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Essays and Experiments in Political Economy

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ESSAYS AND EXPERIMENTS IN POLITICAL ECONOMY

By

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I dedicate this to Jaclyn and Gabrielle – the loves of my life. Every day with you is heaven.
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ABSTRACT

This dissertation presents three papers that can be generally categorized as political economy. Though they differ in topic and methodology, a unifying theme is accountability. The first two papers focus on political accountability and the factors that influence a voter’s decision to hold representatives responsible for their choices. Such factors include seniority advantage, information, and pork barrel spending. The third paper offers a look at the effects of a lack of accountability among police forces in Rio de Janeiro’s favelas and the peculiar institution that has arisen as a result.

In the standard principal-agent relationship, a promise of long-term employment is considered a tool for ensuring quality performance on the part of the agent; however, in the political realm, the benefits that voters experience by having a senior politician empower the agent. I have constructed models to separately test the implications of term-limits as well as the information available to voters using laboratory experiments. In theory, term limits are meant to reduce the cost of replacing a senior incumbent who shirks. They should also dampen the effects of redistributive pork-barrel spending. I find that seniority is highly influential in voters’ decisions even when incumbents support policies the median voter does not agree with. Nonetheless, voters do respond to shirking as well as the reduced cost of replacing an incumbent when terms are limited; however, term limits do nothing to overcome the collective action problem inherent in politics. Despite the individual voter response to shirking and term limits, reelection rates of shirking incumbents are not affected.

Revealing information about incumbents’ choices is usually assumed to benefit voters, but seniority advantage is costly to give up. This might imply that voters disregard such information. We might also assume that information revelation should influence an incumbent’s decision to shirk unless they are confident seniority insulates them from retribution. Results suggest that voters are significantly more responsive to incumbent shirking when information improves under certain conditions. Moreover, incumbents are less likely to shirk when voters are informed, but simply informing voters about their own incumbent’s decisions is not enough to encourage accountability. I find that voters are more responsive when they can compare their own incumbent’s behavior to others in the legislature. This provides a benchmark that allows them to compare their outcome to the overall norm. It also influences incumbent behavior. Although shirking does not completely cease, incumbents appear to be concerned with not being the worst offender which leads to a decrease in the negative impact on voters.
The third paper investigates the peculiar relationship between drug dealers, police and missionaries found in the favelas of Rio de Janeiro. Despite having socio-political control drug factions allow peace workers, like missionaries and NGOs, to operate in their territories. The objective is to explain why violently powerful dealers allow the presence of competitive rivals who offer a substitute good. A model is developed that does not rely on irrationality or perverse forms of altruism. Instead, it suggests that dealers allow missionaries to work in the favelas to avoid costly conflict with corrupt police forces. Police are feared and distrusted by favela residents due to brutality and criminality. If the police have not run factions out of a favela and taken over illegal activity completely, they collect payment from local faction leaders in exchange for permission to sale drugs and arms. Attempts to gain control of profitable territories make deadly skirmishes frequent. Innocent residents fall victim to this violence, but police action is rarely investigated and holding those involved accountable is even rarer. Instead, victims are reported to be involved in the drug trade, which the media and upper-classes accept despite protest by favela residents. I argue that this secrecy would not be possible if a missionary was a victim of such conflict. Because defense is costly, perhaps more so than the cost of losing customers from missionary efforts, drug factions rationally allow these rivals to operate to prevent police forces from attempting to take over territory.

In summary, accountability affects the relationship between citizen and state. This work is a positive analysis of this connection, but we are naturally led to ask normative questions. If issues like seniority and pork-barrel spending discourage voters from holding agents responsible for actions, what can we say about the condition of representative government? When citizens are abandoned by the state and no longer have police protection, can they truly rely on criminal factions to uphold social order, regardless of their tactics or motives?
CHAPTER ONE

UNIFYING THEME

This dissertation combines different papers that are a direct result of course work leading to the completion of my degree. Field courses give students a taste of previous work in specific areas. The research questions in these papers are ones that I found previous research could not answer, therefore they stem from personal interest and experience. The topics are wide ranging as is the methodology, thus this is an attempt to underline a unifying theme. That theme is accountability.

1.1 Introduction

The underlying theme of the three papers presented here is accountability. Overall, the papers fit into the general field of political economy; however, this is such a broad description that it does not present a clear unifying theme. The application or setting varies although two of the papers on political accountability are closely related. These projects are meant to understand the factors that impact a voter's decision to hold a representative agent accountable for their actions. Therefore they address the endogenous determination of accountability. Theories are developed and tested in the laboratory using incentivized subjects acting as voters and legislators. In general, powerful legislators who can provide transfers for their voters can be self-serving in ways that adversely affect voters.

The third paper looks at the effects of a lack of accountability within the destitute neighborhoods around Rio de Janeiro known as favelas. These neighborhoods are home to rival drug factions that are constantly seeking to expand and maintain territory. The factions not only face competition from each other but corrupt police forces as well. The lack of accountability for police actions means that citizens are never safe although factions do enforce social order. I argue that factions have responded to corrupt police forces by allowing missionaries to operate in the favelas to deter the police from attempting violent takeovers.

1.2 Political Accountability
The two elements examined here that influence a voter’s decision to hold a representative agent accountable are seniority and information. Seniority in Congress creates an advantage in pork-barrel legislation and distorts voter incentives (Plott 1968; Fiorina 1989; Dick and Lott 1993; Friedman and Wittman 1995; Knight 2002; Bernhardt, Dubey and Hughson 2004; Chen and Niou 2005). It potentially creates a collective action problem where voters tolerate shirking, such as poor policy representation, by reelecting incumbents because of the implicit cost of foregone federal spending in their district or state i.e. pork (Dick and Lott 1993; Bernhardt et al. 2004). The strategic implications of seniority were first recognized by McKelvey and Riezman (1992) where they showed that legislators have the incentive to institute seniority to prevent legislator turnover. In theory, recurring competitive elections, promises of long-term employment and the ability to monitor legislator behavior would solve the principal-agent problem, but using tenure as an allocation mechanism for political benefits encourages the principal to lower her performance standard. Seniority is modeled similarly here as senior incumbents have an advantage in providing pork.

This project uses a controlled environment to determine whether subjects react to these incentives in the laboratory and whether term limits increase a voter’s willingness to vote against an incumbent by reducing the implicit cost of replacing a senior legislator. I also test whether they are effective at reducing the asymmetrically redistributive nature of pork barrel legislation.

In the lab subjects are divided into districts and act as legislators and voters. Legislators set taxes that fund pork barrel projects, which are awarded according to seniority, and vote on policy. Abortion was chosen as the policy issue that would compete with the monetary incentives subjects faced. I hoped to employ what Zajone (1980) refers to as hot cognitions by introducing affect into the voters’ decision process and provoking feelings without requiring them to think much about their preference and why they may or may not identify with a legislator’s choice.

Legislators choose policy through the novel use of donations to pro-life and pro-choice foundations, where legislators vote to determine the recipient. Survey data on subjects’ preferences were used to structure districts so that voters begin the treatments with incumbents who have opposing preferences to their own, but they are not informed of legislator preferences ex-ante. They are only able to determine this through policy choices. Voters determine whether incumbents stay in office or are replaced by an unproven challenger where the underlying model predicts that voters concerned with monetary payoffs reelect incumbents regardless of policy choices in order to maintain an advantage in pork barrel spending. Term limits are imposed with the expectation that the voters become more willing to hold incumbents accountable for policy choices as the cost of
replacing an incumbent legislator decreases. The distribution of income is also predicted to equalize across districts as term limits cap seniority advantage.

I find that incumbents do not take full advantage of seniority when voting on policy and that voters respond to shirking when it is relatively inexpensive to do so. When terms are not limited, reelection rates for senior incumbents who vote against district majorities are high but are slightly lower than those senior incumbents who vote with the district majority. An important result of the paper is that legislator shirking decreases an individual voter’s likelihood of voting for the incumbent, but reelection rates are unaffected. This highlights the importance of the electoral process in aggregating individual decisions. Term limits do significantly affect the individual decision to vote for senior incumbents who vote against the district majority, but this effect does not manifest itself in reelection rates. Finally, it is likely that term limits do impact the distribution of income resulting from pork barrel spending.

Another form of shirking that makes an appearance in the second paper is legislators’ use of tax dollars. The Treasury Department reports that Congress has spent approximately $110.5 million on foreign travel since 2001 on fact finding trips to various places like Italy or the Great Barrier Reef in Australia (Singer 2010).\(^1\) Overall, spending on overseas travel is up ten-fold since 1995 (Mullins and Farnam 2009). Bloated budgets for office décor and the exclusive VIP wing at Walter Reed hospital have also received attention (Sepp 2000, Zoroya 2007). Before the 2010 midterm elections growing anti-government sentiment led the House to take modest steps with regard to spending, but nothing has been done in the Senate. Yet reelection rates have averaged ninety-five percent in the U.S. House since 1972 (Friedman and Holden 2009), and many point to incumbents’ ability to secure pork barrel projects as one of the largest reasons why (Fiorina 1977, Mayhew 1974, Levitt and Snyder 1997). In the 2010 re-election rates were 87% in the House and 84% in the Senate, but 75% of Gallup poll respondents disapproved of Congress (Saad 2011). Voters are not necessarily inconsistent if they approve of their own legislator while disapproving of the actions of the legislature as a whole, but it may indicate voters’ dissatisfaction with the inherent moral hazard problem in politics. The moral hazard problem is modeled as legislators forcing voters to shoulder the burden of privately enjoyed benefits, but the model can be applied to any legislator’s effort decision that may adversely impact voters.

In addition to seniority, the central element to the experiments is voter information. Electoral accountability hinges on voter information. It is possible that shirking occurs because of

\(^1\) This does not include travel to war zones in Iraq and Afghanistan (Singer 2010).
the usual rational ignorance and collective action problems in politics. Voters lack the incentive to become informed because of their infra-marginality and lack incentive to act even if they are informed because personal costs are low relative to system wide costs. Experiments are useful in that they allow control over the information voters can access. Experimental results suggest that voters predictably respond to the incentives created by seniority which trumps any effect from information revelation except when voters are able to compare their incumbent’s behavior to that of other incumbents. Legislators take advantage of their seniority, but not to the extent predicted by the model. Their tendency to shirk is also affected by the information treatments.

1.3 Lack of Accountability

The first two papers use experiments to test theory. The third paper looking at the lack of accountability in slums of Rio de Janeiro uses anthropological evidence as well as game theory to build a case explaining why missionaries, who discourage drug use and drug-gang life, are allowed to work in the territories that factions defend so violently. Drug factions hold a powerful advantage in the one-thousand plus favelas, or shanty towns, around the city of Rio de Janeiro. These communities are expansive and improvised extension of the city where government is largely absent except for the militaristic attacks by police (da Silva 2000, Dowdney 2003). This absence has created a hole that has been effectively filled by local drug factions.

Despite this control, it is extraordinary to consider the presence of various groups working to improve the lives of favela residents. The goals of these organizations are hardly consistent with the factions’ goals. The noticeable presence of local and international missionaries openly working to keep residents off drugs and persuading soldados (soldiers) to leave the factions is intriguing. The fact that these groups are allowed to openly operate in the favelas seems to be a paradox in light of the tremendous control exhibited by the drug factions. In a way this is akin to an incumbent oligopolist allowing a producer of a substitute good to operate freely within its market. This paper attempts to explain this arrangement between the drug factions and missionaries. I propose a model that includes corrupt military police as a key component to this relationship. Because police do not face accountability for their actions in the favelas that involve local residents, corruption and brutality is widespread. However, I argue that the potential cost of inadvertently involving a missionary in an attack on a drug faction is extremely high. Because factions face heavy costs from conflict with
police due to their war grade weaponry, they allow missionaries to operate in the favelas to discourage attack from crooked police forces.

1.4 Conclusion

This dissertation presents three papers that can be generally categorized as political economy. Though they differ in topic and methodology, a unifying theme is accountability. The first two papers focus on political accountability and the factors that influence a voter’s decision to hold representatives responsible for their choices. Such factors include seniority advantage, information, and pork barrel spending. The third paper offers a look at the effects of a lack of accountability among police forces in Rio de Janeiro’s favelas and the peculiar institution that has arisen as a result. A general result is that principals, modeled here as voters and citizens in general, are better off when agents, legislators and police, are accountable.
CHAPTER TWO

VOTER BEHAVIOR AND SENIORITY ADVANTAGE IN PORK BARREL POLITICS

This paper uses experiments to investigate whether a legislative system favoring seniority leads voters to choose pork barrel transfers over policy representation. Term limits are considered as a mechanism to reduce the cost of electing a junior legislator who better represents voters on policy, as well as reduces the resulting asymmetric distribution of income. The issue of abortion is used innovatively to capture incumbents’ policy choice where subject legislators vote to determine how a donation is allocated to either a pro-choice or pro-life foundation.

2.1 Introduction

Seniority in Congress creates an advantage in pork-barrel legislation and distorts voter incentives (Plott 1968; Dick and Lott 1993; Friedman and Wittman 1995; Knight 2002; Bernhardt, Dubey and Hughson 2004; Chen and Niou 2005). First, it potentially creates a collective action problem where voters sacrifice representation on policy issues by reelecting incumbents because of the implicit cost of foregone federal spending in their district or state i.e. pork (Dick and Lott 1993; Bernhardt et al. 2004). Second, competition for pork leads to frequent reelection of incumbents causing a redistribution of income to districts with senior legislators (Friedman and Wittman 1995; McKelvey and Riezman 1992, Muthoo and Shepsle 2010).

This project uses a controlled environment to determine whether subjects react to these incentives in the laboratory and whether term limits increase a voter’s willingness to vote against an incumbent by reducing the implicit cost of replacing a senior legislator. I also test whether they are effective at reducing the asymmetrically redistributive nature of pork barrel legislation.

In the lab subjects are divided into districts and act as legislators and voters. Legislators set taxes that fund pork barrel projects, which are awarded according to seniority, and vote on policy. Abortion was chosen as the policy issue that would compete with the monetary incentives subjects faced., I hoped to employ what Zajonc (1980) refers to as hot cognitions by introducing affect into the voters’ decision process and provoking feelings without requiring them to think much about
their preference and why they may or may not identify with a legislator’s choice. It is also a topic about which even politically uninformed individuals have a distinct opinion. Voters could express their preference or suppress it in favor of collecting the monetary reward. As Zajonc argues, affect is inescapable, but it is possible for individuals to control their expression.

Legislators choose policy through the novel use of donations to pro-life and pro-choice foundations, where legislators vote to determine the recipient. Survey data on subjects’ preferences were used to structure districts so that voters begin the treatments with incumbents who have opposing preferences to their own, but they are not informed of legislator preferences ex-ante. They are only able to determine this through policy choices. Voters determine whether incumbents stay in office or are replaced by an unproven challenger where the underlying model predicts that voters concerned with monetary payoffs reelect incumbents regardless of policy choices in order to maintain an advantage in pork barrel spending. Term limits are imposed with the expectation that the voters become more willing to hold incumbents accountable for policy choices as the cost of replacing an incumbent legislator decreases. The distribution of income is also predicted to equalize across districts as term limits cap seniority advantage.

I find that incumbents do not take full advantage of seniority when voting on policy and that voters respond to policy choices when it is relatively inexpensive to do so. When terms are not limited, reelection rates for senior incumbents who vote against district majorities are high but are slightly lower than those senior incumbents who vote with the district majority. Junior incumbents who vote against the district majority, on the other hand, are reelected at a significantly lower rate than both senior incumbents in general and junior incumbents who vote with the district majority. An important result of the paper is that legislator shirking decreases an individual voter’s likelihood of voting for the incumbent, but reelection rates are unaffected. This highlights the importance of the electoral process in aggregating individual decisions. Term limits do significantly affect the individual decision to vote for senior incumbents who vote against the district majority, but this effect does not manifest itself in reelection rates. Finally, it is likely that term limits do impact the distribution of income resulting from pork barrel spending.

The following section provides a brief summary of previous research. After that, section 2.3 contains the model showing a sub-game perfect equilibrium exists where senior incumbents are always reelected regardless of policy choice when terms are unlimited. Introducing term limits into the model improves policy representation under certain conditions. Careful attention is devoted to
the experimental design where procedures and hypotheses are explained in section 2.4. Results follow in section 2.5 and a summary concludes.

## 2.2 Background

Structuring a contract that aligns principal and agent interests is challenging. In theory, voters can do this through the competition of recurring elections and reward of long-term employment; however, when tenure becomes an allocation mechanism for political benefits, the principal may be inclined to lower her performance standard. That is, the principal and agent’s interests are no longer aligned and the constitutionally established method of inducing acceptable effort is no longer effective (Barro 1973, Ferejohn 1986). Evidence suggests that shirking occurs and increases as the principal-agent bond between voter and legislator weakens (Kalt and Zuppan 1990).²

Fiorina (1989) described the evolution of Congress in which lawmaking became risky and pork became a “pure profit” activity (see also Mayhew 1974; Weisberg, Heberlig and Campioli 1999; Lopez 2002). In the distributive theory of government, seniority is an advantage due to experience, committee leadership, and agenda power (Weingast and Marshall 1988; Lopez 2003; Muthoo and Shepsle 2010). Alvarez and Saving (1997) find strong evidence that committee membership on what they call “prestige” and “constituency” committees significantly increases spending in home districts.³ As Calamita (1991) wrote, “…[C]ommittee and subcommittee chairmen are often powerful enough to single-handedly land their district or state significant amounts of federal jobs and money.”⁴

McKelvey and Riezman (1992) were arguably the first to frame seniority as a strategic advantage in reelection. Seniority provides incumbents with an asset that no challenger can trump (Muthoo and Shepsle 2010). Models in this vein use the concept of Markov subgame perfect

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² There are several challenges to capturing the phenomenon empirically. First, it is difficult to truly measure electorate preferences as well as differentiate the geographic constituency from the electoral constituency whose vote is decisive. Deviations from general constituent interests are a necessary but not a sufficient condition for there to be shirking. Secondly, the traditional method of capturing the influence of an incumbent’s preferences, or ideology, on their voting record with the residual from a first stage ideology regression likely suffers from multicollinearity problems, omitted variable bias, and measurement problems (Bender and Lott 1996). This provides justification for the use of experiments where the relevant constituency is identifiable and shirking is measurable as are preferences.

