allocated government posts to distribute among their supporters in ways intended to influence the direction of their legislative decisions.

The process for punishing legislators allegedly involved in corruption (or in any other infringement of ethics codes) in the Chamber of Deputies follows the two-stage process in the Ethics Committee and on the floor, described in the previous section.³ Judgment by the Ethics Committee is a rare procedure, usually occurring only after a significant wellspring of public indignation and critical evidence has built up.⁴ During the period analyzed, 51 legislators were investigated. In 17 cases (33.3%), the Ethics Committee recommended the maximum penalty (expulsion).⁵ However, the plenary votes on the floor of the Chamber approved the committee’s report in only 4 (7.8%) of those cases. The main purpose of this empirical analysis is to investigate some of the determinants of the decision to expel legislators recommended by the Ethics Committee and confirmed by the floor.

Given the sequential structure of the decision-making process for punishing legislators in the Brazilian Congress, the floor’s final decision may not be free of selection bias. The selection problem is that the sample of legislators whose cases are voted on the floor of the Chamber consists only of legislators that the Ethics Committee has recommended for expulsion. These legislators may differ in important unmeasured ways from those legislators that the Ethics Committee decided to acquit. For example, a powerful legislator (who is either a Party leader or a Chamber leader) might be tremendously influential at the committee level. Given that the Ethics Committee’s decision occurs under an open roll call vote procedure, which might permit retaliation against committee members in the future, such a deputy might be more likely to survive. This would not be the case at the floor level, where legislators, by using secret ballots, would have more freedom to send one of their influential peers packing.

Several political scientists have discussed statistical procedures designed to avoid selection bias in sequential estimations of conditional probabilities. The most commonly used procedure in the literature is the Heckman (1974) selection model.

Sartori (2003), however, argues that Heckman selection models are appropriate only when at least one extra explanatory factor influences selection, but not the subsequent outcome of interest. The problem with the Heckman model, in other words, is that there are occasions in which researchers may believe that identical explanatory variables influence both the selection and the subsequent outcome equations. According to Sartori (2003) there are three conditions in which identical explanatory variables can be used in both the selection and outcome models, as long as both dependent variables are binary: (1) selection and the subsequent outcomes of interest involve similar decisions and goals; (2) the decisions have the same causes; and (3) the decisions occur within a short time frame and/or are close to each other geographically.

These three conditions are met in the sequential decision-making process of punishing legislators involved in corruption scandals in the Brazilian Congress: the outcomes of interest involve similar decisions, similar causes, and are temporally and geographically proximate. Therefore, we use Sartori's binary selection model here. In this estimation, the dependent variable has three possible values: 0 if the Ethics Committee decides not to punish (thereby closing the case); 1 if the Committee decides to punish but the Chamber Floor does not; and 2 if both the Committee and the Floor vote to punish. In order to be consistent with the theoretical model previously discussed, we use several distinct variables to test our three central considerations about certainty, power, and procedure (see descriptive statistics in Appendix 1).

With regard to **certainty**, we measure both the media prominence of the accused legislator and the severity of the crimes the accused is charged with. The first variable is "media", which measures the coverage a given deputy has received in stories relating to scandal in two leading media outlets, the *Veja* weekly magazine, and the *Folha de São Paulo* daily newspaper. This is a strictly numerical measure, with no judgment about the positive or negative nature of that coverage, although the story count focuses solely on mentions of the deputy in stories about corruption scandals. Our expectation is thus straightforward: the greater the media exposure, the higher the probability of punishment both in the committee and on the floor. The second variable used is a proxy of severity, labeled "penalty." Penalty represents the sum of the maximum prison sentences (in years) under Brazilian law for any crimes the legislator is charged with.⁶ So, the worse the charges are, the higher the penalty variable will be. We expect, other things equal, that the higher the total penalties the legislator faces, the greater the probability of the committee and the floor voting in favor of expulsion.

With regard to **power**, we test the effect of five variables that estimate how powerful (loaded with votes, money, and/or leadership) legislators are, and as a consequence, the extent to which they could intimidate peers working to punish them.

- “Party leader” indicates whether a deputy is a leader of his or her party; “Chamber leader” indicates whether a deputy is a member of the group of 11 deputies who preside over the Chamber of Deputies (the so-called “*mesa diretora*”).⁷ Given the significant power wielded by party leaders in the Chamber of Deputies and the almost absolute control of the voting agenda exercised by the Chamber leadership (Figueiredo and Limongi 1999), we assume that membership of either group is associated with lower rates of punishment, since these legislators’ potential for retaliation and their access to political resources are both great.
- “Campaign expenditure” is how much the legislator spent in their 2002 campaign; we expect that the more the legislator has been able to spend, the more likely they are to wield significant power, and hence the less likely they are to be punished.
- “Budget Appropriation” is the percentage of budget amendments offered by the deputy that have been implemented: because the budget allocation in Brazil authorizes the government to spend, but does not compel it to spend, one way the executive branch controls its coalition is by fulfilling (or not) deputies’ budget amendments. More powerful deputies generally are more likely to have their budget proposals fulfilled; we thus expect that higher budget appropriations are associated with lower likelihood of punishment.
- Finally, “votes” is the number of votes obtained by the accused legislator in the 2002 election. It is reasonable to expect that the larger the size of the electorate supporting a particular legislator, the greater his political capital among his peers. This is especially the case because of the coattails effect in Brazilian legislative elections, whereby high vote-gainers are able to carry low-vote members of their parties into office. Therefore, we expect a negative correlation between the number of votes a deputy has received and the probability of punishment.

The last consideration, **voting procedure**, is intrinsic to the two-stage model: that is, the Ethics Committee uses an open ballot and the Chamber floor uses a secret ballot. To test the model in a scenario marked by a relatively low number of observations and hence low degrees of freedom, we ran several variations on the model, with distinct independent variables in each case (Table 2).

[Table 2 about here]

2b. Model results

The models shown in Table 2 produce some striking results: voting procedure, deputies’ power and certainty all have an effect, albeit with important variation across the independent variables. All seven models are quite robust, with pseudo- R^2 measures that range from 21.03 to 33.96. More importantly, although the number of

observations never surpasses 51 in any of the models, the results are robust to bootstrapping, a resampling method which we ran on 1,000 samples of the data (Keele 2007; Chapter 8). We discuss the three sets of variables in turn below.

1. The **certainty** variables show mixed results. The “penalty” variable is not statistically significant, which may reflect the difficulties deputies have in evaluating their previous peers’ levels of corruption on the basis of complex, inconsistent, uncertain, and often lengthy judicial procedures.⁸ Media exposure as measured by the “media” variable, however, has a consistently significant effect in the Ethics Committee and – with one exception – on the floor. A particularly interesting result is that the effect is slightly larger in the Ethics Committee, where the vote is open to the public. Although the effect of “media” is relatively small at the margin, in the aggregate it is both substantive and significant.

To illustrate the potential effect of media coverage, we calculate the predicted probability for the independent variable “Media” using the results of 1,000 post-estimation simulations (i.e., King, Tomz, and Wittenberg 2000), varying media coverage from the mean to the 90th percentile. We calculated the mean of these 1,000 iterations under all three possible outcomes: Committee votes “no” (against expulsion); Committee votes “yes”, but the Floor votes “no”; and Committee votes “yes” and the Floor confirms that decision with a “yes” vote of its own. After that, we calculated the difference of those means and took their p-values. These results are shown in Table 3, below.