³ The prestige committees include Appropriations, Budget, Rules and Ways and Means. The constituency committees include Agriculture, Armed Services, Interior, Merchant Marine, Public Works, Science, Small Business, and Veterans’ Affairs.

⁴ Calamita uses the example of Senator Robert Byrd who was able to transfer facilities of the FBI, CIA, Bureau of Alcohol, Tobacco and Firearms, Bureau of Public Debt, and IRS from Washington D.C. to West Virginia.
equilibrium to find endogenously instituted seniority and no legislator turnover. Legislative bargaining models featuring ideology imply that senior legislators use their advantage to buy votes and impose their ideology while never losing reelection (Baron and Ferejohn 1989, McKelvey and Riezman 1992, Jackson and Moselle 2002). Theoretical and experimental work on valence advantages, which are a type of psychological attachment by voters, has shown that advantaged incumbents move closer to their preferred policy as the advantage increases (Stokes 1963; Feld and Grofman 1991; Wittman 1983; Ansolabehere and Snyder 2000; Groseclose 2001; Aragones and Palfrey 2002, 2004, 2005). These studies corroborate well with the evidence that winning incumbents are farther away from the median voter as a group compared to challengers of both major parties, and that incumbents in non-marginal districts are closer than the challenger to the median less often but almost always win (Achen 1978, Sullivan and Uslaner 1978).

“Voting the bums out” comes at the high cost of foregone pork and term limits have been proposed as a solution to the collective action problem that voters face. Simultaneously high reelection rates and low approval ratings of Congress as a whole are suggestive of the high cost of kicking out an incumbent (Erikson and Wright 2005; Elhauge, Lott, and Manning 1997). Reelection rates in the 2010 elections were 87 percent in the House and 84 percent in the Senate, while Gallup polls show that 75 percent of respondents disapprove of Congress as a whole (Saad 2011). Approving of one’s legislator while disapproving of the legislature as a whole is not necessarily inconsistent, but these results might suggest dissatisfaction with a system that encourages strategic reelection of incumbents who does not truly represent the electorate. Further evidence of the collective action problem is the fact that the twenty-three states that unilaterally imposed congressional term limits between 1990 and 1995 used trigger clauses calling for a certain number of states to likewise impose limits before implementing them. The reality that twenty-seven states did not pass term limit amendments is an indication of the free riding involved (Elhauge, Lott and Manning 1997).5

This suggests that economic outcomes are incorporated into the voter calculus (Kramer 1971; Fiorina 1978; Lau and Sears 1981; Kiewiet and Rivers 1984, Stein and Bickers 1994, Alvarez

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5 Empirical analysis of state legislatures suggests term limits limit incumbents’ ability to promise service and favors leading to less campaign contributions and more competitive elections (Daniel and Lott 1997; Moncrief, Niemi and Powell 2004). This correlates well with the finding that incumbents in their final term spend significantly less time and effort acquiring district specific benefits and pork (Carey, Niemi and Powell 1998). Besley (2006) finds that governors in their final term are significantly more congruent to the electorate, suggesting a selection effect where those governors that make it to their last term are only those that perform according to electorate standards. We might infer from this an increased willingness of voters to not reelect a powerful incumbent. For a review of empirical work involving term limits see Besley (2006) and Morton (2006).
and Saving 1997, Levitt and Snyder 1997, Gomez and Wilson 2001, Arceneaux 2006). Here I argue that voters are both retrospective and prospective in vote choice. They are prospective in the sense that they look forward to future pork, but are simultaneously retrospective when considering legislators’ policy choices. Overall, the aim of this project is to add to this existing literature by using a novel experimental design testing voters’ reactions to seniority advantage in pork barrel legislation and policy choice. Term limits are proposed as a mechanism to cap seniority advantage, reduce the cost of electing a new legislator who better represents the electorate on policy issues and reduce the asymmetric distribution of pork.

2.3 The Model

The model is a three period problem describing the incentives voters and incumbents encounter with and without term limits. Incumbents are assumed to seek reelection, to influence policy, and to enjoy the perquisites of office. Voters respond to policy as well as transfers that are dependent on the incumbent’s seniority status. Challengers do not assume an active role within the model, but the existence of an alternative to the status quo is sufficient to incentivize incumbents. Some simplifications are made in explaining the model in order to form a concept of what to test experimentally.

Suppose there is an odd number of districts, $D$, and each has a legislator, $L_d$. Each district has $N_d$ voters which is the same for all $d = \{1, \ldots, D\}$. Incumbents vote on the policy issue $y$ and are differentiated in the legislature by, $e_d$, which is equal to their continuous tenure in office. This leads to the first critical assumption.

**Assumption 1:** The incumbent from each district is either senior or junior based on the variable $e_{dt}$ that measures tenure. That is,

$$s_{dt} = \{\text{senior if } e_{dt} \geq e_m\} \cup \{\text{junior otherwise}\},$$

where $e_m$ is the median tenure among all incumbents.
This assumption precludes the possibility of voters competing to have a more senior incumbent among the junior set, which admittedly may have important implications on the model’s conclusions.\(^6\)

Voters are assumed to be risk neutral utility maximizers whose single period payoff is based on government transfers and policy choice:

\[
U_{i dt} = c_{i dt}(s_{dt}) - \alpha |y_{i dt} - \hat{y}_{dt}|
\]  

(2.1)

The term \(c_{i dt}(s_{dt})\) indicates the consumption good that is a function of the incumbent’s seniority status. The term \(\alpha\) is the relative weight that the voter places on the policy issue. The legislator’s policy vote is \(\hat{y}_{dt}\) and the voter’s preferred policy is \(y_{i dt}\).

**Assumption 2:** The policy issue is a binary set. That is \(y_{id} = \{0, 1\}\). Preferences are independently and identically distributed where the median preference is \(y_{md}\) and \(\sigma_{yd}\) is the variance. The use of Euclidean policy preferences implies the median voter is decisive. Therefore \(N_a = N_{a0} + N_{1a}\) indicates the number of district voters on either side of the policy issue. In a world without transfers a candidate who supports (opposes) the policy would be elected if \(N_{1a} > N_{0a}\) \((N_{1a} < N_{0a})\).

**Assumption 3:** The relative weight of the policy issue, \(\alpha\), is equal across all voters.

This is a vital assumption that allows us to remain in a single dimension policy space and rely on the median voter theorem to locate the pivotal voter in each district. This leads to the following lemma.

**Lemma 1:** All voters share the same \(\alpha\) and the median voter on the policy dimension is pivotal.

**Proof:** This follows simply because \(\alpha\) is a multiplicative constant that affects each voter equally.

**Assumption 4:** Voters from a senior district enjoy positive transfers which the voters from junior districts finance.\(^7\) That is, \(c_{id}(\text{senior}) = T\) and \(c_{id}(\text{junior}) = 0\).

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\(^6\) Dick and Lott (1993) elaborate on this competition, but do not model it specifically.

\(^7\) The experimental design features a tax equal to the full voter endowment. Legislators vote to determine if voters are taxed. This part is in the background of the model for simplification. The structure of the tax benefits and seniority implies that the tax should always pass. This assumption is inconsistent with the theory of universalism where logrolling

11
Legislators are risk neutral utility maximizers whose single period preferences are based on perquisites of office and policy:

\[ U_{dt} = W - \beta |\gamma_{dt} - \hat{y}_{dt}| \]  

Thus, in choosing a policy, legislators are not simply maximizing the probability of reelection but care about policy as well (Wittman 1983). Here the preference is homegrown, but the model and implications would work equally well using special interests influence. The term \( W \) is the legislator’s wage and other perquisites while in office. The term \( \beta \) is the relative weight that the legislator places on the policy issue where \( \hat{y}_{dt} \) is his policy vote and \( \gamma_{dt} \) is his preferred policy choice. This leads to another simplifying assumption.

**Assumption 5:** There exists a pool of legislators who are “campaigning” to take office. Legislators who lose reelection enter back into this pool campaigning to take office somewhere else. Legislators in office earn a salary of \( W \) and those campaigning earn a salary of \( w \). It is assumed that \( W > w \) to reflect the incentives and material advantages incumbents have over challengers as well as the perquisites only enjoyed in office.

Each period of the game has two stages.\(^8\) In the first stage, legislators vote on policy. In the second stage, voters see their legislator’s choice and vote whether to re-elect him or elect an unproven challenger. A world with seniority but without policy would essentially be that found in McKelvey and Riezman (1992) and Muthoo and Shepsle (2010) without senior legislator turnover. This relies on allowing for weakly dominant strategies where a pivotal voter in a senior district is clearly worse off by electing a challenger and a pivotal voter in a junior district is indifferent between a junior incumbent and a newly “minted” challenger with the same influence in the legislature (see Muthoo and Shepsle 2010 for a nice exposition of both models).

Adding the policy issue creates a more difficult problem. The weight \( \alpha \) in the voter utility function is crucial in showing that equilibrium exists where there is no legislator turnover. First I will show that when the pivotal voter is less than certain about change in legislative seniority there is a

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\(^{8}\) Once again, the experiment includes another dimension to the legislators’ role where the first stage involves legislators voting whether or not to tax voters to provide transfers to those in senior districts. This part is bypassed here for exposition purposes.
range for $\alpha$ in which she chooses a senior incumbent regardless of his policy choice but will choose the challenger over a junior incumbent who votes against her policy preference. I will also show that there exists a range of $\alpha$ where the pivotal voter will choose the senior incumbent who votes against her policy preference when terms are not limited but chooses the challenger under term limits.

Table 2.1: Voter strategies and Payoffs

<table>
<thead>
<tr>
<th>Case 1: No Term Limits</th>
<th>Incumbent in period 1 is senior and votes against the policy preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td><strong>Payoff over three periods</strong></td>
</tr>
<tr>
<td>$I$</td>
<td>$(1 + \gamma + \gamma^2) (T - \alpha)$</td>
</tr>
<tr>
<td>$A$</td>
<td>$(\gamma + \gamma^2) q_{id} T$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case 2: No Term Limits</th>
<th>Incumbent in period 1 is junior and votes against the policy preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td><strong>Payoff over three periods</strong></td>
</tr>
<tr>
<td>$I$</td>
<td>$(1 + \gamma + \gamma^2) (q_{id} T - \alpha)$</td>
</tr>
<tr>
<td>$A$</td>
<td>$(\gamma + \gamma^2) q_{id} T$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case 3: Term Limits</th>
<th>Incumbent in period 1 is senior and votes against policy preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td><strong>Payoff over three periods</strong></td>
</tr>
<tr>
<td>$I$</td>
<td>$(1 + \gamma) (T - \alpha)$</td>
</tr>
<tr>
<td>$A$</td>
<td>$(\gamma + \gamma^2) q_{id} T$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case 4: Term Limits</th>
<th>Incumbent in period 1 is junior and votes against policy preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td><strong>Payoff</strong></td>
</tr>
<tr>
<td>$I$</td>
<td>$(1 + \gamma) (q_{id} T - \alpha)$</td>
</tr>
<tr>
<td>$A$</td>
<td>$(\gamma + \gamma^2) q_{id} T$</td>
</tr>
</tbody>
</table>

The strategy space $\nu$ for voters includes two strategies: $I = \text{always vote for the incumbent}$ and $A = \text{vote for the incumbent if he agrees on policy}$. Voters are allowed to play different strategies
based on the state of the world where the state consists of the seniority of the incumbent and whether terms are limited or not. Table 2.1 lists the pivotal voter’s payoffs beginning from period one of the three period game when the incumbent votes against her policy preference in the first period. Cases are separated by seniority and the use of term limits. It is a dominant strategy for a voter to reelect an incumbent who votes for her preferred policy, thus in the table it is assumed the incumbent in period one votes against voter preference. An elected challenger is assumed to have a majority preference and to be junior in his first term meaning that the voter does not receive a transfer in the first term with a newly elected legislator. The voter holds belief $q_{ld}$ that the challenger will become senior after his first term if reelected. In cases 3 and 4 term limits are imposed in the third period meaning that voters can keep the incumbent for periods one and two but are forced to elect a newly “minted” legislator without seniority in the third period.

Notice that imposing term limits simply restricts the voter’s payoff from using strategy $I$ because she cannot elect the incumbent in the third period when the term limit is imposed. We will now find the conditions required on $a$ to determine what strategy will be chosen in each case.

The pivotal voter plays strategy $I$ if and only if Condition 1 (C1) holds:

$$\alpha < \left(1 - \left(\frac{y+y^2}{1+y+y^2}\right)q\right)T$$

(2.3)

Similarly, for Case 2 the pivotal voter uses strategy $I$ if and only if Condition 2 (C2) holds:

$$\alpha < \frac{q}{1+y+y^2}T$$

(2.4)

Comparing C1 to C2 shows by simple algebra that as long as $q < 1$ then C2 is more restrictive; otherwise they are equal. This leads to the first result.

**Result 1:** As long as voters are less than certain ($q < 1$) that changes in seniority are likely to occur, there exists a range of $\alpha$ where the pivotal voter will prefer a senior incumbent regardless of policy choice when terms are not limited, but will choose the challenger over a junior incumbent who shirks.

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9 To see why this is sensible suppose that the legislator holds the minority preference and determines that in the first period he can maximize his period payoff by voting against the district majority. If he is reelected, he has no reason to then vote with the majority in the periods thereafter. However, it is necessary to justify ignoring the possibility that the incumbent votes with the district majority in the first period, but changes his vote in later periods. A legislator that votes with the majority might suspect he can get away with voting against the majority after being reelected in the first period, but this does not change the voter’s choice of strategy because any strategy that maximizes utility conditional on $a$ in the three period case above would be optimal in a condensed version beginning in the period that the incumbent changed his vote.
Figure 2.1 shows $\alpha$ as a real valued number bounded below by zero. Along the line $C2$ marks Condition 2, likewise $C1$ marks Condition 1. If $\alpha$ is below $C2$, the voter prefers a senior incumbent regardless of his policy choice. If it lies above $C1$ then she always prefers a challenger over a senior incumbent who votes against her policy preference. Above $C2$ the voter prefers to elect the challenger if the current incumbent is junior and shirks. Consequently, if $\alpha$ is between $C2$ and $C1$ voters will re-elect any senior incumbent, but only elect junior incumbents who vote for her preferred policy.

![Figure 2.1: Range of $\alpha$ showing Conditions 1 and 2](image)

Now we can compare the conditions on $\alpha$ under term limits beginning with Case 3. The pivotal voter chooses $I$ over $A$ if and only if Condition 3 ($C3$) holds:

$$\alpha < (1 - \gamma q)T$$  \hspace{1cm} (2.5)

For Case 4 it can be shown that the voter chooses $I$ and $A$ if and only if Condition 4 ($C4$) holds:

$$\alpha < (1 - \gamma)qT$$  \hspace{1cm} (2.6)

A comparison of $C3$ and $C4$ shows that the latter is more restrictive, which implies that as long as $q < 1$ then there are voters who will keep a senior incumbent who shirks but not a junior one under term limits. The second result is similar to the first but applies when term limits are used.

**Result 2:** long as voters are less than certain ($q < 1$) that changes in seniority are likely to occur, there exists a range of $\alpha$ where a voter will prefer to hold onto a senior incumbent regardless of policy choice when terms are limited, but will choose the challenger over a junior incumbent who shirks.

The next result is the motivation of this paper. Comparing $C1$ to $C3$ shows that the latter is more restrictive. Of course, these conditions apply under two different election rules, but the importance of this result is that it allows for the possibility of equilibrium where voters hold on to
senior incumbents regardless of policy choices when terms are not limited, but are not so lenient when terms are limited.

Result 3: There exists a range of \( \alpha \) where a voter will prefer to hold onto a senior incumbent regardless of policy choice when terms are not limited, but will choose the challenger over a senior incumbent shirks when terms are limited.

Figure 2.2: Range of \( \alpha \) showing Conditions 1, 2 and 4

Figure 2.2 shows that \( \alpha \) in the range above C1 means that voters will not reelect any incumbent who shirks on policy. If \( \alpha \) is between C1 and C2, voters allow senior incumbents to shirk when terms are not limited. An \( \alpha \) in the range between C1 and C4 implies that voters will allow senior incumbents to shirk when terms are not limited but will choose the challenger over a shirking senior incumbent if term limits cap seniority.\(^{10}\)

Proposition 2.1: Assuming symmetry across all districts and independent and identically distributed voters in each district, if \( \alpha \) is in the range \([ (1 - \gamma)qT, \left(1 - \frac{\gamma + y^2}{1 + \gamma + y^2} \right) qT \] there exists an equilibrium where there is no turnover in seniority when terms are not limited. Senior legislators can shirk and win reelection, but junior legislators are only reelected if they vote with the district majority. This is referred to as a “shirking equilibrium”. Considering the same range of \( \alpha \), when terms are limited shirking legislators are never reelected and legislator turnover is high in equilibrium. This is referred to as the “high-turnover equilibrium”.

\(^{10}\) Although the relationships between C2 and C1I and C4 and CI in Figure 2.2 always hold, it is not the case that C4 is always greater than C2. In fact this is a very important result because for sufficiently large \( q \) \( \left( q > \left( \frac{1+y+y^2}{1+\gamma+y^2+y}\right) \right) \) C4 is less than C2. This would indicate a range (between C4 and C2) where voters tolerate shirking by either junior or senior incumbents when terms are not limited, but who are stricter and do not allow any shirking when terms are limited.
Incumbents in the shirking equilibrium do not have an incentive to deviate from voting for their own preferred policy unless they are junior. Legislators will always vote for their preferred policy given a sufficiently large $\beta$ when terms are limited even if they are junior, but more voters are willing to elect a challenger because of the reduced cost in foregone transfers. The latter may seem like a grim outcome, but the fact that voters are not willing to put up with a shirking legislator means representation should improve overall.

Until now $q$ has been assumed to be positive but less than one and any implications from a change in election rules have been ignored. However, the election rules are vital to a voter’s belief about change in seniority in any period and allowing a voter’s belief to vary based on the election institution is important.

To give an example of what these equilibria might be like, suppose that when terms are not limited voters have little confidence that a change in seniority will take place i.e. $q = 0$. This expands the range between $C_1$ and $C_2$ such that the former is now equal to $T$ (the tax transfer voters in senior districts receive) and $C_2$ is zero. A voter will prefer a challenger to a shirking senior incumbent if she places an extremely large weight on policy in her utility function. Because legislators are first movers and anticipate voter reaction, the dominant strategy for them is to vote for their preferred policy even when it is against the district majority.

Now suppose term limits are imposed and the belief that seniority in the legislature will change increases to one. The new point for $C_4$ is $(1 - \gamma)T$ such that if $\alpha$ is above this point she now prefers not to reelect a shirking incumbent even if senior. Below this point a voter will re-elect a senior incumbent who shirks, but not a junior. Of course if $0 < q < 1$, the range between $C_4$ and $T$ gets larger implying there is a greater likelihood voters choose to re-elect a shirking senior incumbent when terms are not limited but vote to elect the challenger under term limits.

**Corollary 2.1:** There is asymmetric distribution of tax benefits from junior districts to senior ones in a shirking equilibrium. Voters from junior districts finance the transfers because senior incumbents never lose reelection. Term limits allow a more egalitarian distribution of transfers as incumbent turnover increases by being forced out of office or losing reelection.
The model, while stylized, contains the correct incentives consistent with the research question and provides an outline of the results to be tested experimentally. The next section lays out the design and procedures.

2.4 Experimental Design and Procedures

2.4.1 Design
This section introduces experimental design. Attention will be given to the implementation as well as the non-standard method of recruiting subjects. The general set up includes \( D = 3 \) districts with \( N_d = 3 \) voters per district. The number of legislators was set to \( L = 6 \). Only three are in office at one time and are referred to as being “active.” The other three are considered “inactive.” This means \( N_dD + L = 15 \) subjects total per session.\(^{11}\)

Each session had three phases. The first phase lasted five periods and was the control treatment. Legislators only made decisions regarding taxes in this round. The second phase, Treatment 1, lasted ten periods. Here legislators made policy and tax decisions. Treatment 2 was the final phase and lasted ten periods. In this treatment a two period term limit was placed on the number of consecutive periods a legislator could be active. The order of the second and third phase was varied. Subjects were regrouped into new districts with randomly chosen legislators at the beginning of each phase; however, the group of legislators remained fixed across all phases. Voters received an endowment of fifty cents each period subject to taxation to fund pork.\(^ {12}\) Active legislators received a “salary” of sixty cents each period while in office. Inactive legislators did not receive endowment salary, but could earn money decoding text strings for 2.5 cents for every correct code. This was done to create some incentive for legislators to stay in office as well as keep inactive legislators engaged throughout the experiment. Payoffs were summed across all periods.

Voter payoffs were a function of the endowment, the tax and the legislator’s seniority,

\[
U_{id} = E - t + \sigma \frac{\eta}{N_d},
\]

where \( E \) is the endowment, \( t \) is the tax rate, and \( \sigma \) measures the legislator’s relative share of pork, \( \eta \), which is the sum of taxes collected across all voters. A voter’s share is based on his legislator’s

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\(^{11}\) The original design used five districts of three voters each and ten legislators for a total of twenty-five subjects per session. The first three sessions used this design, but due to recruiting challenges, I decided to use the design described above.

\(^{12}\) The voters in sessions with five districts received an endowment of 45 cents, but shares of pork for voters in senior districts stayed the same.
seniority, thus is a fixed proportion. The vector \( \sigma \) lists the relative shares of the first, second and third ranked legislators based on tenure: \( \sigma = \left( \frac{1}{2}, \frac{1}{2}, 0 \right) \). Taxes are homogenous such that \( \Pi = DN_a t \). Thus, voters in a senior district receive seventy-five cents whereas the others receive nothing if the tax passes.\(^{13}\)

A linear payoff function was implemented to sharpen incentives such that districts either desired a full tax or none at all. Junior voters want to avoid a tax because it means they are financing pork for other districts. Thus the tax is a purely redistributive one. The structure of the shares implies that a majority of the active legislators always want to tax voters. Any other setup would allow for a majority to prefer not to pass pork legislation or call for allowing legislative bargaining. Fixing the shares accordingly such that there is always an advantaged majority is also consistent with legislative bargaining literature where a minimum winning coalition decides how to split the pie (Baron and Ferejohn 1989; Frechette, Kagel and Lehrer 2003; Frechette, Kagel and Morelli 2009).

To begin each phase, active legislators were randomly determined to be either “senior” or “junior”. Seniority status was then dependent on the number of consecutive periods as an active legislator. There were an equal number of pro-choice and pro-life legislators to allow control over district makeup. Districts always began with an active legislator that opposed the district majority in order to maximize the chance for shirking.

### 2.4.2 Survey

The goal was to analyze those instances where there was a mismatch between legislator and voter policy preferences. Subjects completed a short survey prior to the experiment to enable this. Recruiting from a small subset of the subject pool made filling a session a challenge, which led to a design change where the first three sessions featured five districts instead of five. The appendix includes the survey.

Subjects were given summaries of two foundations related to abortion and asked how well they identified with either foundation. These were the Pro-Life Action League and Pro-Choice America.\(^{14}\) The response scale ranged over seven points from “Strongly Do Not Identify” to “Strongly Identify.” The language in the survey was taken directly from the groups’ websites and the groups were selected based on the fact they appeared first in the list of search engine results. This

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\(^{13}\) In the larger sessions the top three districts had a seniority advantage.

\(^{14}\) The Pro-Life Action League is a non-violent protest group and Pro-Choice America is a lobbying organization.
was an attempt at being unbiased in selecting the groups. Similar questions were included on other topics and foundations so it was not obvious which topic would be involved in the upcoming experiment. Subjects provided names and email addresses so they could be contacted for the actual experiment.

There was a much greater response from self-identified “pro-choice” individuals (fifty-three percent) as well as students whose preferences were indiscernible or were explicitly neutral (twenty-three percent). This unbalanced survey sample led to five of the eight total sessions using self-identified pro-choice subjects as voters. Of course, this was not the initial intent. Specific numbers of subjects from each self-identified group were recruited for each session. For instance, when the session featured three districts using pro-choice voters, twelve pro-choice subjects were recruited where nine filled the role of voter and three filled the role of legislator. Their roles were determined randomly upon arrival to the laboratory. Three pro-life subjects were recruited to fulfill the role of legislator with opposing preferences. While it was known that these subjects were to act as legislators, the group to which they were assigned was always random as was their beginning seniority rank. Sessions with pro-life voters likewise had twelve pro-life subjects and three pro-choice subjects.

Much care was taken to prevent the ill-will of subjects because of the sensitive policy issue. Subjects were asked before entering the experiment whether they would prefer not to participate in an experiment that involved the issues on the survey, to which none of them objected. Within the experiment, specific language from the consent form emphasizing the subjects’ right to leave at any moment with their earnings was included in the first paragraph of the instructions. Finally, subjects voluntarily completed a post experiment opinion-poll with an open ended question about the experiment’s content. This was to allow subjects the opportunity to express disapproval. No subject ever asked to leave or expressed reproach in the survey.

2.4.3 Experiment Procedures and Hypotheses
The experiment used generic terms where voters were referred to as “Type A players” and legislators were called “Type B players”. Districts were rematched and assigned legislators with opposing policy preferences in the beginning of each treatment. The subjects were simply told that half of the legislators would begin “active” and half would begin “inactive”. The actual instructions

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15 Sessions with five districts used twenty subjects of one group where twelve were voters and five were legislators. Five subjects from the opposing group were used as legislators for a total of twenty-five subjects.
can be found in the appendix. Each period of the game included two stages. The following details the different treatments.

2.4.3.1 Control. In Stage 1 of the Control legislators voted whether to tax the electorate or not. If the tax passed, each voter’s entire endowment was allocated to a public account that was divided according to the explanation above. The shares were divided evenly among voters within the districts receiving a positive transfer. If the tax did not pass, the subjects kept their endowments and no pork was provided. This was a major simplification but it made the incumbents’ decisions more salient to voters. It also allowed voters to understand that the asymmetric nature of the transfer.

In Stage 2 an election was held in each district where voters were asked whether they wanted to keep the incumbent in office. They were aware of the allocation mechanism based on seniority as well as the relative seniority of all legislators. They were also aware of their incumbent’s choice as well as their payoff. The incumbent stayed in office if a majority of the district’s voters approved and the experiment advanced to the next period proceeding in the same manner. If the incumbent failed to be reelected, he became inactive and was replaced by a randomly selected inactive legislator. This mimics the idea that a challenger’s true preferences are not known to voters and can only be revealed over time if elected (Chen and Niou 2005). This leads to the first set of hypotheses.

Hypothesis 1.c: The tax will always pass in the legislature given the artificial minimum winning majority.

Hypothesis 2.c: Voters will always re-elect the incumbent given seniority advantage in pork barrel legislation. Seniority rank is non-decreasing if an incumbent always returns to office. Replacing him ensures a smaller share of pork except for voters in junior district when all districts simultaneously replace incumbents. Thus no incumbent will lose an election.

Hypothesis 3.c: At the end of the control treatment the voter payoff distribution will favor the districts that begin with seniority. Because the tax will always pass and there is no legislator turnover, endowments will be completely redistributed to voters in senior districts.

2.4.3.2 Treatment 1: Seniority with Policy Choice. In Stage 1 of Treatment 1, taxes and shares of pork were decided in the same manner as the control, but the legislators also voted on policy. Their votes determined each period which foundation would receive a donation of $2.00 which does not affect subject payment. These donations were aggregated for the entire session. This created a non-monetary aspect to the legislators’ choice set that voters may or may not approve of.
In reference to the model in Section 3, this relates to the voters’ $\alpha$ term, or the relative weight they place on policy representation. Observing voter behavior will provide inference regarding the importance of the policy issue in vote choice. Legislators and voters were informed about the preference of the district’s majority. The intensity of preferences was recorded in the survey for ex-post analysis but was not disclosed to the legislators.

Stage 2 was the same here as other treatments, but voters also saw the incumbent’s policy vote and its outcome.

_Hypothesis 1.1:_ The tax always passes. Senior incumbents will vote for their preferred foundation. Junior incumbents will vote with the district’s majority.

_Hypothesis 2.1:_ Voters will always re-elect senior incumbents given the allocation mechanism regardless of their policy vote. Junior incumbents will be reelected only if they vote with the district majority.

_Hypothesis 3.1:_ At the end of Treatment 1, the voter payoff distribution will favor those districts that begin with seniority.

2.4.3.3 Treatment 2: Seniority with Policy Choice and Term Limits. Stages 1 and 2 proceeded the same way as in Treatment 1 with the addition of two-period term limits that capped legislative tenure. Term limits were staggered such that the senior legislators were removed from office after two periods if not already replaced by voters whereas the junior legislators did not face the term limit until the third period if not replaced by voters. This was done to vary the timing of incumbents leaving office so junior legislators had a chance to become senior. It was possible a priori that voters rendered this ineffective, but there was never a case where every legislator was term limited in the same period.

_Hypothesis 1.2:_ The tax always passes and legislators vote for their preferred foundation.

_Hypothesis 2.2:_ Term limits reduce the cost of replacing shirking incumbents, thus senior and junior incumbents who vote against the majority will be replaced. Policy representation improves as districts’ willingness to search for a legislator with matching preferences increases.

_Hypothesis 3.2:_ Term limits reduce the possible seniority advantage and thus lead to a more egalitarian distribution of payoffs across all districts.
2.5 Results

A total of eight sessions were run at the XSFS laboratory on the Florida State University campus. The average payment was roughly $20 for one hour in the lab, including a $10 show up fee. The first three of these sessions used the setup of twenty-five subjects and five districts and the final five used the fifteen subject-three district setup. Three sessions used self-identified pro-choice voters whereas the rest used pro-life voters. The order of treatments was reversed for three of the sessions as well. Analysis controls for these factors where possible. Subjects appear to understand the seniority structure and respond to the incentives it creates; however, term limits prove to be a weak mechanism for improving representation.

2.5.1 Passing the Tax

The tax passed eighty-one percent of the time (n=300 s.d. = 0.40) in the control treatment, which is a surprisingly low result. This is not particular to the control as seen in Figure 2.3. The fact that the senior legislators gave up monetary benefits for their voters is odd. Legislators were not identifiable, so there was no cause for reputation concerns where voters who were once junior and had to finance the pork spending could take out their frustrations on those legislators who passed the tax if one happened to become their representative at some future point. Subjects were also aware that their role as voter or legislator would be the same throughout the experiment, which rules out the possibility of subjects wanting to set a precedent of low tax passage rates in the case they became a voter at some point in the future. One possibility is that incentives were made so sharp that some legislators avoided repeatedly leaving other subjects with a period payoff of zero because of other-regarding preferences. This appears irrational since reelection depends solely on their district’s vote.

The tax passed at even lower rates in Treatment 1. It passed merely sixty-five percent of the time (n=600 s.d. = 0.48) overall. It passed seventy-one percent of the time (n=600 s.d. = 0.45) overall in Treatment 2. Two odd results remain in that senior incumbents did not always vote for the tax and junior incumbents voted in favor of it as seen in Figure 2.4.

It seems especially odd that the tax did not always pass after the policy issue was introduced because this provided legislators the opportunity to buy votes and vote for their preferred policy.

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16 In the fifth session there was a shortage of two pro-choice subjects, so I elected to use two pro-life subjects as voters. This was the only incidence where session composition was not as I explained above. In Treatment 1 these two subjects were randomly grouped together, so this group has been dropped from all analysis.
Moreover, if a legislator wanted to serve the interest of voters on the policy issue, one would assume they would also serve their financial interests.

Figure 2.3: Passage Rate of Tax by Treatment

Figure 2.4: Frequency of Voting For Tax by Treatment and Seniority
Perhaps legislators wanted to prevent other subjects from making more money than they did in the experiment, but this seems highly unlikely because a legislator relied on reelection to maintain his or her high payoff from period to period. Legislators with conflicting preferences might have tried to spite voters by not passing the tax, but this would have shown up in the policy vote as well.

Legislators knew their seniority rank at the beginning of each phase and every period throughout the experiment. One possibility is that subjects failed to take notice of changes in seniority. This seems quite possible for junior incumbents who become senior and fail to notice, thus vote against the tax, but it is not possible to move down in seniority and cannot explain junior incumbents voting for the tax. This would also imply that these mistakes would not take place in the first period of each phase before any election has taken place. Looking at Figure 2.4 shows that for each treatment the rates at which senior incumbents vote against the tax and junior incumbents vote for the tax begin at high levels and stay roughly the same over time. The mistakes would also be more pronounced in Treatment 2 where turnover and seniority change were frequent, but this does not seem to be the case.

The distribution scheme of this game has an ultimatum game flavor, so it is possible that legislators exhibited fairness concerns for subjects who had no control over their future payoffs. This is contrary to the strategic play in the ultimatum game where it is the responders’ other-regarding preferences that matter, as suggested by Bolton and Ockenfels (2000). Subjects frequently give positive amounts in dictator games, but it is well below the amount given in ultimatum games. Likewise, Guth and van Damme (1998) show that the dummy player in a three-player ultimatum game that has no role in accepting the suggested split by the proposer only receives marginal amounts from the agreed upon distribution casting doubt on pure equity concerns.

Given the binary nature of the legislators’ decisions, a simple adaptation of the Bolton and Ockenfels (2000) ERC model can be used to estimate the proportion of legislators who have equity preferences and compare it to their results across different types of games. I ignore the junior incumbents because there is no story of equity concerns to explain junior incumbents voting for the tax. I call $\xi$ the proportion of subjects with a preference for equal payoffs, or relativists (equivalent to $\alpha$ in Bolton and Ockenfel’s original paper). The payoff of active legislators is not dependent on their seniority status, so equity concerns would involve the differences in voter payoffs. An egoist will vote for the tax ($\nu = 1$) so that their voters receive seventy-five cents and voters from junior districts receive zero, and a relativist will vote against the tax ($\nu = 0$) so that all voters receive fifty cents. This means that the proportion of votes for the tax is $\bar{\nu} = (1 - \xi) \cdot 1 + \xi \cdot 0 = 1 - \xi$. 