The chances that the Ethics Committee will vote “no,” absolving a legislator, is substantially greater (79.6%) when media exposure is at the median value (285 mentions). However, it drops dramatically to about 11.4% when media exposure increases from the median to the 90th percentile (2500 mentions). This difference between the means, -68.3%, is statistically significant at .033 (p-value). Said another way, as the implicated deputy’s media exposure rises, the likelihood that the Ethics Committee will absolve him decreases substantively, in line with our initial hypothesis.

Similarly, under the same conditions, the likelihood of a Committee vote in favor of punishment, combined with a Floor vote against punishment (a “1” outcome), would rise by 36.5% (from a mean of 19.6% to 56.1%). Finally, and also in line with our initial hypothesis, the likelihood of both a Committee and Floor vote in favor of punishment (a “2” outcome) would rise from a negligible 0.7% to 32.5%, a difference of 31.8% that is statistically significant at .033 (p-value). In sum, a move from the mean of media exposure to a high level has a decisive effect in increasing the likelihood of punishment.

[Table 3 about here]

2. The **power** variables also show mixed but important results. The performance of individual legislators – whether measured by campaign expenditure, budget appropriations, or votes – has no statistically significant effect, meaning that these measures of deputies' performance do not matter either to the probability of their being punished in the Ethics Committee or on the Floor (the one exception is campaign expenditure, whose coefficient is statistically significant in Model 6, but with a miniscule substantive effect). One of the stronger results is that party or Chamber leadership are associated with a lower and statistically significant likelihood of punishment in the Ethics Committee. In other words, powerful leaders are less likely to suffer punishment by their peers. The coefficient for party leader shown in Table 2 illustrates that a party leader is nearly twice as likely (92.8%) to be absolved in the Ethics Committee than a peer who is not a leader. Furthermore, members of the Chamber leadership are progressively less likely to be punished, depending on their position in the leadership hierarchy. Simply being a member of that hierarchy already implies a 38.8% decline in the probability of Ethics Committee punishment, in comparison with a backbencher.

3. Note, however, that these results are only significant at the Ethics Committee level, where the vote is open to the public, and thus potentially subjects deputies to retaliation by the accused. With regard to **voting procedure**, then, in comparing the selection model and the outcome model, we see a significant difference between the Ethics Committee and the Chamber floor. Especially as regards party or Chamber leadership, we find that power shields leaders from punishment at the Ethics Committee level (where voting is open), but has an uncertain effect on the Chamber floor (where voting is secret), given that the coefficients of these variables though negative are no longer statistically significant at the floor level. This result may shed new light on the discussion about legislative accountability and vote procedure. On the one hand, legislators might be held highly accountable by voters under open vote procedure. On the other hand, open vote procedure creates an extra burden on legislators who punish misdeeds by their peers unless they are protected by a secret vote, which can protect them against future retaliation.

2c. Preliminary considerations about the statistical model results

Two considerations are worth discussing with regard to the model. The first has to do with the sequence of voting. What exactly are the implications of this sequence, particularly in the Ethics Committee, where the vote is open to scrutiny? To put it another way, if the Ethics Committee were always certain that the Floor would punish, would its decisions look any different? Do members of the Ethics Committee respond more to the likelihood of retribution from peers they vote to punish, or to pressures from the public which is able to scrutinize their vote? There is no way to get to clear answers from this model, but the fact that six of the seven variables have the expected direction and effect in the Ethics Committee, and not in the Chamber, raises the possibility that there is a conditional effect at work.

The second consideration is related. Both leadership variables (Party Leader and Chamber Leader) have the expected effect in the Ethics Committee, but not on the Floor. That is, under an open vote in the Ethics Committee, a leadership position, which increases the power of the accused, leads to reduced probability of punishment, as we expect it would. On the Chamber Floor, however, these leadership variables produce no statistically significant results. Although these results are tenuous because of their low statistical significance – which is itself a likely result of the small number of cases voted on the Floor – they raise doubts about the conventional wisdom that transparent voting is good for accountability. To the contrary, these results suggest the possibility that an open vote in the Ethics Committee may actually make deputies more susceptible to intimidation than they would be under a secret vote on the Chamber Floor.

This is so despite the inconvenient fact that, even before voting rules (open vs. secret votes) intervene, members of the Ethics Committee are cleaner *ex ante* than their peers in the full Chamber. The average total jail time (total penalty) faced by members of the Ethics Committee is lower than that of the full Chamber (a little less than one year and five months, as opposed to slightly more than one year and seven months, respectively. See descriptive statistics in Appendix I). In other words, *ex ante*, the average member of the Ethics Committee is already slightly “cleaner” than the average member of the Chamber, and thus potentially less likely to tolerate corruption than his peers in the full Chamber. The fact that they nonetheless appear susceptible – however weakly – to the “power” variables in determining the punishment to be meted out to their colleagues is notable.

Finally, it is clear that the media play an important signaling role to politicians. In many ways, this finding confirms past research, suggesting that the media plays an important compensatory role in Brazilian politics, even when the public has very low confidence in more mainstream accountability institutions such as the judiciary. As Ferraz and Finan (2008) revealed in their innovative study of Brazilian municipal audits, in municipalities with higher corruption but more independent media, release of the audits decreased the probability of reelection by nearly a third, by signaling malfeasance to the electorate. The media appear to be playing a similar signaling role in this case, with the effects possibly working through two channels: first, by drawing legislator attention to potential wrongdoing; and second, by informing the public of the presence of potential malfeasance and thus adding to the voting deputies’ potential costs of tolerating such wrongdoing.

3. An Agent-Based Model of Legislative Accountability

In this section, we use an agent-based model to explore some of the theoretical implications of the empirical findings above. Using the basic framework presented in Sections 1 and 2, we illustrate how modest changes in the basic parameters of voting procedure, power, or certainty may lead to significant changes in the probability of expulsion, depending on the preferences of the legislature. We

first develop the basic assumptions of the agent-based model (ABM), and test how well these simple assumptions approximate reality under conditions similar to those uncovered in the regression analysis above. Second, we use the ABM to illustrate how voting behavior might shift under changing conditions.

3a. Basic logic of the model

The basic model follows the logic of the previous two sections. We have used NetLogo 4.1 software (Wilensky 1999) to prepare the ABM. A screenshot of the ABM in Appendix II shows that the model can be altered on five basic dimensions:

- 1) characteristics of the implicated deputy;
- 2) characteristics of the Ethics Committee;
- 3) characteristics of the Chamber as a whole;
- 4) system variables; and
- 5) voting procedure.

The first dimension, characteristics of the implicated deputy, includes a scale of power (0 to 1) and a scale of certainty of the implicated deputy's guilt (0 to 1). The second and third dimensions – Ethics Committee and Chamber characteristics – refer to the percentage of deputies in each body that are dirty, clean or tainted.⁹ We assume that these three different types of legislators have different preferences with regard to punishing their peers, as described in Section 1 of the paper.

The fourth dimension, “system variables,” includes the number of members of both the Ethics Committee and the Chamber; the number of iterations of the model that will be run; and a “random factor”, intended to capture the effect of external factors not incorporated in the model (e.g., public attention to the vote; public image of the accused; whether the voting deputy woke up on the right side of bed, etc.). The variables “Dirty-Threshold” and “Clean-Threshold” determine under what conditions “dirty” and “clean” deputies will vote to expel. That is, if the value of the certainty variable minus the value of the power variable is greater than type of deputy's threshold, they vote to punish (for “tainted” deputies, we assume that their certainty variable is half that of a “clean” deputy).