25
Thus, \( = 1 - \bar{v} \). Using the overall proportion of senior legislators voting for the tax in all treatments leads to the estimate \( \xi = .25 \). When broken down by treatment, the respective estimates are 0.22, 0.28 and 0.24 for the control, Treatment1 and Treatment 2. These figures are below the estimate of 0.5 Bolton and Ockenfels estimate for the dictator game, such that it is quite possible that other-regarding preferences of relativists lead to this outcome. Nevertheless, it is difficult to use such an approach to explain the junior incumbents voting for the tax, so it is likely that it is a combination other-regarding preferences and mistakes on the part of subjects.

Experiment Result 1: Legislators do not always pass the tax, possibly because of other-regarding preferences for voters in junior districts.

2.5.2 Voting Against District Majority

This section will focus on the legislators who opposed district voters on policy. These legislators did not always vote against the majority in Treatment 1. Only thirty-two percent (\( n = 287 \) s.d. = 0.03)\(^{17} \) of policy votes by these legislators went against the district majority. Figure 1.5 displays shirking according to seniority and treatment and shows that in Treatment 1 senior legislators were significantly more likely than junior legislators to vote against the district majority. Senior incumbents voted against the majority forty-two percent of the time compared to the ten percent of votes by the junior incumbents (t-stat 6.03 p-value 0.00). This result is consistent with the predictions; however, it is far from the point predictions of 100 and 0 percent. The difference in Treatment 2 is not statistically greater than zero (t-stat 1.14 p-value 0.12), which is also consistent with predictions but lower than the predicted 100 percent.

Three results merit notice. Game theory suggests by backward induction that imposing a finite limit causes an unraveling. The results show that senior incumbents were less likely to vote against district majorities under term limits than when terms were not limited (34% versus 42%; t-stat 1.67 p-value 0.05). Likewise, term limited incumbents were no more likely to shirk in their last term than in their first term (33% versus 30% respectively; t-stat 0.53 p-value 0.30). Finally, junior incumbents were more likely to vote against the district majority when terms were limited than when

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\(^{17}\) In one session a subject who had been registered by the experimenter as a pro-choice subject was actually pro-life. This was discovered after the fact when verifying subject preferences. The instances where this subject was an active legislator have been dropped from the analysis.
they were not. (27% versus 10%; t-stat 3.26 p-value 0.00), which is consistent with model predictions.

Figure 2.5: Proportion of Legislators Voting Against District Majority by Treatment and Seniority

Voting against district majorities occurred much less frequently than predicted in both treatments. The payoff difference for active and inactive legislators may have been so large that active legislators did not want to risk losing reelection. This makes sense in Treatment 1 if subjects believed their chance of becoming active again was extremely low if they lost reelection, but the small pool of legislators meant that chances of becoming active again were high in Treatment 2. In Treatment 2 an incumbent who lost reelection had an ex ante probability between forty and sixty percent of becoming active again after one period depending on how many incumbents were forced out of office by term limits. This is an upper bound because actual reelection outcomes may have disrupted how term limits were initially staggered. The data show that the ex-post probability was a twenty percent chance of returning after one period and a forty percent chance of returning after two periods. An incumbent remained inactive after losing reelection for 4.32 periods (out of 10) on average in Treatment 1. In Treatment 2 a losing or term limited incumbent remained inactive 3.25 periods on average before becoming active again. The difference is significant (t-stat 2.73 p-value 0.01). The fact that senior incumbents in Treatment 2 shirked less frequently suggests subjects did not understand the impact that term limits had on the likelihood of returning to office.
Although this was not explicitly tested or modeled, this would be consistent with the classic articles on electoral control by Barro (1973) and Ferejohn (1986) that show voters can expect better performance from their representatives the higher the relative value of staying in office. Anecdotal evidence from the post-experiment surveys suggests that some subjects perceived that the legislators faced the difficult decision of choosing monetary benefits or their preferred policy. One subject wrote that, “it was interesting to see how money affects people’s choices. [Legislators] had to decide between money and what they believe in.”

Experiment Result 2: Shirking was less frequent than predicted overall. Senior incumbents shirked more frequently than junior incumbents when terms were not limited. Junior incumbents shirked more frequently when terms were limited than when they were not. Senior incumbents were no more likely to shirk in their last term when terms were limited.

2.5.3 Reelection
The effect that shirking and term limits had on reelection will now be analyzed. Senior incumbents were clearly favored in reelection when considering overall reelection rates as shown in Figure 2.6. More important are the reelection rates of those legislators who were in office in the first period. Table 2.2 shows that by the fifth and final period of the control treatment, only 20 out of 30 (67%) original legislators were still in office; however, 11 of the 19 original senior legislators (58%) were still in office. In Treatment 1, sixteen of the 29 (55%) original legislators were still in office at after the last period. Ten of the original 18 (56%) senior legislators were still in office. These results suggest that subjects understood the implications of seniority but do not match the predictions.

More importantly, the differences are much more pronounced conditional on the incumbent voting against the district majority as shown in Figure 2.7. Senior incumbents who voted against the majority were reelected ninety-one percent of the time compared to thirty-six percent of the junior incumbents in Treatment 1 (t-stat 5.38 p-value 0.00). Likewise, senior incumbents who shirked in Treatment 2 were much more likely to be reelected than junior ones (t-stat 4.92 p-value 0.00). Voters were clearly responsive to the seniority structure when it came to choosing between pork and policy representation.
Figure 2.6: Reelection Rates by Treatment and Seniority

Table 2.2: Reelection of Original Legislators

<table>
<thead>
<tr>
<th></th>
<th>Control*</th>
<th>Treatment 1</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall number to begin</td>
<td>30</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Overall number at end of last period</td>
<td>20</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Percentage</td>
<td>67%</td>
<td>55%</td>
<td>-</td>
</tr>
<tr>
<td>Number of senior to begin</td>
<td>19</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Number of senior at end of last period</td>
<td>11</td>
<td>10</td>
<td>All forced out by term limit in second period</td>
</tr>
<tr>
<td>Percentage</td>
<td>58%</td>
<td>56%</td>
<td>-</td>
</tr>
</tbody>
</table>

The control contained five periods whereas the other treatments contained ten.
Perhaps the most important result is that senior incumbents who shirked were reelected eighty-eight percent of the time under term limits compared to ninety-one percent of the time in the no term-limit treatment. Therefore voters were not significantly more inclined to respond to shirking by electing a challenger when terms were limited (t-stat 0.54 p-value 0.59). Voters did not respond to the decreased cost of replacing an incumbent and were more responsive to the monetary incentives.

![Figure 2.7: Reelection Rates of Incumbents Voting Against District Majority by Treatment and Seniority](image)

It was a concern a priori whether subjects would care about policy, at least in the experimental implementation of it. Abortion was selected because it was believed that the average person takes a firm stance on the issue, but the reaction might have been a function of donation size. The donation was roughly three to four times larger than each voter could have made each period. Regression analysis controls for subjects’ strength of preference and indicates that a stronger preference meant lower tolerance for shirking. However, the biggest indicator that policy mattered is the low reelection rates of junior incumbents who vote against the district majority. This implies that when the cost of caring about the policy was low, voters reacted more frequently. Figure 2.8 confirms this by showing the reelection rates in both treatments by vote and by seniority.
The reelection rates of senior incumbents who vote against the district majority are in fact lower than those who do not shirk in both treatments, but the rate is still very high (t-stat 2.21 p-value 0.01 for Treatment 1; t-stat 1.92 p-value 0.03 for Treatment 2). The difference is much more dramatic for junior incumbents. In Treatment 1 junior incumbents were reelected seventy-two percent of the time when voting with the district compared to thirty-six percent after having shirked (t-stat 2.40 p-value 0.01). The difference was even more pronounced in Treatment 2 at seventy-one and thirty-one percent respectively (t-stat 3.92 p-value 0.00).

This leads to another important consideration: the small size of the voting districts in the experiment. Pork may weigh more heavily on the voters’ decisions because of the high probability of being pivotal. Caplan (2007) models voter preferences over beliefs and suggests that the price of holding certain beliefs is very low given the zero probability of being pivotal. In this case, the cost is high because the probability of being pivotal is high.

Experiment Result 3: Voters respond to shirking, but more so when the incumbent is junior and the cost of not reelecting the incumbent is low. Senior incumbents who shirk are reelected at the same rate whether terms are limited or not, suggesting voters do not recognize the reduced cost of electing a challenger when seniority advantage is capped.
A subtle approach to judging the level of representation is to look at the instances where the voter and legislator preferences match. There is an obvious departure from the model in the experimental design because a random inactive legislator replaces an incumbent upon losing reelection, but it is worthwhile to note that the match rate is significantly higher in Treatment 2 under term limits than under Treatment 1 even when voters are not directly choosing the
replacement (44% versus 33%; t-stat 2.51 p-value 0.01). Figure 2.9 shows the proportion of voters each period with a senior incumbent who has matching preferences. It is clear that under term limits voters are more likely to enjoy the advantages of seniority and a legislator with matching preferences (31% versus 14%; t-stat 3.22 p-value 0.00). There might be reason to suggest that even though term limits do not induce voters to replace incumbents who vote against district majorities, they improve representation by force.

2.5.4 Voter Payoff Distribution

The payoff distribution in the control treatment clearly favored the districts that began with seniority, but there was not complete redistribution to those voters as predicted. This is partially attributable to a few senior legislators losing reelection, but it is largely due to the tax not passing every period. Figure 2.10 displays the proportions going to those districts that began with senior legislators and those that began with junior legislators for each treatment.

The distribution is still skewed in Treatment 1 but less so. This is a product of some of the original senior legislators losing elections after shirking and the fact that Treatment 1 contained twice as many periods, but it is mostly due the tax passing significantly less often than in the control treatment (65% versus 81%; t-stat 5.00 p-value 0.00).

The payoff distribution under term limits is much more equal than compared to the control, but it isn’t significantly different from Treatment 1. However, two things should set these treatments apart. First, the tax was passed significantly more often in Treatment 2 than in Treatment 1 (72% versus 65%; t-stat 2.61 p-value 0.01). Second, the general reelection rate was much greater in Treatment 1 than Treatment 2 (85% versus 75%; t-stat 2.69 p-value 0.00). Combined, these factors likely mean that it was term limits that caused a more egalitarian distribution in Treatment 2.

*Experiment Result 4:* Payoff distributions favor voters that begin with seniority in all treatments. It appears that term limits reduced this asymmetry in Treatment 2.
2.5.5 Econometric Analysis

The following section details a more formal data analysis using individual voter and legislator choices. Table 2.3 shows results from panel mixed effects analysis using the data on voter choices. The dependent variable is the probability of voting for the incumbent. Period fixed effects are included as well as district and individual random effects. The district random effects also served to control whether the voters in the session were pro-choice or pro-life. Treatment 1 and 2 data are pooled for this regression. The sample includes only those voters who did not always vote for or against the incumbent, hence the seemingly strange number of observations. Figure 2.11 shows the distribution of voters by incumbent vote for both Treatment 1 and Treatment 2. The horizontal axes measure proportion of votes for the incumbent by voter, and the vertical axes indicate the proportion of the sample in each bin. Results show that 32% of voters in Treatment 1 always voted for the incumbent and 19% of voters in Treatment 2 did so. The shapes of the distributions are telling as the Treatment 2 distribution is far less skewed to the right indicating more voters choosing the challenger.

Figure 2.10: Distribution of Voter Payoffs by Beginning Seniority
Table 2.3: Probability of Voting for Incumbent Mixed Effects Logit Regression

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients and Standard Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior * Vote Against District Majority (VADM)</td>
<td>-0.73 (0.49)</td>
</tr>
<tr>
<td>Senior * Vote With District Majority (VWDM)</td>
<td>1.12** (0.34)</td>
</tr>
<tr>
<td>Junior * VWDM</td>
<td>1.16** (0.45)</td>
</tr>
<tr>
<td>Term Limits (TL) * Senior * VADM</td>
<td>-1.16** (0.47)</td>
</tr>
<tr>
<td>TL * Junior * VADM</td>
<td>-1.66** (0.35)</td>
</tr>
<tr>
<td>TL * Senior * VWDM</td>
<td>2.06** (0.76)</td>
</tr>
<tr>
<td>TL * Junior * VWDM</td>
<td>0.01 (0.31)</td>
</tr>
<tr>
<td>Tax Vote</td>
<td>-0.17 (0.17)</td>
</tr>
<tr>
<td>Strength of Preference</td>
<td>-0.31** (0.13)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.89 (0.40)</td>
</tr>
<tr>
<td>Observations</td>
<td>1010</td>
</tr>
<tr>
<td>Number of Districts</td>
<td>55</td>
</tr>
<tr>
<td>Number of Subjects</td>
<td>129</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>29.06</td>
</tr>
</tbody>
</table>

Random Effects at the district and subject levels. (*) and (**) indicate p-value < 0.05 and 0.01 respectively. Period fixed effects also included in the regression.
Figure 2.11: Distributions of Voters by Proportion of Votes for the Incumbent

The main goal in analyzing the individual voter decision is to verify that the individual response matches what the aggregate results are suggesting. The reference group is voters with senior incumbents who vote against the district majority when term limits are not in place. The sign and significance of the variable \( \text{Junior} \times VADM \), which is equal to one when the incumbent is junior and shirks on policy choice, indicates that in Treatment 1 a voter is neither more nor less likely to vote against a junior incumbent who votes against the district majority than a senior one. This is curious given the difference in reelection rates between the two. Both senior and junior incumbents who vote with the district majority were significantly more likely to get a vote.
The main variable of interest is $TL \times Senior \times VADM$, or senior incumbents who shirk under term limits. Theory suggests that this group should be less likely to get a vote than the reference group as term limits reduce the voter’s cost of doing so. A vote was not taken in a district whose incumbent is actually term limited, so the variables indicating Treatment 2 signify incumbents who are in the first term of the two period term limit. Results show that a voter was significantly less likely to vote for senior and junior incumbents who voted against the majority under term limits than a shirking senior incumbent when terms were not limited. Therefore, the behavior at the individual level is consistent with theory and suggests that the average voter perceived the cost reduction provided by term limits. Recall though that the aggregate reelection rates of senior incumbents who voted against the district majority were not different between treatments.

Overall, it appears that the average voter responded to an incumbent who shirks, whether senior or junior, but to a greater extent when the incumbent was junior and the cost of doing so was low. Referring to Figure 2.8, there is also only a small difference in Treatment 1 reelection rates between senior incumbents who shirk and those who do not; however, the positive and significant coefficient on $Senior \times VWDM$ indicates that an individual was more likely to vote for a senior incumbent who does not shirk than one who does. This highlights the importance of group choice and aggregating individual decisions. It is also consistent with other findings suggesting that suggest voters respond to roll-call votes that align with extreme party positions, but it does not impact reelection rates (Canes-Wrone, Brady and Cogan 2002). This implies that the pivotal voter is not being influenced to change her vote.

Finally, one of the important predictors of a vote against the incumbent is a voter’s strength of preference. This data comes from the pre-experiment survey. The values range from 1 to 3 and indicate whether a subject “somewhat identified”, “identified” or “strongly identified” with either the pro-choice or pro-life interest group. By this measure, a stronger policy preference means a voter is more likely to vote against a shirking incumbent.

Experiment Result 5: Regression results indicate that when terms are not limited an individual was significantly less likely to vote for a shirking senior incumbent than senior or junior incumbents who vote with the district majority. They were also significantly less likely to vote for a shirking senior incumbent when terms were limited than when they were not; suggesting voters recognized the reduced cost of replacing an incumbent when seniority is capped. The insignificant difference between reelection rates of shirking senior incumbents between treatments underscores the
importance of aggregating choices and suggests that the average voter was influenced by shirking behavior but the pivotal voter was not. Stronger policy preferences also predict an inclination to vote against an incumbent.

Table 2.4: Probability of Voting Against District Majority Mixed Effects Logit Regression

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients and Standard Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior</td>
<td>3.92**</td>
</tr>
<tr>
<td></td>
<td>(1.52)</td>
</tr>
<tr>
<td>Term Limit (TL) * Senior</td>
<td>-2.29</td>
</tr>
<tr>
<td></td>
<td>(1.33)</td>
</tr>
<tr>
<td>TL * Junior</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td>(1.37)</td>
</tr>
<tr>
<td>Last Term</td>
<td>2.15</td>
</tr>
<tr>
<td></td>
<td>(1.51)</td>
</tr>
<tr>
<td>Strength of Preference (SOP)</td>
<td>2.56**</td>
</tr>
<tr>
<td></td>
<td>(0.68)</td>
</tr>
<tr>
<td>Last Term * SOP</td>
<td>-0.25</td>
</tr>
<tr>
<td></td>
<td>(0.65)</td>
</tr>
<tr>
<td>Constant</td>
<td>-8.37</td>
</tr>
<tr>
<td></td>
<td>(2.25)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>581</td>
</tr>
<tr>
<td>Number of Districts</td>
<td>59</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>203.68</td>
</tr>
</tbody>
</table>

Random Effects at District and Individual levels. (*) indicates p-value < 0.01. Period fixed effects also included in the regression. Limited indicates an incumbent that is in their last term.

Incumbent decision analysis is displayed in Table 2.4. The dependent variable is the likelihood of voting against the district majority. Period fixed effects are included as well as district and individual random effects. Once again, the district random effects also served to control for sessions with pro-choice or pro-life voters. Senior incumbents are significantly more likely to vote against the district majority, which again suggests that subjects did understand that the seniority advantage insulates incumbents from losing reelection even though the rate of voting against the district majority was lower than expected.
One concern about term limits is the disincentive for incumbents to exert high effort as backward induction suggests in a finitely repeated game. Incumbents have the incentive to shirk, especially in their last terms in office. \textit{Last Term} is equal to one for legislators in their last term of the two period term limit. This variable is also interacted with an incumbent’s strength of preference. The coefficients are insignificant indicating that there was not significantly more shirking by these incumbents. This reinforces the difference in means test suggesting the unraveling predicted using backward induction does not occur. Finally, an incumbent was more likely to vote against the district when their strength of preference was stronger.