The final dimension, “voting procedure”, measures the effect of voting procedure, as it is transmitted through the power and certainty variables. We assume that voting procedure can have an effect ranging from -1 to 1 on the value of the power and certainty variables, increasing or decreasing their effect. In running the model, we follow the conclusions of the regression analysis above, and assume that both power and certainty matter more under an open vote than under a closed vote. Under an open vote, certainty is expected to have a positive effect, while power is likely to have a negative effect.

At the core of any ABM is the notion that each agent's behavior is governed by parameters that each agent obeys at every iteration of the simulation. In this simulation, the agents (legislators) have a very simple choice between voting "yes" if they want to punish or "no" if they don't. The sum of "yes's" and "no's" will determine the collective decision of the Ethics Committee and subsequently of the Chamber, following a simple majority rule.

But how and why does each agent decide to vote yes or no? The two fundamental variables at stake are Certainty and Power, so that if the subtraction of power from certainty yields a value greater than a "threshold" value, the legislator votes "yes"; otherwise, he votes "no". Certainty and Power are variables related to the accused legislator, so they are equal for all the voting legislators, but they are modified by a random-factor unique to each agent, so that no agent has the same perception of Certainty nor Power. This randomness generates the possibility of different decisions by agents with the same characteristics.

A second important modifying element in the model is the definition of "threshold", the value that must be reached to change a "no" vote to "yes". Threshold could in principle be a fixed value, set by the authors, but this solution wouldn't respect the philosophy of complex simulation, which seeks to explain the internal dynamics of a process without external interference. For this reason, Threshold isn't set by the authors, but instead is a function of certainty and power. In this way, the internal properties of the system explain its operation, and don't rely upon any external factors (such as authors' caveats) to explain unpredictable or contra-intuitive dynamics and results. In sum, the rule of behavior can be mathematically described:

with X = certainty; Y = power; a = random-factor;

$$Z = ((X - Y) / 2) + 0,15;$$

IF $((X + (aX)) - (Y + (aY)) > Z$

THEN vote "yes"

ELSE vote "no"

There are of course many functions of Z [x; y] that can be studied in further works. In the analysis below, we use this function, which most closely approximates the results of the statistical model.

3b. Comparison of the agent-based and statistical models

Using the parameters uncovered by the statistical regression model, we constructed an ABM that closely mirrors the behavior of actual Brazilian legislators.

Here we test the ABM's ability to replicate the predicted probabilities of the statistical model at various levels of media exposure. We set the composition and number of the Ethics Committee and the Chamber to their mean values in the Brazilian Congress during the 2003-2006 legislative session.¹⁰ The value of "Power" (0.23) is the average of means of the two statistically significant "power" variables: Party Leader (0.156) and Chamber Leader (0.314).

Using the results of the statistical model as our benchmark, we also set the threshold values, the random factor, and the variation generated by the difference between the first "open" voting procedure of the Committee and the "secret" one in the Chamber. The threshold values are 33% for Clean and Tainted legislators, and 66% for Dirty legislators. This means that there must be at least a 33% chance that the implicated will be punished (is guilty) to convince a Clean deputy to vote in favor of punishment, while this probability must be two times greater for the Corrupt members to vote against their peer. In sum, the composition of the Ethics Committee and the Chamber is very relevant to determining the vote result.

The Random Factor is more important than we initially imagined, especially during the Ethics Committee deliberations. The Random Factor helps to explain why it is that even when "Media" is at the 90th percentile, there is still an 11% chance that the Ethics Committee will vote "no", even under an open vote. It should be noted, though, that while the Random Factor is very important in the Commission with only 15 members, it is relatively insignificant in the Congress with 513 members. This is because the higher number of legislators reduces the chances that a few "unpredictable" legislators can change the voting result.

Figure 2 holds all parameters steady while altering the value of the "Certainty" variable, demonstrating that the ABM very closely mirrors the results of the statistical model.

[Figure 2 about here]

3c. ABM simulations¹¹

The empirical data from the Brazilian case is limited: as noted previously, we have only a small sample of 51 cases with which to test the implications of voting procedure. Although bootstrapping allows us to confirm the robustness of our statistical model, the low number of cases complicates any further tests of our empirical results. For this reason, the agent-based model is particularly helpful. Although any results are necessarily speculative, and rely on the parameters set by the authors, the results illustrated in Figure 2 suggest that we are able to replicate the real-world data fairly accurately.

It is of course unreasonable to claim that the ABM is anything more than a simulation of the simultaneous calculations made by hundreds of actors in a fictional

world. For that reason, we would ask the reader to take any conclusions of this section as merely illustrative. However, we believe that the experiments shown here can contribute to our understanding of accountability processes in at least three ways. First, by explicitly laying out our assumptions of how voting procedure may matter. Second, by providing theoretical guidance to research that might be productively conducted by researchers with access to broader datasets. Finally, by illustrating that small changes in the basic parameters of the model can have important effects on accountability. Below we test the effects of shifting three of the most interesting parameters: composition, certainty, and voting effects.

With regard to the first variable, the model is constructed such that a change in the composition of the Ethics Committee or the Plenary is expected to have an effect on the likelihood that the Congress will vote to expel or not. So it is thus no surprise that a change in the composition of the Congress indeed seems to have an effect on the probability that an accused deputy will be expelled. What is interesting, however, is that the model shows that 1) there is a tipping point in terms of the proportion of clean deputies beyond which the likelihood of punishment grows rapidly; but 2) that even with relatively high levels of certainty, expulsion is far from guaranteed, even when Congress is entirely composed of “clean” deputies.

Figure 3 illustrates this in graphic form, dividing deputies by type: clean, dirty, or tainted. The graph begins on the left side with a Chamber evenly split between dirty and tainted deputies, with the number of clean gradually rising from 0% as we move from the far left to 100% on the far right. We assume that the concomitant reduction in the number of dirty and tainted deputies is evenly split between the two types. Superimposed on the graph is a heavy line indicating the likelihood that the Chamber will vote to expel, as calculated by the model when we maintain all variables except composition constant (and assume 90% Certainty).

[Figure 3 about here]

As the Chamber’s composition rises from 74% Clean to 93% Clean, the likelihood of a vote for expulsion on the floor of the Chamber rises rapidly, from 1% to over 53% (reaching 77% when the Chamber is composed solely of clean deputies). In other words, even though the decision to vote for punishment is individual, the likelihood of punishment varies non-linearly as a result of slight changes in the composition of the Congress. This suggests an important policy implication of our research: namely, that legislation banning certain types of candidates from office – such as candidates who are under investigation or have been convicted in a trial court – may have an important effect on increasing the likelihood of accountability within Congress. Such legislation is under consideration in Brazil at this moment, although its effectiveness will depend greatly on the details of its implementation.

A second implication of the model for Brazil comes from the non-linear nature of the results. Brazil's Chamber of Deputies is – by the rough measure described in Section 2 – currently made up of a proportion of 83% clean, 12% dirty, and 5% tainted deputies. This figure is of course very tenuous, since the measure of total penalty on which it is based was shown to be an uncertain predictor. Nonetheless, as Figure 4 illustrates, this suggests that Brazil may be at a crucial point in the accountability function. Other things equal, and under the specific conditions laid out here, a few more clean deputies (roughly 26, under the parameters used here) could ensure much greater accountability. By the same token, a reduction of roughly 46 clean deputies could mean a very quick drop off in the likelihood of punishment to virtually no chance of accountability. In other words, Brazil may well be on the cusp of great improvements, or – if momentum is not kept up – could well fall back rapidly to a less favorable position.¹²

[Figure 4 about here]

The second major finding that can be drawn from the ABM regards the effects of Certainty. It is both obvious and tautological to argue that the certainty variable matters; after all, we assumed from the outset that certainty matters, and it is thus built into our model. However, it is worth noting that Certainty's effects are non-linear, and begin to play an important accountability role only once the threshold value has been crossed. Under equivalent conditions, even relatively small changes in the certainty of the charges against a deputy can have important effects on the likelihood of punishment (see Figure 5). From a policy perspective, this suggests that media and prosecutors have an important role to play in changing the likelihood of punishment, whether it is by writing about scandal (our "Media" variable in Section 2) or by charging those suspected of crimes (the "Penalty" variable).

An interesting additional finding regarding certainty is that with a few voters, the non-linear procedures lead to considerable unpredictability. When we move from the small Ethics Committee to the large Chamber, the larger number of legislators stabilizes the dynamic. In other words, when the marginal effect of each agent's decision is high, the randomness of his behavior can lead to unexpected collective results. In policy terms, this suggests that one way to make the accountability process more stable and less unpredictable (though not necessarily more effective) would be to increase the number of members of the Ethics Committee so as to reduce each member's marginal effect on the voting outcome.

[Figure 5 about here]

Finally, let us look at voting effects. We have assumed throughout this paper that a change in voting procedures influences legislators through the certainty and power variables in at least two ways: 1) by altering voters' perceptions of whether the accused is guilty, and thus influencing the costs to the legislator of voting for or

against punishment (the sunshine effect); and 2) by altering the likelihood of retribution against the legislator if he votes to expel his peer (the retribution effect).

It is logical to imagine that a secret vote would mean that certainty about the accused of guilt would matter less to dirty congressmen voting on their peer's future. After all, under a secret vote, nobody will know if they voted to let their dirty colleague off the hook. It also seems to make sense in the opposite direction; that is, in terms of making the power of the accused legislator matter less: that is, the chances of retribution would seemingly be smaller under a secret vote.

To test these hypotheses under the basic assumptions of the ABM, we compared the results under four distinct sets of parameters, shown in Figure 6. Model A is a benchmark model that replicates the parameters used in Figures 3-5¹³, and follows the rules of the Brazilian Congress, with an open vote in the Ethics Committee and a secret vote in the Chamber. Let us compare Model A's results with those of Model B, which uses the same parameters but assumes that instead of using a secret vote, the Plenary switches over to an open voting system.

The results are unequivocal, illustrating that at all levels of Certainty, an open vote in the Chamber leads to a greater likelihood of expulsion. But does this imply that a change in voting procedure might lead to greater accountability? Not necessarily, as the discussion below illustrates.

Models A and B test the power of voting rules when the accused legislator is of relatively low power. What happens if we raise the value of Power significantly (from 23% to 83%)? A comparison of the results of Model C with Model A shows that under the original voting conditions (open in Ethics Committee; secret in Chamber), a more powerful legislator is less likely to be expelled, as we would expect.

Where things get interesting is in the comparison with Model D, which looks at how the Chamber would judge this powerful legislator under an open voting system. The previous relationship is *reversed*: rather than open voting leading to more punishment, it instead leads to less. The difference in punishment, best illustrated by the huge gap between the results of Models B and D, is sufficient to illustrate that perhaps secret voting is not a panacea under all conditions. The two simultaneous but contradictory effects at work here – sunshine and retaliation – may help to explain why the statistical model in Section 2 produced ambiguous and insignificant results on the Chamber Floor.

[Figure 6 about here]

The policy implications of these results are complex, to say the least. They suggest that it is not correct to assume the open voting is always the best solution. It is enormously effective if the accused legislator is relatively weak, but extraordinarily ineffective if he is relatively strong. Similarly, secret voting is less effective when the

legislator is weak, but more effective if he is strong. A second source of complexity is the two-stage voting model used in Brazil. We do not attempt to vary the voting procedure of the Ethics Committee here, but one implication of these findings is that the Ethics Committee may also be intimidated by powerful legislators, suggesting that open voting in the Ethics Committee may inhibit its members from recommending expulsion. Perhaps one policy solution would be for the Brazilian Congress to use two sets of rules that take the power differential between legislators into account: secret voting whenever a party or Chamber leader is being judged, but open voting otherwise.

4. Conclusions:

To be written!

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Figures and Tables:

Figure 1: The Expulsion Game

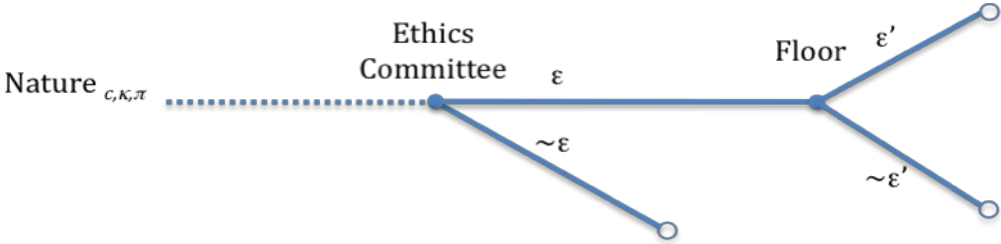


Table 1: Payoffs [incomplete]

	ε	$\sim\varepsilon$	ε'	$\sim\varepsilon'$
Clean				
Tainted				
Dirty				

Table 2: Sartori Selection Model: Probability of Punishing Corrupt Legislators in the Ethics Committee (Selection) and on the Floor of the Chamber (Outcome)

	1	2	3	4	5	6	7
Selection Model (Ethics Committee)							
Media	.0004*** (.0001)	.0004*** (.0001)	.0006*** (.0001)	.0010*** (.0003)	.0010*** (.0003)	.0006*** (.0001)	.0010*** (.0003)
Penalty		.0024 (.0177)			.0041 (.0186)		
Party Leader			-.9805* (.6515)	-1.9286** (.8798)	-1.9462** (.8839)	-.9519* (.6202)	-2.0437** (.9806)
Chamber Leader				-.3884** (.2036)	-.3795* (.2060)		-.4360** (.2206)
Campaign Expenditure						-5.67e-07 (7.12e-07)	
Budget Appropriation							-2.6727 (2.3133)
Votes							3.48e-06 (5.22e-06)
Constant	-.9796*** (.2673)	-.9916*** (.2772)	-.9809*** (.2680)	-1.1556*** (.2934)	-1.1692 (.3000)	-.9319** (.3613)	-1.1273*** (.4488)
Outcome Model (Chamber Floor)							
Media	.0003*** (.0001)	.0003*** (.0001)	.0004** (.0002)	.0007* (.0004)	.0006* (.0004)	.0005** (.0002)	.0007 (.0006)
Penalty		-1.8663 (168.72)			-2.0296 (128.9094)		
Party Leader			-1.6268 (2.0086)	-3.3512 (6.2851)	-2.8464 (5.2742)	-1.7192 (1.6356)	-3.4324 (8.9537)
Chamber Leader				-1.8247 (138.0735)	-2.5292 (4794.131)		-1.8066 (161.2598)
Campaign Expenditure						7.15e-06* (4.04e-06)	
Budget Appropriation							1.1636 (5.2894)
Votes							-1.07e-06 (.00001)
Constant	-2.1298*** (.4367)	-1.9621*** (.4618)	-2.1690*** (.4814)	-2.2553*** (.5982)	-2.0072*** (.6156)	-4.4198** (2.0435)	-2.3070** (1.0097)
Log Likelihood	-32.9598	-32.2444	-31.4154	-28.7594	-28.1750	-29.1405	-27.5620
Pseudo R ²	.2103	.2274	.2473	.3109	.3249	.3018	.3396
Observations	51	51	51	51	51	51	50