\textit{Experiment Result 6: Seniority and strength of preference are significant predictors of an incumbent’s vote against the district majority. Incumbents in their last term were no more likely to shirk ceteris paribus under term limits.}

\textit{2.5.6 Supplementary Results}
Subjects’ strength of preference did not significantly differ from session to session, but this possibility was controlled for in the regression analysis. Pro-life subjects had an average strength of 1.83 whereas self-identified pro-choice subjects had an average strength of 1.98 (t-stat 1.03 p-value 0.30). Thus the average subject was at the midpoint of identifying themselves as either pro-choice or pro-life.

Remember that in a session all of the voters preferred the same side of the issue. Overall, the charity that the voters did not prefer received the donation twenty-one percent of the time. In sessions 1, 2, 4, 5 and 6 where voters were self-identified pro-choice, the pro-life policy passed fifteen times every 100 periods. In the third, seventh and eighth session with pro-life voters, the pro-choice policy passed thirty two times every 100 periods, which is a significant difference (t-stat 2.52 p-value 0.01). There was no difference between treatments.

\textit{2.6 Discussion and Conclusions}
This project tests the theory that a system that favors seniority encourages voters to compete for transfers via the legislature and disregard policy work done by politicians. It employs a novel use of visceral and monetary incentives in the lab where payoffs are affected by seniority advantage but overall utility is affected by the policy choices of legislators. These policy choices are made by voting to donate money to either one of two foundations that stand on opposing sides of the abortion
issue. Work by Zajonc (1980) and Lowenstein (1996) suggests that visceral responses are greater than those seen involving monetary payoffs, contrary to mainstream thought in economics and political science, but that does not seem to be the case here.

It was proposed that the advantage of seniority and competition for pork would lead voters to disregard policy choice and to reelect incumbents in order obtain more district benefits. This would then lead to poor policy representation by legislators as well as disparity in the balance of tax benefits and costs. Term limits were proposed as a way to reduce seniority advantage and reduce the cost of replacing an incumbent, allowing voters to give weight to policy choices and replace legislators who vote against the district majority. They were also anticipated to improve the disparity in voter payoffs.

Results are not quite as expected. First, the tax does not always pass even with an artificial minimum winning majority. Senior legislators essentially give up monetary benefits to their voters. One might expect legislators with opposing policy preferences to at least pass the tax to buy off voters on the policy issue, much like the model by Jackson and Moselle (2002). The obvious possibility is that subjects exhibited other-regarding preferences.

Second, and more importantly, term limits do not decrease the likelihood of reelection for senior incumbents after voting against the majority. Although incumbents vote against district majorities far less than predicted, voters respond to the seniority structure by almost always reelecting senior incumbents even when they vote against the district majority, but reelecting junior incumbents who do much less frequently. Nevertheless, shirking senior incumbents are reelected significantly less often than those who vote with the district majority. Thus, voters appear to compete for monetary payoffs and respond to policy representation when the cost of doing so is low. On the other hand, results at the individual level are in line with theory as a voter was significantly less likely to vote for shirking senior incumbent when terms were limited than when they were not.

Finally, it is likely that term limits significantly reduced the distribution effects on voter payoffs. Distribution of voter payoffs is highly skewed in the control treatment when the tax passed roughly every period, but there is no statistically significant difference between the distributions of Treatment 1 and Treatment 2 because the voters in Treatment 1 were not always taxed.

The model and experimental design are stylized, but I argue that the incentives point in the right directions. Results could impact policy by changing the institutions within legislatures. Term limits were tested here, but other mechanisms may be discovered after a general review of the
seniority system. The mission of legislators in Congress might be re-examined if voters see them as providers of transfers rather than law makers. This may translate into a new institutional structure with term limits or some other change where leadership and committee seats are no longer determined by tenure but some other mechanism.

One important benefit of this experimental design is that it lends itself well to extensions that address other important topics in political economy as well as behavioral sciences. Right away it is apparent that according to the model used, smaller and poorer districts should be even more likely to reelect incumbents in order to secure more pork. Treatments using districts of different sizes and districts with varying endowments could easily address this concept. Another concern with seniority advantage is that voters disregard legislators’ abuse of perquisites because of the competition for pork. A similar design can be easily implemented that allows the legislators to allocate a share of the transfer to themselves. The question is whether voters will overlook this knowing the district’s share of pork is dependent upon seniority. This particular project is currently underway.

Opponents of term limits claim that an unintended consequence to capping tenure is that qualified challengers will postpone running for office until the incumbent is forced to leave in effort to more effectively use campaign funds. This of course excludes political capital building campaigns. Creating a cost for inactive legislators wanting to be considered to replace incumbents would simulate this idea. Framing it in opportunity cost terms and awarding bonuses to those inactive legislators who withdraw their names from consideration could be a way of doing this. The laboratory has been, and will continue to be, an important research tool in answering challenging questions in political economy.
CHAPTER THREE

FACT FINDING TRIPS TO ITALY: AN EXPERIMENTAL INVESTIGATION OF VOTER INCENTIVES

This paper investigates whether a legislative system favoring seniority induces voters to tolerate moral hazard on the part of elected representatives. A simple game theoretic model is used to predict outcomes in a pork-barrel experiment where subjects act as legislators and voters. Senior legislators have an advantage in providing transfers, the quality of which are uncertain. This opens up the opportunity to shirk where legislators can enrich themselves by taking graft. Voter information about incumbent behavior is varied across experimental treatments but it is found to be insignificant unless voters can compare their own legislator’s behavior to the behavior of others. Despite the fact that voters succumb to the incentives of seniority, information is effective in deterring legislator shirking.

3.1 Introduction

Legislators’ use of tax dollars has come under heavy scrutiny in the wake of the current recession. The Treasury Department reports that Congress has spent approximately $110.5 million on foreign travel since 2001 on fact finding trips to various places like Italy or the Great Barrier Reef in Australia (Singer 2010). Overall, spending on overseas travel is up ten-fold since 1995 (Mullins and Farnam 2009). Bloated budgets for office décor and the exclusive VIP wing at Walter Reed hospital have also received attention (Sepp 2000, Zoroya 2007). Before the 2010 midterm elections growing anti-government sentiment led the House to take modest steps with regard to spending, but nothing has been done in the Senate. Yet reelection rates have averaged ninety-five percent in the U.S. House since 1972 (Friedman and Holden 2009), and many point to incumbents’ ability to secure pork barrel projects as one of the largest reasons why (Fiorina 1977, Mayhew 1974, Levitt and Snyder 1997). In the 2010 re-election rates were 87% in the House and 84% in the Senate, but

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18 This does not include travel to war zones in Iraq and Afghanistan (Singer 2010).
75% of Gallup poll respondents disapproved of Congress (Saad 2011). Voters are not necessarily inconsistent if they approve of their own legislator while disapproving of the actions of the legislature as a whole, but it may indicate voters’ dissatisfaction with the inherent moral hazard problem in politics. If the effort observed by voters contains some element of randomness, thus deteriorating their performance signal, seniority acts to insure incumbents against bad outcomes and leads to moral hazard. The distributive theory of politics suggests that voters overlook such behavior because of a legislator’s ability to secure pork-barrel spending (Stein and Bickers 1994, Alvarez and Saving 1997, Levitt and Snyder 1997, Gomez and Wilson 2001, Arceneaux 2006). Seniority plays a vital role in a legislator’s ability to acquire pork as he or she gains experience, establishes networks and obtains leadership roles (Weingast and Marshall 1988). Experimental evidence has shown that seniority is important to voters when they must tradeoff monetary benefits for policy representation (Rodet 2011), so there is also reason to believe that it matters when a voter must choose a legislator who “does the right thing” or one who is known for “feathering his own nest” (Stigler 1971).

The strategic implications of seniority were first recognized by McKelvey and Riezman (1992) where they showed that legislators have the incentive to institute seniority to prevent legislator turnover. In theory, recurring competitive elections, promises of long-term employment and the ability to monitor legislator behavior would solve the principal-agent problem, but using tenure as an allocation mechanism for political benefits encourages the principal to lower her performance standard. Seniority is modeled similarly here as senior incumbents have an advantage in providing pork. The moral hazard problem is modeled as legislators forcing voters to shoulder the burden of privately enjoyed benefits, but the model can be applied to any legislator’s effort decision that may adversely impact voters.

In addition to seniority, the central element to the experiments is voter information. Electoral accountability hinges on voter information. It is possible that shirking occurs because of the usual rational ignorance and collective action problems in politics. Voters lack the incentive to become informed because of their infra-marginality and lack incentive to act even if they are informed because personal costs are low relative to system wide costs. Experiments are useful in that they allow control over the information voters can access. Experimental results suggest that voters predictably respond to the incentives created by seniority which trumps any effect from information revelation except when voters are able to compare their incumbent’s behavior to that of
other incumbents. Legislators take advantage of their seniority, but not to the extent predicted by the model. Their tendency to shirk is also affected by the information treatments.

The next section lays out a simple model used to make predictions tested in the laboratory. Section 3.3 details the experimental design and the hypotheses involved in several treatments with the results presented in Section 3.4. Section 3.5 concludes.

### 3.2 The Model

In representative government the state must acquire the consent of voters to maintain tenure. If the state is made up of a single agent who acquires consent via promises of redistribution, he would garner sufficient consent by appropriating wealth from a minority and allocating it entirely to the opposing majority. In the case where the state is made up of many agents representing many more principals, the basic concept is the same, but allowing seniority to determine control empowers senior representatives in the principal-agent relationship with their voters. In other words, the majority is not guaranteed to receive the full redistribution, nor does it require it in exchange for consent, because it stands to be on the other end of the exchange by electing a challenger who lacks seniority influence. This arrangement decreases the cost of obtaining consent. The following model formally shows that equilibrium exists where representative agents enjoy full discretion because of seniority.

In the model there are $D$ districts, each with $N_d$, $d = \{1, \ldots, D\}$ voters and one incumbent legislator. Voters receive an endowment, $E$, each period, which is taxable. The incumbent from each district is either senior or junior based on the variable $e_{dt}$ that measures his tenure. That is,

$$s_{dt} = \begin{cases} \text{senior if } e_{dt} \geq e_m \\ \text{junior otherwise} \end{cases},$$

where $e_m$ is the median tenure among all incumbents. Legislators determine whether voters are taxed and seniority dictates how the tax revenue is distributed.\(^{19}\) Senior incumbents decide how much of the transfer is actually delivered to their voters as they have the option to take some or all of the voters’ shares of the transfer. This is represented by $g_{dt}$ and is assumed to be equal for all voters in the district. The period payoff for a voter $i$ in district $d$ is:

---

\(^{19}\) This can be thought of as the structure-induced equilibrium resulting from committee proposal power achieved by seniority (Shepsle and Weingast 1981).
The term $\alpha_t$ is a random efficiency variable that affects the “quality” of the net transfer delivered to voters after the incumbent chooses $g_{dt}$. It is uniformly random on the range $[\alpha, 1]$ with mean $\bar{\alpha} = (1 + \alpha)/2$ and variance, $\nu = (1 - \alpha)^2/12$. Each period a new $\alpha_t$ is drawn that is unknown to incumbents when the choice $g_{dt}$ is made; however, both voters and legislators know the distribution from which $\alpha_t$ is drawn. The choice $g_{dt}$ is bound above by $\frac{\sigma_{dt} \Pi_t}{N_d}$. The parameter $\sigma_{dt}$ is the district’s share of the tax benefits where

$$\sigma_{dt} = \begin{cases} \frac{1}{S} & \text{if } s_{dt} = \text{senior in period } t \\ 0 & \text{if } s_{dt} = \text{junior} \end{cases},$$

and $S$ is the subset of senior legislators. Total tax revenue is represented by $\Pi_t$. The tax is assumed to be equal across all districts as is the number of voters and as a result $\Pi_t = \tau_t N_d D$. The function $I\{s_t\}$ equals 1 if the incumbent is senior. The period payoff for incumbent $d$ is:

$$U_{dt} = W + I\{s_t\} g_{dt} * N_d. \quad (3.2)$$

The term $W$ represents the legislator wage and perquisites guaranteed while in office. It is assumed that incumbents who lose reelection join an existing pool of legislators, $L - D$, earning a wage $w$ and can be elected again in the future. It is assumed that $W > w$. Challengers are not specifically modeled as they are integral only by their existence. It is assumed only senior incumbents choose $g_{dt}$.

For simplicity, the game is assumed to be finite with $T$ periods. The tax is simplified to be a binary decision where legislators vote either ‘yes’ or ‘no’ on taxing voters an amount equal to their endowment. Given the seniority structure, it is assumed throughout the rest of model that voters are always taxed such that the period payoff for a voter in a senior district is

$$U^{s}_{idt} = \alpha_t \left( B - g_{dt} \right), \quad (3.3)$$

where $B = \frac{\sigma_{dt} \Pi_t}{N_d}$. The period payoff for a voter in a junior district is

$$U^{j}_{idt} = 0. \quad (3.4)$$

The continuation payoffs for voters in senior and junior districts are respectively found in (3.5) and (3.6).
The variable \( c_t = \{I, C\} \) is the voter’s choice of either the incumbent or challenger where \( I\{I\} = 1 \) if the voter chooses the incumbent and \( I\{C\} = 1 \) if the voter chooses the challenger. The voter’s belief that the junior legislator will become senior in the next period if he is reelected is \( p_{idt+1} \). This is equivalent to believing that a senior incumbent as well as the junior incumbents ranked ahead of the legislator from district \( d \) will all lose reelection.

The continuation payoffs for senior and junior incumbents are found in (3.7) and (3.8):

\[
\begin{align*}
V_{dt}^s &= max_c \alpha_t (B - g_{dt}) + \gamma_t \left[ I\{I\} \left( \alpha_{t+1} (B - g_{dt+1}) \right) + I\{C\}(0) \right] \\
V_{dt}^j &= max_c 0 + \gamma_t \left[ I\{I\} \left( p_{idt+1} (\alpha_{t+1} (B - g_{dt+1})) \right) + (1 - p_{idt+1})(0) \right] + I\{C\}(0). \tag{3.6}
\end{align*}
\]

The term \( q_{dt+1} \) is the incumbent’s belief about reelection. Junior incumbents hold the same belief about becoming senior as their district voters.

In the first stage of each period the senior legislators choose \( g_{dt} \). In the second stage voters choose whether to keep the incumbent or elect a challenger. The game is played under a condition of common knowledge such that legislators and voters understand each others’ incentives. Allowing voters to use weakly dominant strategies results in the following equilibrium:

**Proposition 3.1:**

The stationary sub-game perfect equilibrium involves probabilities \( p = 0 \) for all voters and legislators and \( q = 1 \) for all legislators, such that incumbents are reelected every period. Senior incumbents choose \( g_{dt} \) such that the voters’ payoff is zero i.e. \( g_{dt} = B \).

A sketch of a proof provides the intuition about equilibrium. Voters reelect senior and junior incumbents, as they are indifferent between receiving zero from an opportunistic senior incumbent or a junior incumbent without sway in the legislature. Senior incumbents maximize their payoff (or minimize their effort) as a smaller \( g_{dt} \) leaves money on the table.

I propose that the incentives in the model are correct despite the model being stylized and the equilibrium extreme. According to the model the only information relevant to voters is their resulting payoff, but there is reason to believe that the revelation of legislators’ decisions will impact
voters’ choices by attributing outcomes either to nature or to the conscious decision of the agent. The experimental design varies the information that voters receive between being completely uninformed, fully informed or having the option to obtain costly information regarding the legislator’s decision, which is shared with their entire district. The costly public information treatment creates a public good problem, but it may remedy the coordination problem voters face if revealing information signals a voter’s willingness to punish excessive shirking. Without information it does not pay for a voter to react if he is uncertain other voters know or will react (Weingast 1997). There is also reason to believe that revealing information affects the behavior of elected officials. Its impact on politician behavior and voter response has been well documented (Besley and Burgess 2002; Djankov, McLiesh, Nenova, and Shleifer 2003; McMillan and Zoido 2004; Stromberg 2004; Ferraz and Finan 2008). Besley and Prat (2006) highlight the correlation between information and high incumbent turnover and low corruption emphasizing that information to the electorate is an essential component of accountability.

3.3 Experimental Design

The following are basic elements to the experimental design. Subjects will be referred to as either voters or legislators but context was not used in the experiment. The reader can find the instructions in the appendix. The parameters were chosen to be consistent with the pork-barrel experiment used in Rodet (2011). The general set up was \( D = 5 \), \( N_d = 3 \), and \( L = 10 \). Only five legislators were in office at one time and are referred to as being “active.” The other five are considered “inactive.” Of the five active legislators, the top three in terms of tenure were considered senior. In total twenty-five subjects were needed per session.

Active legislators received a salary of sixty cents each period, and inactive legislators decoded text strings for 2.5 cents for every correct code. Voters received an endowment of forty-five cents each period which was subject to taxation. Voters were taxed an amount equal to their endowment if the active legislators passed the tax. Only voters in senior districts stood to receive a positive share

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20 Peru’s ex-president Alberto Fujimori and his secret-police chief Vladimiro Montesinos Torres learned the hard way when the lone cable news channel that they did not bribe exposed the administration’s infractions. Montesinos deemed the channel too small to be considered a threat. Bribery efforts were concentrated in the television industry rather than newspaper because only the upper class was exposed to newsprint. Thus “it was not the elite whom Montesinos feared, but the masses.” (McMillan and Zoido 2004)

21 For a review of the possible down side to supplying the principal full information see Prat (2005).
of the tax revenue and could receive as much as seventy-five cents in a single period. This means voters in junior districts were left with nothing if the tax passed.