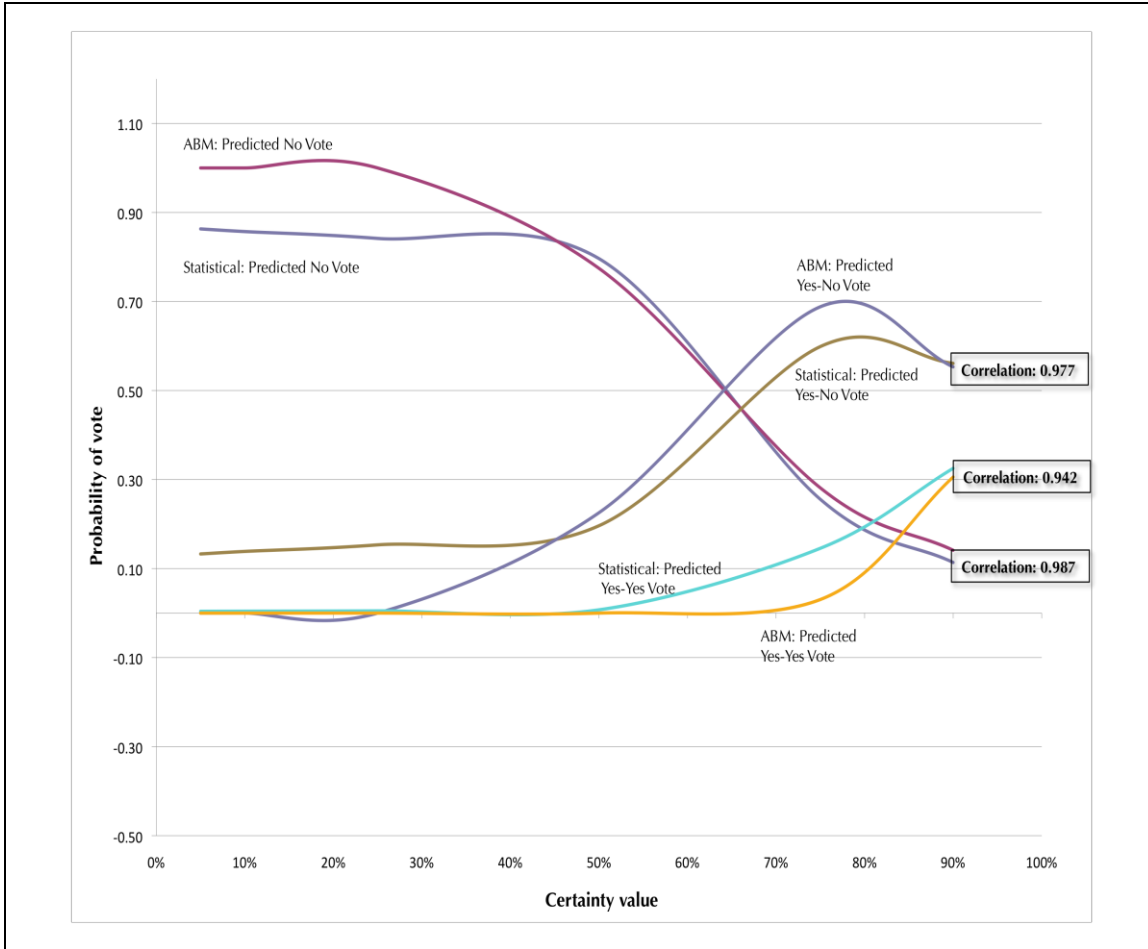
Standard error in parenthesis; Significance: 1% ***, 5% **, and 10% *

Table 3: Predicted Probability of Outcomes by the Committee and the Floor when Media Exposure varies from 285 (median) to 2500 (90th percentile)

Outcomes	Mean of the results when Media Exposure is 285 mentions	Mean of the results when Media Exposure is 2500 mentions	Difference of the Means (p-value)
Committee no (0)	.7963805 (.0692787)	.1137849 (.1300955)	-.6825956 (.033)
Committee yes & Floor no (1)	.1962666 (.065304)	.5610088 (.1918202)	.3647422 (.033)
Committee yes & Floor yes (2)	.0073529 (.0105455)	.3252062 (.1986604)	.3178533 (.033)

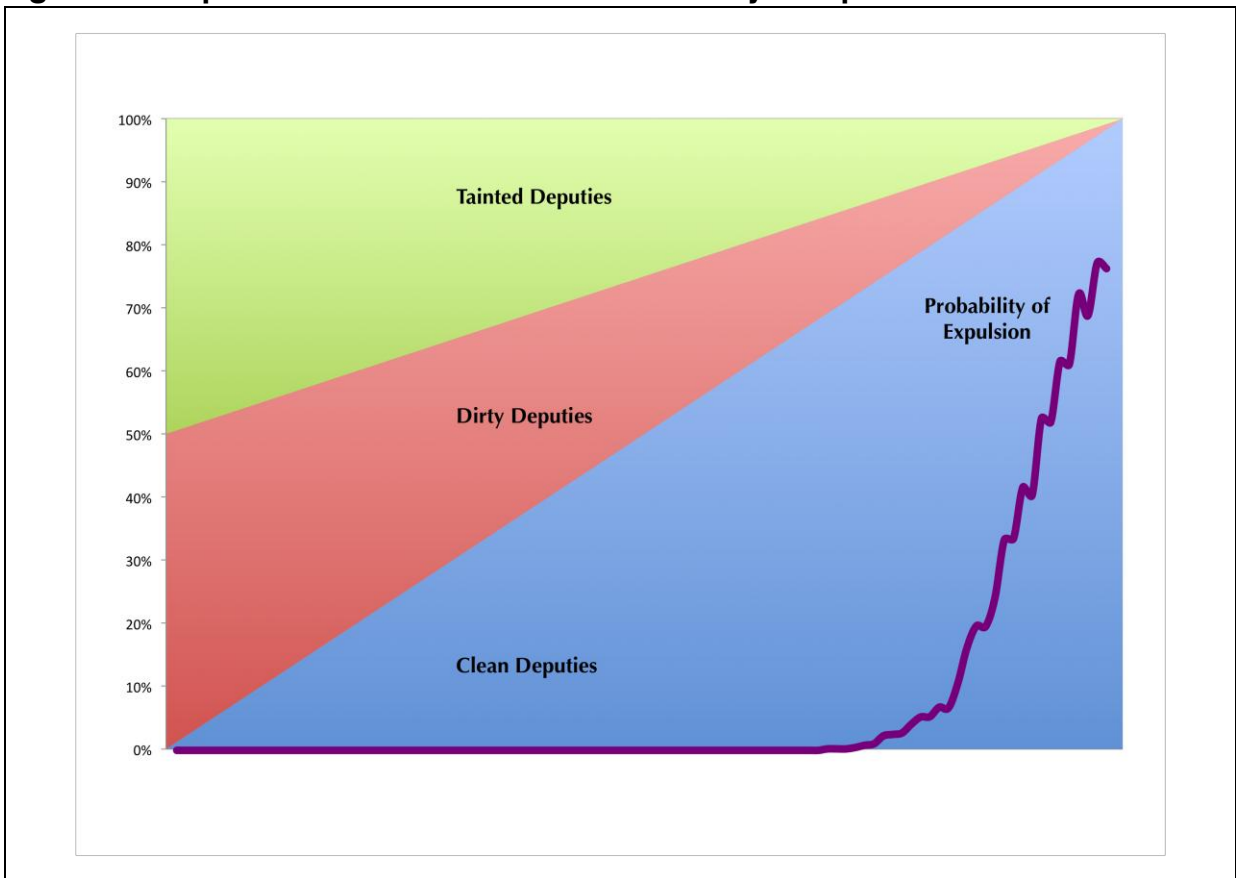
Note: Standard errors are in parentheses; 1000 post-estimation simulations (King, Tomz, and Wittenberg 2000). Calculated using the coefficients in Model 4 (Table 2).

Figure 2: Comparison of predicted probabilities, agent-based versus statistical model



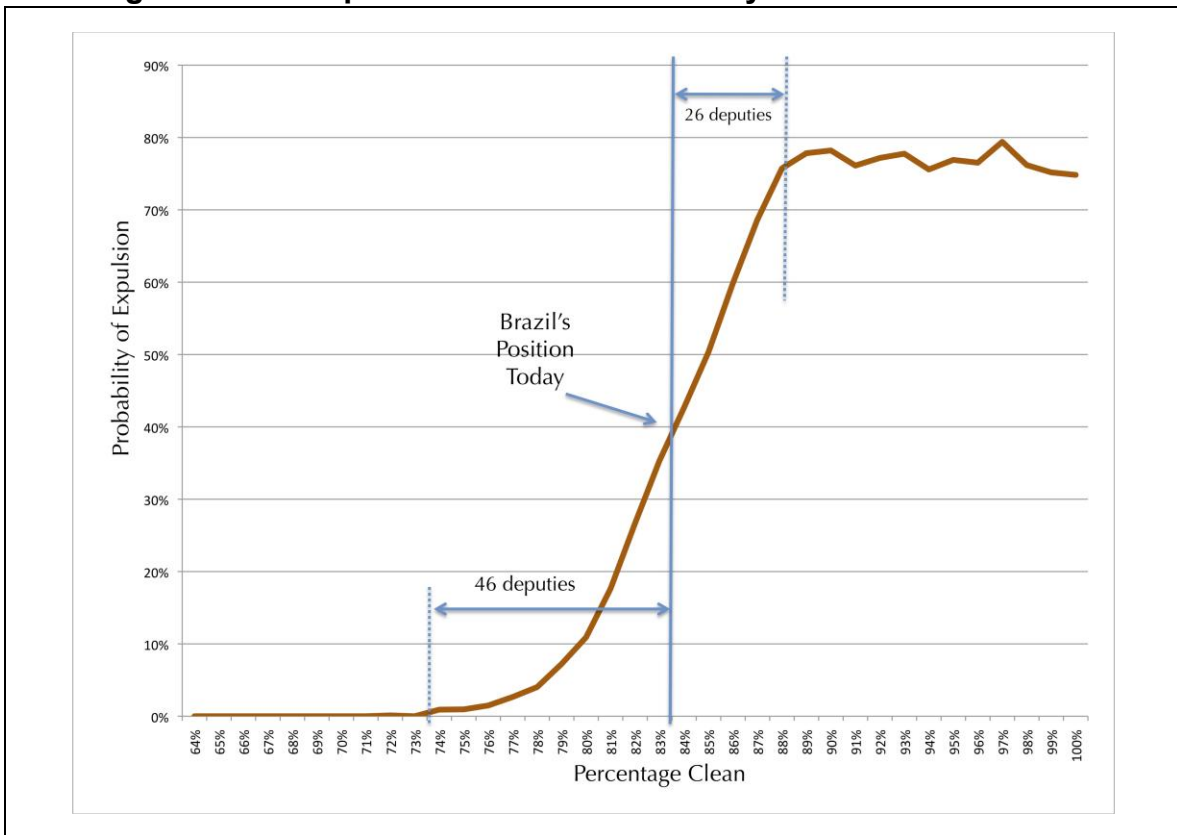
Note: calculations by authors. Parameters of ABM: Power: 0,23; Ethics Committee Composition: D=9%, C=89%; Chamber Composition: D=12%, C=83%; Random factor: 0.5; Certainty variation: -40%; Power variation: -80%; Members of Ethics Committee: 15; Members of Chamber: 513; Iterations of ABM run for each predicted value: 10,000.

Figure 3: Composition of the Chamber and Probability of Expulsion



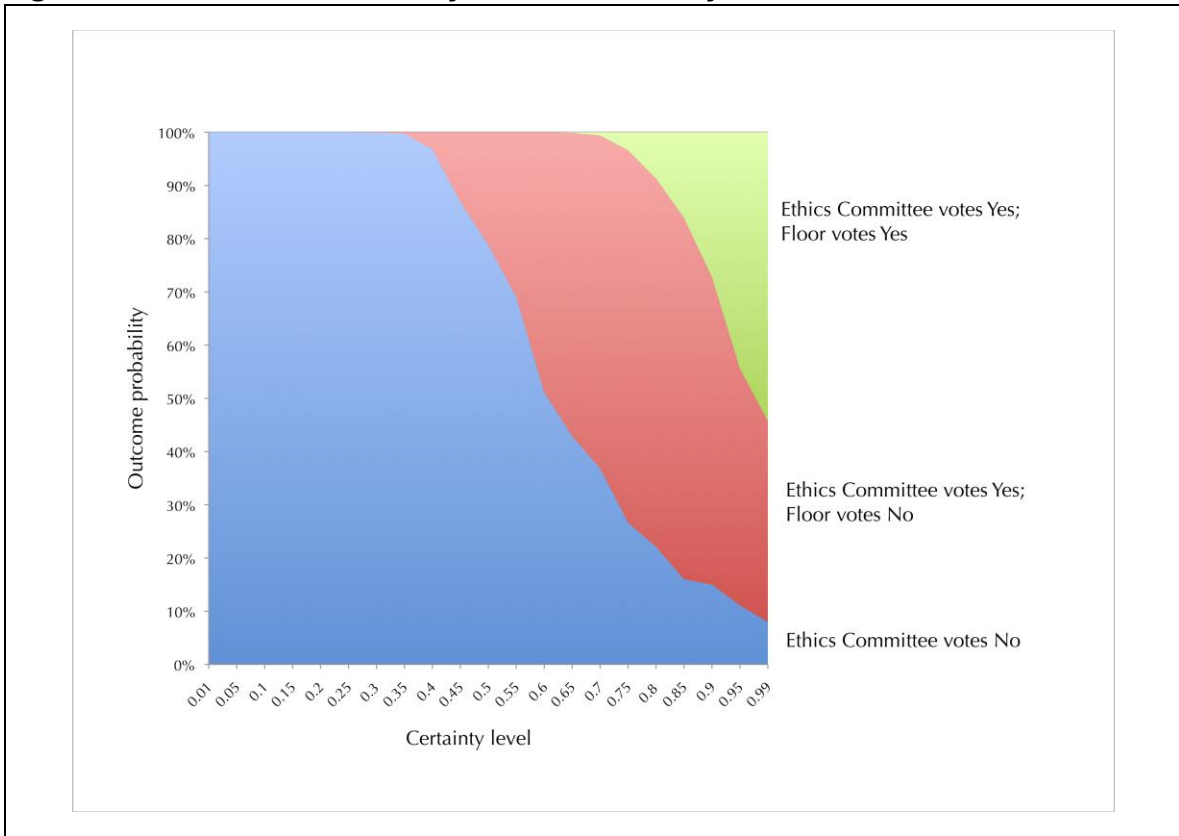
Parameters: Certainty = 0.9; Power = 0.23; the Ethics Committee is 89% clean, 9% dirty, and 3% tainted; Random =0.5; Certainty variation = -0.4; and Power variation = -0.8. Results are from 1,000 iterations of the model run at each percentage point.