The efficiency variable $\alpha_t$ varied between $[1/3, 1]$ each period. The lower bound of $1/3$ was chosen so that the ex-ante expected value of the transfer to senior district voters was fifty cents. This was intended to be greater than the endowment so senior district voters would prefer that the tax passed but would still allow senior incumbents to hide their actions in the no-information treatment. The random draw each period was the same for each treatment and session. The legislators did not know the value of $\alpha_t$ when making their decisions, but all subjects knew the distribution from which the efficiency variable was drawn.

Each session featured twenty paying periods. The first five periods functioned as a control where legislators set taxes by simple majority rule. Groups were then randomized and the next 15 periods allowed for legislator shirking. Subjects were thoroughly instructed on the payoff structures and were told that the maximum amount a legislator could take per voter was seventy-five cents whereas the minimum was zero. Legislators and voters also had access to a calculator at the beginning of each period that allowed them to test different levels of efficiency as well as legislator graft.

3.3.1 Treatments

Each period of the experiment had two stages. In the first stage the active legislators made their choices and in the second stage voters decided whether to keep the incumbent legislator based on the information they were given. Stage 1 did not vary across treatments, but Stage 2 varied by the information voters received. While the model’s predictions rule out information influencing voter decisions, behavioral considerations as to whether voters respond differently to outcomes of chance and outcomes of strategy are important. In the baseline treatment voters are only informed of the resulting payoff each period and have no knowledge of the incumbent’s choices. Voters in the other treatments are either given information or can access it for a price.

3.3.1.1 No Information Treatment: In Stage 1 active legislators voted on the tax and each senior incumbent indicated how much of the voters’ transfers they would keep if the tax passed. In Stage 2 of this treatment voters saw their payoffs, but they did not see the value of $\alpha_t$, the legislator’s vote, or how much of the transfer the incumbent decided to keep. They voted on whether to keep the incumbent or not. Legislators saw their own payoffs, the value of $\alpha_t$ and their voters’ payoffs. Election results were announced within each district. If the incumbent stayed, the
voters were informed of the legislator’s seniority rank in the upcoming period. If the incumbent was voted out of office, the voters were informed of what their seniority rank would be with the incoming challenger.

3.3.1.2 Full Information Treatment: In this treatment voters saw their legislator’s tax vote, the value of $a_t$ and their payoffs. If the incumbent was senior they also saw how much the transfer he or she awarded themselves. A vote was then taken to determine the fate of the incumbent.

3.3.1.3 Costly Information Treatment: Here voters saw their payoffs, but did not see the value of $a_t$, the legislator’s tax vote, or how of the transfer was kept by the incumbent if he or she was senior. They had the option of paying five cents to reveal information to the group about the legislator’s decisions and the efficiency variable.22

3.3.1.4 Relative Information Treatment: This treatment differed from the Full Information case because voters not only saw the graft taken by their own senior incumbent, but all voters saw the graft taken by all senior incumbents. Incumbents did not see the graft taken by the others.

3.3.2 Hypotheses

We now arrive at the predicted legislator and voter behavior.

*Hypothesis 1:* Voters will always be taxed given the senior minimum winning majority in the legislature.

*Hypothesis 2:* Senior legislators take the largest graft possible from voters’ transfers (seventy-five cents per voter).

*Hypothesis 3:* Incumbents will always be reelected. The marginal voter cannot do any better by electing the challenger based on seniority rule.

*Hypothesis 4:* Information will not matter. Moreover, no voter will pay to reveal information in the Costly Information Treatment.

The hypotheses are stark and point to a possible weakness in the theoretical model. The role of information is absent from the model but it is the main experimental treatment. This is because there are important behavioral factors to consider including voters’ visceral reaction to discovering

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22 All voters had the option of paying the fee to reveal information, even those with a period payoff of zero. The bankruptcy rule instituted guaranteed that subjects leave with at least their participation fee of $10.
their payoff is not a result of nature but the choice of an elected individual to increase their own payoff at the voters’ expense. We know that behavior in the simple ultimatum game, of which the pork-barrel game is arguably an elaborate extension, does not align with theory. The Full Information treatment provides a direct comparison to the No Information treatment where any variation in behavior can be linked to the ability to directly attribute outcomes to legislators’ choices. The Costly Information treatment provides a rough measure of the willingness of voters to use information that is not given freely. The final hypothesis constitutes a true display of rational ignorance elucidated by Downs (1957) where voters free ride on others’ willingness to supply information. As he put it, “when benefits are indivisible, each individual is always motivated to evade his share of the cost of producing them.” The Relative Information treatment adds another wrinkle to the Full Information treatment that may affect a voter’s behavioral response by allowing them to compare their own incumbent’s behavior to others’. It is also likely that any difference in voter behavior will cause a reaction in legislator behavior because this is a repeated game.

### 3.4 Results

This section details the results from the eight sessions ran at the XSFS lab at the Florida State University. Subjects were recruited using the ORSEE online recruiting software (Greiner 2004). Two sessions of each treatment were run using twenty-five subjects each. This led to two-hundred subjects in all. The average payment was around $18 including a $10 participation fee for an hour in the lab. The aggregate results will follow the order of the hypotheses, followed by regression analysis of voter choice.

#### 3.4.1 Taxes

Voters were taxed virtually every period of each treatment as predicted. The legislators in the no-information (NI), full-information (FI), costly-information (CI) and relative information (RI) treatments passed the tax at respective rates of one-hundred percent, ninety-seven percent, one-hundred and ninety-seven percent of the time.

**Result 1:** Legislators pass the redistributive tax nearly one-hundred percent of the time in every treatment.

#### 3.4.2 Graft Taking
Figure 3.1 shows the mean legislator graft by treatment and by period bin. Each bin consists of three periods except for the fifth bin where the last period is excluded from the analysis. Right away it is apparent that senior legislators did not behave as predicted and took well below the maximum of seventy-five cents per subject. Panel A includes the instances where senior legislators took zero graft whereas Panel B shows the mean graft conditional on being greater than zero.
Simple indications that legislators were strategically concerned with voters’ responses are the last period jumps, which are not included in the figure. Initially there is not much difference between treatments, but the differences between the RI treatment and every other treatment in the fifth bin are statistically significant in both Panels A and B. Moreover, except for the third bin, the average graft in the RI treatment appears to be less than the mean in every other treatment. Table 3.1 shows the mean graft in cents per voter for each treatment as well as the mean graft conditional on being positive. Comparing the overall means reveals that the average graft was smaller in both the FI and RI treatments when compared to the NI case (t-stat 1.36 p-value 0.09 and t-stat 1.37 p-value 0.09 for FI and RI respectively). This suggests legislators reacted to the information treatments; however these differences disappear when looking at the conditional means. This implies that fewer legislators were inclined to take positive graft in the FI and RI treatment.

Table 3.1: Mean Graft Taken by Legislators

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean</th>
<th>Conditional Mean</th>
<th>Frequency</th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>12.31</td>
<td>14.57</td>
<td>71</td>
<td>85%</td>
</tr>
<tr>
<td>Information</td>
<td>(1.99)</td>
<td>(2.27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>8.97\textsuperscript{a}</td>
<td>15.14</td>
<td>48</td>
<td>59%\textsuperscript{c}</td>
</tr>
<tr>
<td>Information</td>
<td>(1.41)</td>
<td>(1.93)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costly</td>
<td>11.13</td>
<td>13.55</td>
<td>69</td>
<td>82%</td>
</tr>
<tr>
<td>Information</td>
<td>(1.64)</td>
<td>(1.87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative</td>
<td>8.58\textsuperscript{b}</td>
<td>11.21</td>
<td>62</td>
<td>77%</td>
</tr>
<tr>
<td>Information</td>
<td>(1.83)</td>
<td>(2.29)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}: Significantly different than NI Treatment (t-stat 1.36 p-value 0.09); \textsuperscript{b}: Significantly different than NI Treatment (t-stat 1.37 p-value 0.09); \textsuperscript{c}: Significantly lower than NI, CI and RI treatments (t-stats 2.78, 2.54 and 1.71; p-values 0.00, 0.01, 0.04); Numbers in parentheses are standard errors. * The overall mean is conditional on the tax passing which happened 84 out of 84 times (100%) in the NI Treatment, 81 out of 84 times (97%) in the FI Treatment, 84 out of 84 times (100%) in the CI treatment, and 81 out of 84 times (97%) in the RI Treatment.

Looking at the percentage of times a legislator took a positive graft gives the impression that the information unquestionably mattered to the subject legislators. In the FI treatment legislators

\textsuperscript{23} The mean is taken for only those periods that the tax passed.
\textsuperscript{24} Notice that the mean graft conditional on being positive is slightly higher in the FI treatment, which is counterintuitive. It is important to remember that the subject legislators did not know the value of the efficiency variable prior to making their decisions, so the means may differ according to the risk profiles of the subjects in each treatment.
only took positive graft fifty-nine percent of the time, whereas in the NI, CI and RI treatments it was eighty-five, eighty-two and seventy-seven percent of the time respectively. Tests reveal that the percentage in the FI treatment is statistically less than all other treatments (t-stat 2.78 p-value 0.00, t-stat 2.54 p-value 0.01 and t-stat 1.71 and p-value 0.04 for the NI, CI and RI treatments respectively), but there is no difference between the RI treatment and the NI and CI treatments (respective t-stat 1.07 p-value 0.14 and t-stat 0.84 p-value 0.20). We might interpret this to mean that legislators in the FI and RI treatments were both affected by information but in different ways. Legislators in the FI treatment were less likely to take any graft, but those that did took graft of similar magnitude. Legislators in the RI treatment took graft at the same rate as in the NI and CI treatments, but they were concerned about being the legislator taking the largest graft.

*Result 2: When information was freely available to voters (FI and RI treatments) the mean graft taken were significantly lower than when information was not freely available (NI and CI treatments). Legislators took graft less frequently in the FI treatment than any other treatment.*

Figure 3.2 tracks the mean graft by experience bins and by treatments. The bins are divided by three periods such that the first bin shows the average graft taken by incumbents with one to three periods of experience and so on. Experience measures their overall time spent as an active legislator and not necessarily their tenure in their current district. Interpreting these results is challenging because few people actually make it to the fifth bin. For example, in the RI treatment only three subjects are included in the fifth bin despite high reelection rates. One might expect that inexperienced legislators start low and increase graft as they start to learn what is acceptable to voters leading to an upward trend. The opposite is also possible if legislators only reach the fourth or fifth bin by keeping graft small. Of course, each district may obey a particular norm, so it is not obvious that there should be any recognizable trend within or between treatments.

According to the figure, there are slight upward trends in both the NI and CI treatments, which are arguably the treatments we might expect to see legislators “testing the water” and gradually becoming more daring knowing that voters are uninformed. This would imply that shirking becomes worse as incumbents gain experience when information is not freely available, but the differences between bins are not statistically significant and shirking never reaches the level predicted. The average graft stays relatively level as incumbents become more experienced in the FI

---

25 All of these results exclude the last period, but including it does not change anything.
treatment. This might indicate that incumbents were able to find a relatively stable level where they could enrich themselves and remain in office even when voters were fully informed. There appears to be a downward trend in the RI treatment where voters not only saw their own legislator’s graft but those taken by other senior incumbents as well. The difference between the first and fourth bins in this treatment is significant (t-stat 1.36 p-value 0.09). The difference between the first and fifth bins looks as though it should be significant, but this cannot be concluded given the small numbers problem. Analysis of reelection rates may shed more light on this. Although the graph does not paint a conclusive picture, regression analysis controlling for subject and group identity as well as treatment concludes that there is an overall upward trend in the size of graft as tenure increases.\(^{26}\)

![Figure 3.2: Mean Legislator Graft by Experience Bins](image)

**3.4.3 Reelection**

Figure 3.3 shows the mean reelection rates of incumbent legislators by treatment and by period bins. The data presented in Panel A includes all incumbents whereas Panel B includes only senior incumbents who take a positive graft.

\(^{26}\) Random effects regression where \( grafted \) is measured in cents per voter:

\[
grafted_{jdt} = \frac{2.83}{(2.50)} + \frac{0.86}{(0.15)} tenure_{jdt} - \\
\frac{1.09}{(1.68)} F1 + \frac{0.85}{(1.61)} CI + \frac{1.27}{(1.65)} RI - \frac{4.35}{(2.82)} efficiency_{t-1} + \frac{0.57}{(0.05)} graft_{jdt-1}; n = 517
\]
In general, reelection is not one-hundred percent in any treatment, but it is obvious that voters recognized the incentives created by the seniority rule by looking at the reelection of shirking senior incumbents. Averages push up against one-hundred percent most of the time except in the initial periods of the RI treatment. In the later periods of this treatment reelection rates for shirking senior incumbents continue at one-hundred percent, but this coincides with a drop in the average graft seen in Figure 3.1. One might expect that reelection rates would be higher in the NI treatment.
where voters could only guess whether it was nature or the incumbent who reduced their payoffs. In fact, the reelection rate falls below one-hundred percent in only two periods of the NI treatment. It would appear by comparing the NI and the RI treatment that providing full and relative information to voters changes the overall reelection rates of incumbents, but the differences at this level are not statistically significant.

Table 2.2: Reelection Rates by Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Overall</th>
<th>Senior Graft &gt; 0</th>
<th>Senior Graft = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>76% (0.04)</td>
<td>94% (0.03)</td>
<td>100%</td>
</tr>
<tr>
<td>Information</td>
<td>n = 140</td>
<td>n = 71</td>
<td>n = 17</td>
</tr>
<tr>
<td>Full</td>
<td>78% (0.04)</td>
<td>93% (0.04)</td>
<td>97% (0.03)</td>
</tr>
<tr>
<td>Information</td>
<td>n = 140</td>
<td>n = 48</td>
<td>n = 36</td>
</tr>
<tr>
<td>Costly</td>
<td>84% (0.03)</td>
<td>97% (0.02)</td>
<td>100%</td>
</tr>
<tr>
<td>Information</td>
<td>n = 140</td>
<td>n = 69</td>
<td>n = 15</td>
</tr>
<tr>
<td>Relative</td>
<td>76% (0.04)</td>
<td>87% (0.04)</td>
<td>100%</td>
</tr>
<tr>
<td>Information</td>
<td>n = 140</td>
<td>n = 62</td>
<td>n = 22</td>
</tr>
</tbody>
</table>

a: Significantly greater than NI Treatment (t-stat 1.63 p-value 0.05); b: Significantly less than CI Treatment (t-stat 1.49 p-value 0.06); c: Significantly less than NI Treatment (t-stat 1.46 p-value 0.07); d: Significantly less than CI Treatment (t-stat 2.17 p-value 0.02); e: Significantly greater than RI Treatment with graft>0 (t-stat 1.79 p-value 0.04); The last period of each treatment is excluded.

Table 3.2 shows that the averages over all periods reveal important differences when looking at senior incumbents who took a positive graft. The mean reelection rates of these incumbents were ninety-four, ninety-three, ninety-seven and eighty-seven percent respectively for the NI, FI, CI and RI treatments. The reelection rate of senior incumbents taking a positive graft in the RI treatment is significantly lower than related rates in the NI and CI treatments (t-stat 1.46 p-value 0.07 and t-stat 2.17 p-value 0.02 respectively). This is remarkable given that the average graft and frequency of graft taking were not different between these treatments. The reelection rates of senior incumbents who did not take a positive graft were one-hundred, ninety-seven, one-hundred and ninety-seven percent for the NI, FI, CI and RI treatments respectively. Differences within treatments would be key indicators that voters cared about graft, but clearly these differences are not significant for the NI, FI and CI treatments (t-stat 0.87 p-value 0.19, t-stat 0.73 p-value 0.23, and t-stat 0.66 p-value 0.26)
respectively). The difference is significant for the RI treatment (t-stat 1.79 p-value 0.04). Together these differences suggest that full information is not enough for voters to react to legislator behavior but that relative information is critical.

**Result 3:** The reelection rate of shirking senior incumbents when full and relative information is given to voters (RI treatment) is significantly lower than when information is not free (NI and CI treatments) or when voters only see their own incumbent’s choices (FI treatment). It is also significantly lower than non-shirking senior incumbents in the same information treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Overall</th>
<th>Senior Graft &gt; 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Information</td>
<td>86% (0.04)</td>
<td>80%&lt;sup&gt;a&lt;/sup&gt; (0.05)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 18</td>
</tr>
<tr>
<td>Full Information</td>
<td>94% (0.02)</td>
<td>82%&lt;sup&gt;b&lt;/sup&gt; (0.08)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 18</td>
</tr>
<tr>
<td>Costly Information</td>
<td>89% (0.04)</td>
<td>90%&lt;sup&gt;c&lt;/sup&gt; (0.03)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 15</td>
</tr>
<tr>
<td>Relative Information</td>
<td>85% (0.05)</td>
<td>84%&lt;sup&gt;c&lt;/sup&gt; (0.06)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 18</td>
</tr>
</tbody>
</table>

<sup>a</sup>: Significantly lower than overall rate (t-stat 1.71 p-value 0.05); <sup>b</sup>: significantly lower than overall rate (t-stat 1.77 p-value 0.05); <sup>c</sup>: significantly lower than overall rate (t-stat 2.06 p-value 0.03)

Looking at the overall reelection rate does not tell us how individuals voted and whether particular individuals consistently voted against a graft taking incumbent. Table 3.3 shows the average rates of voting for a senior incumbent by treatment as well as the average rates of voting for a shirking senior incumbent. The percentage of times an individual voted for the incumbent when he or she was senior was found for each voter and averaged by treatment. This was also done for the instances when voters had a senior incumbent who took a positive graft. For example, an individual voter in the NI treatment voted for a senior incumbent eighty-six percent of the time on average. In the same treatment a voter voted for a shirking senior incumbent eighty-percent of the time on average. Differences in the NI, FI and RI treatments are significant, though the averages remain high (t-stat 1.71 p-value 0.05, t-stat 1.77 p-value 0.05, and t-stat 2.06 p-value 0.03 respectively). This
suggests that some voters responded to shirking despite the fact that reelection rates of shirking incumbents were not significantly lower except for in the RI treatment. This reflects the classic collective action problem of changing the status quo in politics. We must be cautious in interpreting these results because various factors are not controlled for. Moreover, all voters are included in these figures including those voters that may have had a senior incumbent only once. This is why a more careful econometric analysis is done, but first the tendency to purchase information must be addressed.