Figure 4: Brazil's position on the accountability curve



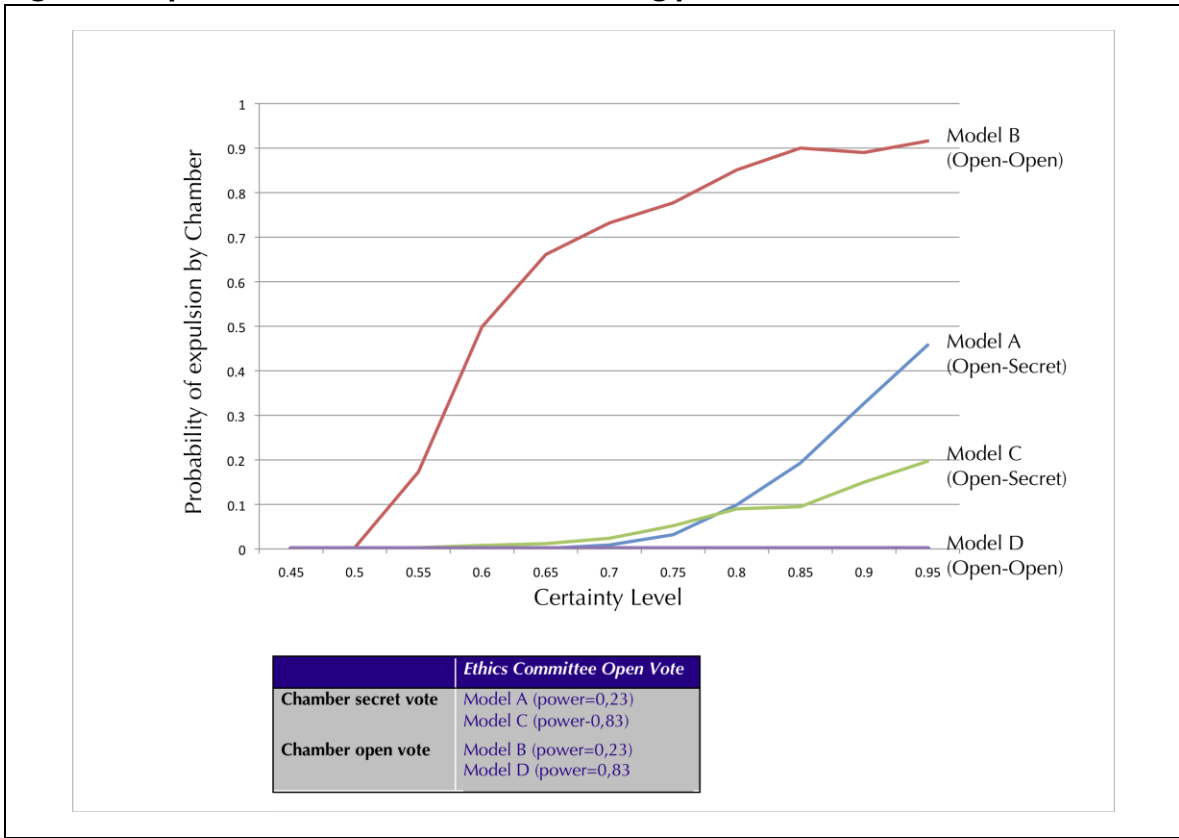
Note: Brazil's position today is calculated using a proportion of 83% clean, 12% dirty and 5% tainted. The function in the figure is defined on the basis of a constant increase/decrease in the proportion of clean deputies, with a concomitant increase/decrease in the proportion of tainted deputies. The proportion of dirty is held constant at 12% until Clean hits 87%. Parameters: Certainty = 0.9; Power = 0.23; an Ethics Committee composition of 89% clean, 9% dirty, and 3% tainted; Random = 0.5; Certainty variation = -0.4; and Power variation = -0.8. Results are from 1,000 iterations at each percentage point.

Figure 5: The Effects of Certainty on Accountability



Note: Based on the same parameters used in Figure 4, with the proportions of each type of deputy held steady at 83-12-5.

Figure 6: Expulsion votes under different voting procedures¹⁴



Appendix I: Descriptive Statistics, Section 2

Table A: Descriptive Statistics (Entire Chamber of Deputies)

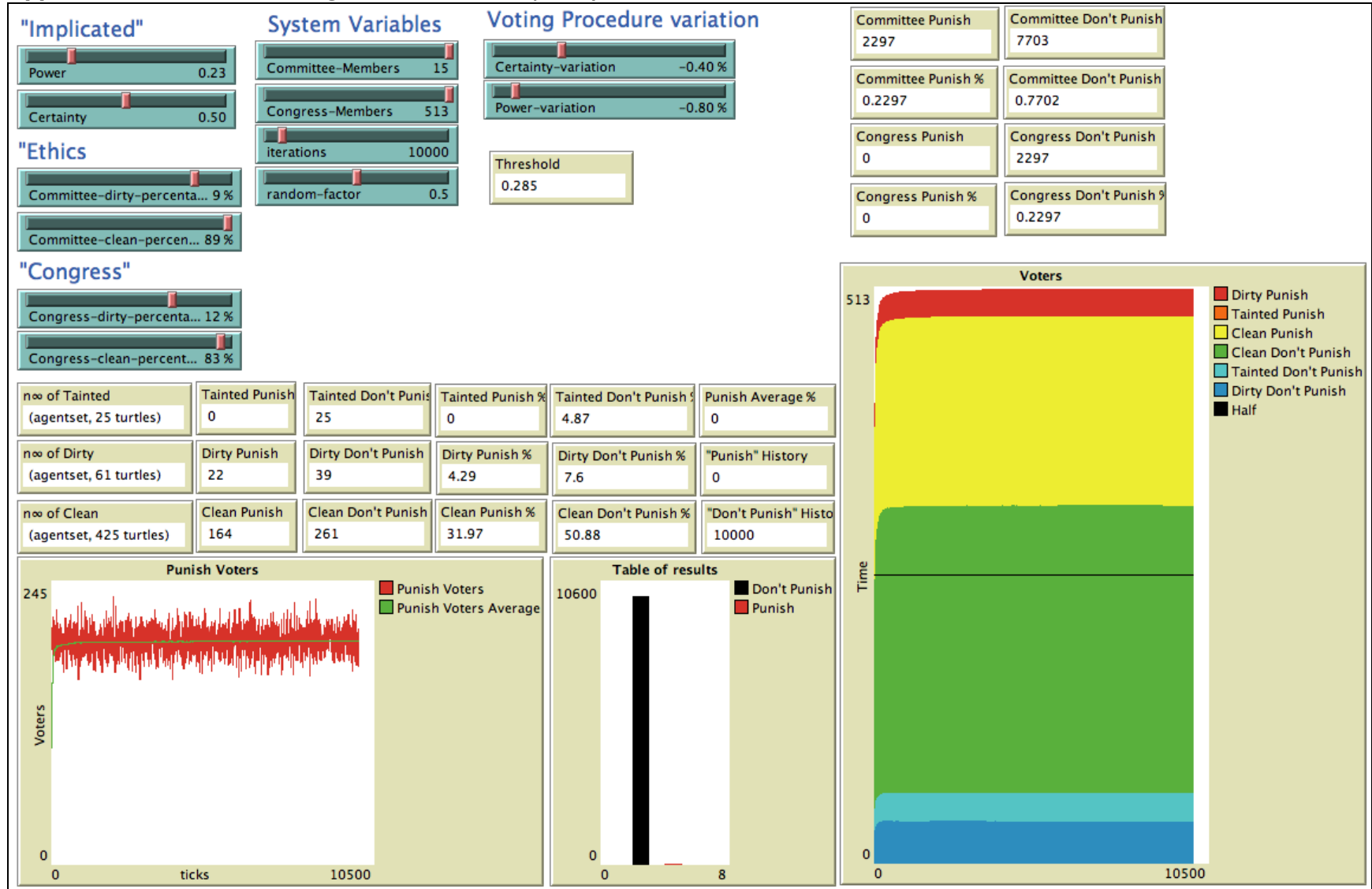
Variable	Obs.	Mean	Std. Dev.	Min	Max
Media	628	258.3933	909.4281	0	14310
Penalty	628	1.603631	5.926734	0	63
Party Leader	628	.0797448	.271114	0	1
Chamber Leader	628	.0621019	.585004	0	7
Votes	604	88159.41	86450.75	0	1573642
Campaign Expenditure	624	214480.2	222362.1	16.5	2531875
Budget Appropriation	628	.1011315	.1196338	0	.8580267