### 3.4.4 Paying for Information

Subjects infrequently paid to reveal information as was predicted. Figure 3.4 shows a histogram of the total number of times a subject paid to reveal information. The mode occurs at zero whereas the average is 1.4 times per subject in the CI treatment. Eleven of the eighteen subjects that did pay to reveal information did so only once. There was one subject who paid for information every period. A voter was significantly more likely to pay for information following a negative change in his or her period payoff where a decrease of ten cents from one period to the next increases the likelihood a voter purchases information by three percent (p-value 0.00) when controlling for period and legislator rank. This is consistent with experimental work by Colliers, Ordeshook and Williams (1989) investigating rational ignorance, but it is not economically significant.

It is not clear that subjects were free riding on other district members to reveal the information because it does not appear that voters used the information in the FI treatment. If voters could reveal the incumbents relative shirking like in the RI treatments they may have revealed information more frequently. It appears that the usefulness of information was overridden by the seniority incentives reflected by the fact that incumbents were reelected in virtually every period in both the FI and NI treatments.

*Result 4: Voters use full and relative information when it is given to them (RI treatment), but they seldom pay to reveal information (CI treatment).*
3.4.5 Econometric Analysis

The main goal of the econometric analysis is to investigate voter choice. The model is found in (3.9), where the dependent variable is the probability of voting for the incumbent. The objective is to explain the decision to vote for a shirking incumbent, so the model pertains only to voters with a senior incumbent and the instances where the tax passed. Certainly a more general model can be derived, but this parsimonious model serves well. The decision is a function of their payoff for that period, which is in turn a function of the amount the legislator took from voter’s transfer share \((\text{graft}_{dt})\) as well as the efficiency variable, \(\alpha_t\). The voter’s profit is not incorporated because including all three variables would create a co-linearity problem. The vector \(T\) includes treatment variables indicating the FI, CI and RI treatments and their interactions with \(\text{graft}_{dt}\). Note that the reference group is the NI treatment. The final terms are individual and district specific factors.

\[
v_{idt} = \beta_1 + \beta_2 \text{graft}_{dt} + \beta_3 \text{efficiency}_t + \gamma T + \epsilon_{idt} + u_{dt}
\]  

(3.9)

Two concerns about estimating this model arise immediately. First is the high probability of idiosyncratic unobservable factors at the individual and district levels. These are easily taken care of using subject random effects. Second, and perhaps less obvious, is the possibility of correlation between the \(\text{graft}_{dt}\) variable with the district specific error term. This endogeneity stems from factors relating to the district’s legislator. Consider the model in (3.10) which is the incumbent’s decision of how much graft to take. It is a function of three main variables: the legislator’s tenure with the current district, \(\text{tenure}_{dt}\), his graft last period, \(\text{graft}_{dt-1}\), and the level of efficiency last
period, $efficiency_{t-1}$. The first variable implies that a high tenure type is likely to take a larger graft, hence the concern for endogeneity in (3.9). Remember that this variable was found to be highly significant in a simple random-effects estimation of (3.10). The legislator’s current decision to take may also be affected by the efficiency last period. Despite the independent draws of $\alpha_t$, the legislator may decide to take more this period believing that he will have more room to shirk this period if efficiency was high last period. On the other hand, if efficiency was low last period, he may be more cautious this period in how much he takes from the public account. The decision is also affected by the information treatment as well as an idiosyncratic factor.

$$
graft_{dt} = \delta_1 + \delta_2 tenure_{dt} + \delta_3 graft_{dt-1} + \delta_4 efficiency_{t-1} + \zeta T + \varphi_{jt}
$$

(3.10)

These factors can be controlled for by including the right hand side variables in (3.10) within (3.9). This leads to the specification of the estimated model in (3.11).

$$
v_{ldt} = \lambda_1 + \lambda_2 graft_{dt} + \lambda_3 graft_{jdt-1} + \lambda_4 efficiency_{t} + \lambda_5 efficiency_{t-1} + \lambda_6 tenure_{jdt} + \gamma T + \omega_{ldt}
$$

(3.11)

The results that follow in Table 3.4 are from four specifications using random effects logit estimation and pooled logit estimation with robust standard errors clustered at the district level. The pooled logit estimator is the partial MLE and is consistent and asymptotically normal without restrictive assumptions on the error terms; however, robust inference must be used to control individual serial correlation and correlation within groups. The first two specifications are regressions using the log of the legislator’s graft in cents along with interaction terms. The third and fourth use binary variables indicating the legislator took graft greater than or equal to the median across all treatments, which was five cents per voter. This was inspired by a noticeable regularity in the data where reelection rates were dramatically lower in the RI treatment if the incumbent took graft that was larger than the mean. The two constructs of the $graft$ variables are meant to display the robustness of the results. The reported results are simply coefficients and are not marginal effects. The NI treatment is the reference group.

In general we can say that a voter in the RI treatment was more likely on average to vote for an incumbent who did not take graft or took below the median indicated by the positive and significant coefficients on the treatment dummy. Moreover, voters responded in this treatment to graft taking and were significantly less likely to vote for a shirking incumbent evidenced by the negative and significant coefficients on the $graft$ variables and the interactions with the RI treatment.
dummy. Results also suggest that voters in the FI treatment were more likely to vote for the senior incumbent who did not take graft or took below the median, but the treatment dummy is not significant in all specifications.

Table 3.4: Probability of Voting for Incumbent

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>1 R.E. Logit</th>
<th>2 Pooled Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI</td>
<td>2.56*</td>
<td>1.33</td>
</tr>
<tr>
<td></td>
<td>(1.49)</td>
<td>(1.34)</td>
</tr>
<tr>
<td>CI</td>
<td>0.77</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>(1.48)</td>
<td>(0.63)</td>
</tr>
<tr>
<td>RI</td>
<td>2.50*</td>
<td>1.23**</td>
</tr>
<tr>
<td></td>
<td>(1.41)</td>
<td>(0.51)</td>
</tr>
<tr>
<td>Log Graft</td>
<td>-0.92***</td>
<td>-0.28</td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(0.23)</td>
</tr>
<tr>
<td>FI*Log Graft</td>
<td>-0.73</td>
<td>-0.47</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>CI*Log Graft</td>
<td>0.43</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>RI*Log Graft</td>
<td>-1.13**</td>
<td>-0.63***</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>Log Graft Lag</td>
<td>-0.41**</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.18)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Efficiency</td>
<td>3.39***</td>
<td>1.81***</td>
</tr>
<tr>
<td></td>
<td>(0.69)</td>
<td>(0.72)</td>
</tr>
<tr>
<td>Efficiency Lag</td>
<td>0.35</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>(0.63)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>Tenure</td>
<td>0.03</td>
<td>0.10**</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.05</td>
<td>-0.22</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(0.81)</td>
</tr>
<tr>
<td>Observations/Groups</td>
<td>1056/96</td>
<td>1056/96</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-280.98</td>
<td>-353.66</td>
</tr>
</tbody>
</table>

(***), (**) and (*) indicate p-values < 0.01, 0.05 and 0.10 respectively. Random effects are at the subject and district level. Numbers in parentheses are robust standard errors. Periods 1 through 19 used in reported results. Including the last period does lead to significant differences.
Table 3.4 Continued: Probability of Voting for Incumbent

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>3 R.E. Logit</th>
<th>4 Pooled Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI</td>
<td>2.29*</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>(1.29)</td>
<td>(0.97)</td>
</tr>
<tr>
<td>CI</td>
<td>0.24</td>
<td>-0.33</td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(0.46)</td>
</tr>
<tr>
<td>RI</td>
<td>1.59*</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>Graft&gt;Median</td>
<td>-1.33**</td>
<td>-0.97**</td>
</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>FI* Graft&gt;Median</td>
<td>-2.64**</td>
<td>-0.14</td>
</tr>
<tr>
<td></td>
<td>(1.29)</td>
<td>(1.06)</td>
</tr>
<tr>
<td>CI* Graft&gt;Median</td>
<td>1.39</td>
<td>1.36**</td>
</tr>
<tr>
<td></td>
<td>(1.11)</td>
<td>(0.61)</td>
</tr>
<tr>
<td>RI* Graft&gt;Median</td>
<td>-3.55***</td>
<td>-1.41***</td>
</tr>
<tr>
<td></td>
<td>(0.79)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Graft&gt;Median Lag</td>
<td>-0.61*</td>
<td>-0.26</td>
</tr>
<tr>
<td></td>
<td>(0.37)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>Efficiency</td>
<td>2.44***</td>
<td>1.60**</td>
</tr>
<tr>
<td></td>
<td>(0.59)</td>
<td>(0.72)</td>
</tr>
<tr>
<td>Efficiency Lag</td>
<td>0.63</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>(0.57)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>Tenure</td>
<td>0.00</td>
<td>0.07*</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.52</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>Observations/Groups</td>
<td>1056/96</td>
<td>1056/96</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-321.00</td>
<td>-384.33</td>
</tr>
</tbody>
</table>

(***) and (*) indicate p-values < 0.01, 0.05 and 0.10 respectively. Random effects are at the subject and district level. Numbers in parentheses are robust standard errors. Periods 1 through 19 used in reported results. Including the last period does lead to significant differences.

The variables log graft and graft>median consistently have negative and significant coefficient estimates, but the insignificance of the other treatment interactions for the most part suggests that voters responded on average to graft taking but there was not a significant difference between the NI, FI and CI treatments. The FI interaction term in the random-effects logit specification with
dummy variables for graft taking above the median is negative and significant but this is not the case in the other specifications. Remember that the reelection rates of shirking senior incumbents in these treatments were not significantly lower than the reelection rates of non-shirking incumbents. This is arguably an example of the collective action problem in politics where the pivotal voter must be prodded in order to affect the outcome. Apparently when voters were able to compare graft taking among all senior incumbents (RI treatment) they were able to categorize unacceptable behavior and coordinate on electing the challenger. It is important to recognize however that the reelection rate of shirking incumbents in the RI treatment was still high (eighty-seven percent) despite the significant difference between the reelection of shirking and non-shirking incumbents.

Result 5: Voters react significantly more to graft taking when they are given full and relative information (RI treatment). This effect translates into a lower reelection rate for shirking incumbents in the RI treatment.

3.5 Discussion and Conclusion

This paper investigates whether a legislative system that favors seniority in allocating transfers, i.e. pork, influences voters to disregard legislator shirking. Shirking can take many forms, but here it is modeled as graft taking. A model is constructed where pork is awarded according to seniority, and in equilibrium legislators use this to maintain incumbency even though they transfer all of the benefits to themselves. An experimental design was implemented where treatments vary the amount of information voters receive about incumbent choices to determine the impact it has on voters’ behavior.

Results suggest that information helped overcome the moral hazard problem by discouraging legislator shirking to some degree. Incumbents were less likely to shirk and to a lesser extent when full information about the incumbent’s choice was given to voters. When voters were able to compare their incumbent’s behavior to others’, legislators shirked at roughly the same frequency as when information was not freely provided, but to a lower degree. This suggests that incumbents were willing to take graft, but did not want to be the one taking the largest. Voters succumbed to the incentives of seniority evidenced by the insignificant differences in reelection rates between the NI, FI and CI treatments. Senior incumbents who took graft were almost always reelected even in the full information and costly information cases. However, providing voters with relative information about incumbent behavior significantly lowers the tolerance for a shirking
incumbent. Voters do not usually purchase information when it is costly, but they are significantly more likely to do so after experiencing a negative change in payoff from one period to the next.

Individual decisions are analyzed econometrically, revealing that the average voter in the RI treatment was significantly less likely to vote for a shirking incumbent than the voters in other treatments. The average voter in the NI, FI or CI treatment responded to graft taking but not to the extent that reelection rates in these treatments were affected. Thus the collective action inherent in politics is evident in the results.

A simple explanation for why reelection is so high in every treatment is the possible incongruity between voter expectations about incumbent behavior, which may be primed by the information treatments, and the low levels of shirking observed. Common knowledge of incentives possibly leads voters to form expectations about what their payoffs will be before playing a single round of the game. If subjects use backward induction to form an expectation that senior incumbents will leave them with little or nothing each period, than any amount greater than zero is acceptable, but evidence from the ultimatum game suggests most subjects do not reason this way. Even so, if they form some prior belief of receiving $0.45 > X > 0$ based on seniority advantage in the legislature, receiving an amount $X + \xi$ would give reason to reelect the incumbent. After all, it seems he or she is not as big a louse as expected. Subjects have been shown to react positively or negatively based on being treated fairly or not in distributive games (Charness and Rabin 2002). As shown above, the ex-post amount voters receive on average is much greater than the $40 – 50\%$ of the possible payoff usually seen in ultimatum games, let alone the equilibrium prediction. This might also explain the differences found in the RI treatment reelection rate where expectations are affected not only by the voter’s own legislator but what other senior legislators do.

Perhaps reelection rates would not be so high in a setting where junior voters do not make so little. Across all treatments fifteen senior incumbents lost reelection, but three of these instances occurred in the last three periods of the experiment. There were several districts that began with a senior incumbent and never elected a challenger: four in the NI treatment, two in the FI treatment, five in the CI treatment and two in the RI treatment. Of the districts that began with a junior incumbent, only one elected a challenger once senior status was achieved. The average wait for seniority after kicking a shirking senior incumbent out of office was 4.56 periods ($n=18$; st.dev. 3.55) with the maximum being eleven and the minimum being one period. This means that the voters gave up approximately $1.87$ on average when electing a challenger over a senior incumbent. The voters who kicked a senior incumbent out of office and never achieved seniority status again
averaged 6.5 periods (n=8; st.dev. 3.66) between the election of a junior challenger and the end of the game. These voters gave up $2.66 on average. Excluding the three cases where the incumbent left office with only three periods left to play increases this to $3.60. If we take nine cents per period as the average loss per voter in a senior district, where the ex-ante expected payoff is fifty-cents per period (75*2/3) and the ex-post expected payoff is forty-one cents period ((75-13.56)*2/3), keeping the incumbent and losing a total of forty-one cents over these 4.56 periods rather than electing a challenger and losing $1.87 is of course rational.

A simpler but rougher metric compares the average final earnings of the voters in the upper quintile of cumulative seniority to those in the bottom quintile. The number of periods a voter had a senior legislator in office were totaled and broken into quintiles. Those in the upper quintile averaged $6.34 in final earnings more than the voters in the bottom quintile of cumulative seniority. This is a substantial difference considering the average fee of $18 per subject, but it may be skewed by the districts that only achieved seniority status in the last two or three periods of the game; however, it still provides a look at what voters were potentially giving up by kicking a senior incumbent out of office.

Perhaps the cards were stacked against finding that voters would care about legislator behavior in this setting. The similar design between this experiment and that in Rodet (2011) allows us to compare voter reactions when graft taking is possible to when legislators can support a policy that the majority of voters disagree with. The policy choice in that paper centers on abortion, which was selected to induce hot cognitions (Zajonc 1980). Comparing reelection rates of shirking and non-shirking senior incumbents between the FI treatment and the No Term Limit treatment of that paper reveals that there is no statistical difference between treatments as shown in Table 3.5. However, there is a statistically significant difference within the No Term Limit treatment between shirking and non-shirking incumbents which is not present in the FI treatment. Thus it appears that voters care about shirking when it comes to a policy issue like abortion under a similar payoff and seniority rules.28

27 These totals were calculated using the average amount taken by legislators across all treatments (13.56 cents) and the expected transfer efficiency (2/3) and the average number of periods of seniority given up. So voters that achieved seniority a second time lost on average (75-13.56)*(2/3)*(4.56) = $1.87. Those that gave up seniority and never regained it gave up (75-13.56)*(2/3)*(6.5) = $2.66.

28 Important caveats include the difference in the number of periods, where the Policy Treatment only includes ten paying periods instead of fifteen, and the random efficiency variable that appears in this design.
Table 3.5: Comparing Reelection of Graft Taking and Policy Shirking Incumbents

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Shirking</th>
<th>No Shirking</th>
<th>P value (within)</th>
<th>P value (between)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graft FI</td>
<td>94% (0.04)</td>
<td>97% (0.03)</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>n = 48</td>
<td>n = 36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy</td>
<td>86% (0.07)</td>
<td>96% (0.03)</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 29</td>
<td>n = 52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rates only include senior incumbents and exclude the last period. Data from Rodet (2010) is from the three sessions that used the same five district design and had similar payoffs.