(*) Although there are only 513 deputies in the Chamber of Deputies at any given moment, a large number of deputies leave office to take up posts in state or federal government, and of course, some become sick or die in the course of their terms. In these cases, their position is filled by a so-called *suplente*. This explains the fact that we have 628 observations, rather than only 513.

Table B: Descriptive Statistics (Deputies investigated by the Ethics Committee)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Media	51	1398.059	2604.828	3	14310
Penalty	51	4.872549	11.30347	0	63
Party Leader	51	.1568627	.36729	0	1
Chamber Leader	51	.3137255	1.392698	1	7
Votes	50	91277.68	82878.99	0	556768
Campaign Expenditure	51	231598.9	166608.6	9933.98	673856.2
Budget appropriation	51	.1097138	.1232812	0	.4532159

Appendix II: Screenshot of Agent-Based Model (ABM)



Endnotes

¹ Accountability is an increasingly important object of academic research (e.g., Grant and Keohane 2005, Lederman et al. 2005, Mainwaring and Welna 2003, Przeworski et al. 1999; Schedler et al. 1999). Although accountability has many potential meanings (Philp 2009), perhaps its most important meaning with regard to political corruption is the answerability of public officials for the public-regardingness and probity of their actions. Political accountability can be imposed in at least four ways, which often interact. Accountability may be imposed through i) electoral sanctions, such as voters' unwillingness to reelect those accused of criminal behavior; ii) reputational sanctions, such as negative media coverage; iii) legal sanctions, such as criminal or civil penalties; or iv) political but non-electoral sanctions, such as congressional censure or removal from office (Power and Taylor, forthcoming). This last form of accountability is our focus here, to the extent that it can be isolated from the others.

² Although there have been some female politicians in Brazil accused of wrongdoing, men are still more prevalent in both politics and in wrongdoing. We hope our use of masculine nouns and pronouns in this paper will thus offend no one.

³ In theory, even a vote by the Chamber to acquit could be followed by prosecution in a court of law. In practice, however, once a decision has been made by the plenary, whether guilty or not, no further action by the courts is likely. This is the result of a complex set of special privileges guaranteed to politicians in the court system, coupled with judicial inefficiency. For an explanation of the factors contributing to the judiciary's weak accountability role, see Taylor (forthcoming).

⁴ The Internal Rules of the Brazilian Chamber of Deputies (*Regimento Interno*) allow the Ethics Committee to impose three types of penalties for legislators accused of violations of parliamentary decorum or administrative improbity: verbal or written censure, which can be effected by the committee itself; temporary suspension of legislative activities for 30 days; or permanent loss of legislative mandate (known as *cassação*, or expulsion). These last two penalties – suspension and expulsion – can only be enforced if they are approved by a plenary vote on the floor of the Chamber. All of the cases reviewed here were *cassação* cases.

⁵ In 7 of the 51 cases, the accused deputy resigned before the Ethics Committee could act. In another 4 of the 51 cases, either the Supreme Federal Tribunal or the Electoral Court acted before the Ethics Committee.

⁶ The “total penalty” variable sums the maximum terms that could be served for all crimes the deputy has been accused of, including those under discussion in the Chamber as well as any other crimes he has been charged with.

⁷ Chamber leader is coded as follows: 0=no position; 1=4th secretary; 2=3rd secretary; 3=2nd secretary; 4=1st secretary; 5=2nd Vice President; 6=1st Vice President; 7=President.

⁸ This result might also reflect a belief that once the electorate has “ratified” a candidate by electing him to office, it is not Congress' role to judge his past sins. As President Lula once said, with regard to the election of Fernando Collor (the impeached former President) to the Senate, “o maior juiz é o eleitor.” (“the greatest judge is the voter”) [Need citation]

⁹ The model allows the authors to set the proportions of “Dirty” and “Clean” legislators; the proportion of “Tainted” is calculated as the remainder, not shown in the screenshot.

¹⁰ Here, we calculate “dirty,” “clean,” and “tainted” legislators on the basis of the maximum number of years of jail time they would serve if convicted of all charges against them. “Clean” legislators face no jail time; “tainted” face anything above zero and less than 3 years; and “dirty” face anything above 3 years. The proportions of each type of legislator used in the ABM are based on this calculation from the 2003-2006 session of the Brazilian Chamber.

¹¹ In future, we will insert here a test of resignation decisions. That is, deputies who resigned before the CE voted on their future. Did they make the right decision, or not, according to the model?

¹² To do in next iteration: run tolerances for Graph 4: graph the same function under different Certainty values...

¹³ The only difference in the parameters is that we have changed the composition of the Ethics Committee to make it equivalent to the Chamber. Our reasoning is that this will eliminate the differential effects of the slightly cleaner Ethics Committee.

¹⁴ We do not analyze the possibility of secret voting procedures in the Ethics Committee because of a circularity problem: we have chosen the parameters of the ABM that most closely mirror the Brazilian case. To do so, we have included the variables "Certainty-Variation" and "Power-Variation", which attempt to compensate for the differences observed between the Ethics Committee and the Chamber. To simulate an open vote, we simply move those two variables to zero. But we do not know what the corresponding variables would be if the Chamber had open voting and the Ethics Committee used closed voting, and there is no way to reliably hypothesize what those would be.