Finally, the possibility that voters were displaying other-regarding preferences by allowing fellow subjects to increase their payoff at the voters’ expense can be ruled out by the fact that active legislators are guaranteed sixty cents each period compared to the senior voters’ ex-ante expected payoff of fifty cents with zero graft. Subjects could not be so generous to want to give to others who are expected to make more each period. On the other hand, this also suggests a lack of inequality aversion for voters. Of course aggregating choices in the district masks the extent at which certain individuals display this aversion, but overall it appears that voters concentrate on their own payoff. Both disadvantageous inequality aversion between legislator and voter and advantageous inequality aversion between senior and junior voters would suggest lower reelection rates. Using a similarly modified version of Bolton and Ockenfels (2000) ERC model as implemented in Rodet (2011) let $\xi$ represent the proportion of relativist voters and $(1 - \xi)$ be of the proportion of egoist voters. A relativist voter will care about the difference between her own payoff and that of the incumbent, and will vote against the graft taking incumbent ($v = 0$). An egoist will simply maximize her own payoff and vote to reelect an incumbent regardless of the amount taken ($v = 1$). This simply means that the proportion of votes in favor of the incumbent is $\bar{p} = (1 - \xi) \cdot 1 + \xi \cdot 0 = 1 - \xi$. Thus, $\xi = 1 - \bar{p}$. This can be taken directly from the data. For all treatments combined $\xi = 28\%$. For the NI, FI, CI and RI treatments respectively, it measures as thirty-four, twenty-seven, twenty-one and thirty-two percent. Thus, even at the individual level, the proportion of subjects exhibiting other regarding preferences appears low.

From a policy perspective, providing information to voters slightly discourages incumbents from abusing the benefits of seniority. Two important design elements may have impacted the rate of shirking. First, graft could only be taken from the voters in the incumbent’s district rather than from general tax revenues. In a way, incumbents could put a face with the dollars they spent unlike
legislators in the US Congress. Second, the incumbents in the experiment could not psychologically defend their decisions as being good for the group as is often done when public officials are on fact finding trips to Italy. Creating some sort of barrier between voters and incumbents may have led to more shirking.

What then would mitigate the power of seniority in the legislature? Admittedly the model employed omits an arguably important fact that voters are represented by two legislators in the Senate instead of one as in the House of Representatives. Having two legislators representing the same electorate probably curbs some of this power because voters can balance representation with the combined seniority of both senators. Ignoring special interests, this may mean voters can kick out one senator for truly egregious shirking and still maintain some seniority. An increased emphasis on ethics investigations might also prove important. There is an obvious conflict of interest when an ethics committee is made up of senior legislators such as those found in both the House of Representatives and the Senate; however, the House of Representatives also employ an independent committee to act as a watchdog. The authority of this committee is naturally being questioned by those who stand to lose power sitting on the House’s internal ethics committee.
CHAPTER FOUR

WHY DRUG FACTIONS ALLOW MISSIONARIES TO OPERATE IN RIO’S FAVELAS

There exists a peculiar relationship between drug dealers, police and missionaries found in the favelas of Rio de Janeiro. Despite socio-political control drug factions allow peace workers to operate in their territories offering a substitute good. The objective is to explain why dealers allow the presence of competitive rivals. A model is developed that does not rely on irrationality or perverse form of altruism helps to illustrate a possible reason- to avoid costly conflict with corrupt police forces.

4.1 Introduction

Drug factions hold a powerful advantage in the one-thousand plus favelas, or shanty towns, around the city of Rio de Janeiro. These communities are expansive and improvised extension of the city where government is largely absent except for the militaristic attacks by police (da Silva 2000, Dowdney 2003). This absence has created a hole that has been effectively filled by local drug factions.29 Factions provide some services, but the provision is dependent on the personality of the local dono (faction leader) and is chiefly in the financial interest of the faction (Leeds 1996, Arias and Rodrigues 2006). Generally, the factions provide social order but it comes with a heavy price. The lei de silêncio, or “law of silence,” is a harsh unwritten code used in all communities as a means to garner cooperation from residents as well as keep the police out of sight (Dowdney 2003).30 Therefore, favela residents can disavow the drug factions, but only at a high cost.

Despite this control, it is extraordinary to consider the presence of various groups working to improve the lives of favela residents. The goals of these organizations are hardly consistent with the factions’ goals. Local NGOs, like Viva Rio and AfroReggae, work against violence and dissuade young people from joining the drug factions. International groups like Coca-Cola, the Ford Foundation and IBM are also working to improve public safety, community development and

29 The main factions include the Commando Vermelho (Red Command), Terceiro Commando (Third Command) and Amigos dos Amigos (Friends of the Friends).
education. Even more intriguing is the noticeable presence of local and international missionaries openly working to keep residents off drugs and persuading soldados (soldiers) to leave the factions. The fact that these groups are allowed to openly operate in the favelas seems to be a paradox in light of the tremendous control exhibited by the drug factions. In a way this is akin to an incumbent oligopolist allowing a producer of a substitute good to operate freely within its market. This paper attempts to explain this arrangement between the drug factions and missionaries.\textsuperscript{31} I propose a model that includes corrupt military police as a key component to this relationship.

Drug factions’ primarily sale cocaine and arms, but it is the control of favela residents that allows them to establish valuable protection rackets, clandestine businesses and political ties.\textsuperscript{32} Territorialism spurs extreme violence between the local faction and its rivals, including the police. Rivals seek to take over profitable bocas de fumo (points for selling drugs) or the favela entirely.\textsuperscript{33} Corrupt police forces enter favelas to broker deals with the local factions or to seize contraband, which they sell to rival factions. In extreme cases they drive factions out and assume control of trafficking and protection rackets (Leeds 1996, da Silva 2000, Misse 2007). Thus residents do not trust the police.

The next section describes the role of the factions, police and missionaries and the relationship each has with the favelas. Section 4.3 details the model and Section 4.4 concludes.

### 4.2 The Groups

#### 4.2.1 Drug Factions

Drug trafficking occurs in both poor and middle class areas of the city, but the extreme violence is only associated with the favelas because the lack of state presence has allowed drug factions to fill the role that city or state governments would normally fill. Members openly carry guns enforcing the local law, tax economic activity and operate informal courts. In 2009 Rio experienced over five thousand murders. Given a metropolitan area population of fourteen million, this is roughly forty murders per one-hundred thousand people, or six times the murder rate of New York City. Half of

\footnote{31}{I will use the term ‘missionary’ but this can be generalized to include the NGOs.}

\footnote{32}{See (Leeds 1996, Dowdney 2003, Arias and Rodrigues 2006) for the history and organization of the drug trade in Brazil.}

\footnote{33}{The latter does not happen quite as often due to certain ‘home-field’ advantages including geographical and personal familiarity with favela. Factions can only operate with the cooperation of residents, and a new faction that does not have personal ties or has not proved their superiority will not be successful in maintaining hold of new territory (Dowdney 2003).}
these murders were related to the drug trade (Parenti 2010). Favelas are traced back to 1898 when ex-slaves and soldiers from the conflict with Antonio Conselheiro sought to settle the hills outside the city, and from their inception the favela residents have been considered marginal. The housing crisis of the 1940s displaced more of the urban poor to the hillsides, and since then the government has sought to satisfy the upper class by segregating the favelas from the *asfalto* (literally the asphalt, used to imply middle-class/wealthy neighborhoods) (Leeds 1996, Pino 1997, Arias and Rodrigues 2006). Faction profits have primarily come from drugs and arms dealing since the introduction of cocaine from neighboring countries in the 1970s, but selling surreptitious cable TV and electricity hook-ups, running clandestine transportation fleets, selling bottled gas and protection racketeering have become more common as faction power has increased (Misse 2007).

Over one-thousand favelas are situated among Rio’s steep hills and they are an amalgamation of narrow improvised roads and pathways. Most are inaccessible to cars except for a few main roads. Thus, they are perfect real estate for illicit activities by providing natural protection to criminals familiar with the meandering alleys. Not only does the territorial advantage offer physical protection, but the absence of the state allows for socio-political domination of the community.

Only 1% of residents are involved in drug trafficking, but everyone faces uncertain danger (Dowdney 2003). Most deaths are connected to conflict with police or rival factions. Citizens’ improvised dwellings are no match for war-grade weapons, and congregating in public is always risky. Shops and schools are often closed due to armed conflict (Freire-Medeiros and Chinelli 2003). Nevertheless, social order in the favelas is high, and some residents claim to feel safer inside their community than outside of it. In fact, intentional violence against residents is uncommon in most favelas except when the *lei de silêncio* is broken. Thievery, fighting, domestic violence, rape and

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34 The use of the terms ‘favelas’ and ‘asfalto’ is common to distinguish between two very different worlds within the same city. Most of the favela residents are Afro-Brazilian whereas those from the wealthy neighborhoods are mostly white.

35 Leeds (1996) features an interview with one of the founding members of the Comando Vermelho explaining why they chose to enter the favelas specifically for the inaccessibility.

36 Innocent residents are often the victim of stray bullets. Police have been known to kill residents in retaliation against the drug factions, and afterward claim that those killed were dealers as in the Vigario Geral massacre. Human Rights Watch claims that armed conflict between police and drug factions kills over 1,000 civilians every year (The Economist 2010).

37 Arias and Rodrigues (2006) argue that this sense of safety is a ‘myth of personal security.’ At any moment favela residents could be victims to violence, but traffickers create a sense of safety through the enforcement of local norms.
murder are prohibited among the residents and faction leaders serve as judge and jury. Minor offenses such as stealing typically result in a warning or having a hand shot off, but punishment severity increases for repeat offenders. Rapists, murderers and anyone that cooperates with police are tortured and killed. Compliance does not guarantee safety but provides some predictability and security (Leeds 1996, Arias and Rodrigues 2006). Maintaining social order is not done in the interest of the residents, however; it is to prevent attracting police to the favela, which disrupts drug sales and typically results in costly armed conflict. Therefore, social order remains high in most favelas and the factions are the greatest beneficiaries.

Factions provide some public services, but the provision depends heavily on the local dono and current profits. Hierarchy changes that bring leadership from other areas are becoming more common and have curtailed many services (Arias and Rodrigues 2006). Community services include running water, supporting neighborhood associations and funding social activities such as dances called *bailes funk*. Food, money for school fees, and transportation to the hospital compose personal services, but these come at the high price of loyalty (Perlman 2004). It is a misconception to attribute this behavior to a distorted sense of altruism or paternalism. Although most faction members come from the favela and have personal ties to the community, their primary motive is profit. Residents accept the factions as a legitimate socio-political power because of fear and lack of alternatives (Leeds 1996, Dowdney 2003). Faction leaders know it is difficult to organize a drug network within the community without the cooperation. Complete control is desired and faction that fails to maintain its legitimacy can be forced out through protest or by cooperation with a nearby rival faction (Arias 2004, Arias and Rodrigues 2006). While this is extremely rare, tolerance for illicit activity requires incentive, especially when any resident might be forced to conceal and house faction members when police invade. Factions also support neighborhood associations organized to lobby city and state government for public services like health clinics in order to garner reciprocity from local leaders and acquire valuable political ties (Arias 2004). The neighborhood

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38 The rules and their enforcement vary across favelas according to the personality of the donos. The consequence one suffers also depends on the respect they have from the drug faction (Arias and Rodrigues 2006). Although the faction is the enforcer, random acts of violence against residents are often prohibited by faction leadership.

39 Anthropologists often like Perlman (2004) comment on the fear that residents have about speaking of the factions, but are quick to describe the brutal and corrupt ways of the police. As Perlman commented, “The police go home at night and leave them and their families at the mercy of those with weapons.” Also see Dowdney (2003).

40 Arias and Rodrigues (2006) describe other methods used by faction members to help residents to accept their behavior. For instance, if the faction wants to kill a particular person they begin talking about it before hand. The news spreads around the favela, and while this possibly allows the person to move from the favela before retaliation can occur, it also prepares the residents for the murder and explains to them why the person is being targeted. It allows residents to justify faction behavior.
dances, or *bailes funk*, are popular among residents but mainly serve to attract crowds of buyers from neighboring favelas. Therefore, these services enhance resident loyalty (and disloyalty to government agencies) and increases profitability (Leeds 1996).

### 4.2.2 The Police

Brazilian policing efforts are a state responsibility divided between two organizations. The military police are charged with preventing crimes and keeping the peace whereas the civil police are plainclothed officers responsible for investigating crimes. For two decades beginning in 1964, the state units of the military police were arms of the federal military forces and until now have maintained a militaristic approach of invading and occupying the favelas (Leeds 1996, da Silva 2000, Dowdney 2003). They enter the favelas in armored vehicles and military grade helicopters with heavy artillery. Officers are strangers to these communities and exhibit the tendency to treat everyone like a criminal. They are known for their brutality and criminality, invading the homes of innocent residents and torturing those arrested whether guilty or not. Residents feel abandoned by the government and are apprehensive in trusting the police because they have either witnessed or fallen victim to their brutality. Human Rights Watch estimated that Rio police kill 1,100 people every year, but in the past decade only four officers have been convicted of abuses (Parenti 2010). Many blame the police for causing favela youth to join the drug factions (Leeds 1996, da Silva 2000, Freire-Medeiros and Chinelli 2003, Arias 2004). In the past, police effort in the hills surrounding Rio was to control an ‘uncivilized’ and ‘unruly’ people whose vices and practices had pushed them to marginality (Jorge 2000). This mentality still remains. The upper-class has the resources for private security and the middle-class has political clout to get policies to protect its interests. This allows the police to act with impunity among the poor in the favelas (Arias and Rodrigues 2006).

Police corruption is a rampant problem, and many attribute the extortion and criminal activities to low wages. In 1966 legislation instituted harsh punishments for any and all drug offenses, which increased the incentive for traffickers to offer bribes if caught (Misse 2007). Police often accept bribes or seize contraband only to turn and sell it to rival factions or other buyers. Off-duty officers have been known to act as guns for hire. In extreme cases, the police expel the drug faction only to install their own power cell taking over protection rackets, drug sales and other

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41 There are instances where permanent police posts exist (The Economist 2010), but this only currently exists in seven out of over 1,000 favelas. For the most part the police function with an attacking strategy of invading and occupying. See also Huguet and Carvalho (2008).

Leeds (1996) interviewed high ranking police and justice officials who conceded that few crimes are committed without the knowledge and permission of the police. In the past its illicit activities were primarily related to the jogo de bicho (an illegal numbers racket), but have long since turned to extortion, kidnapping, and trafficking. If the police aren’t receiving payment from the local faction, they have essentially taken its place.

### 4.2.3 The Missionaries

The favelas have long been the focus of humanitarian work due to the extreme poverty and abandonment by local governments. In 1947 Catholic Cardinal Jaime Câmara founded the Fundação Leão XIII to provide financial assistance and political counseling. Dom Hélder Câmara, the Catholic Bishop of Recife and Auxiliary Bishop of Rio de Janeiro, launched the federally financed Cruzada São Sebastião apartment complex in the favela Praia do Pinto to house squatters willing to give up vices associated with the favela. In the 1970s, the Catholic Church created Pastoral da Favela to address the spiritual and material needs of residents (Pino 1997).

The country as a whole and the favelas in particular, are experiencing a large movement towards protestant religions. This movement began in the later part of the twentieth century and is due mostly to the efforts of missionaries from the United States and other Latin American countries. This work has proactively sought to confront issues like alcoholism, drug abuse, poverty and crime by emphasizing right living, education, family life and becoming a productive member of society. There has been noticeable success even in the face of the high cost of joining most sects. For instance, many members abstain from the use of tobacco, alcohol and sex outside the bonds of matrimony as well as follow strict guidelines regarding dress and acceptable social activities (McKinnon, Potter, and Garrard-Burnett 2008).

Today missionary work within the favelas is carried out by local churches as well as international denominations of various creeds. Some are independent church members that make local connections in order to preach and provide aid. Others are larger and more organized and internationally recognized entities that coordinate efforts geographically according to need and have their own facilities and local leadership. Missionaries and their organizations are documented and

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42 Mafra (2008) reports finding 33 “churches, projects and civil society initiatives,” in just the Pavão-Pavãozinho and Cantagalo favelas.
closely followed by federal and state governments. Missionary work includes service projects and disaster relief, as well as youth groups that provide alternatives outside of school that aim to keep them off drugs and out of drug gangs. Some missionaries plant independent churches where others seek to strengthen the local congregation of their particular sect. Though there exist differences in theology, all groups teach about the benefits that come from honest living and shunning vices such as promiscuity and drug abuse. Other international organizations that work or financially support work in the favelas are corporations aiding NGOs working to improve the lives of favela residents through education, social activities and interventions such as gun buy-back programs.

The fact that these groups are allowed to openly operate in the favelas seems to be a paradox in light of the tremendous control exhibited by the drug factions. One might argue that this is an example of offering a service to the community in exchange for cooperation, but this type of service is diametrically opposed to the factions’ business operations. The missionaries offer a substitute good to current drug buyers as well as potential users at a price that includes time and behavioral commitments. As the missionaries are more successful, faction profits tail off. The other ‘services’ factions provide can be directly linked to profit motives. Tolerating the dissuasion of loyal and potential customers seems hardly consistent with factions that ruthlessly defend profits. However, this arrangement may serve to protect faction interests by dissuading corrupt police forces from attempting to claim favela territory.

In a perfect world there would exist data portraying trends in faction profits as well as missionary activity in the favelas. One arguably good measure of missionary success is the rise of protestant religions in Brazil. At one time the country was the largest Catholic country in the world, but this has changed dramatically since the late 1980s (Birman and Leite 2000). Moreover, missionary work in the favelas is largely dominated by non-Catholic Christian religions.

An innocent favela resident almost certainly becomes a victim when police and factions engage in open conflict. This has been met with resident protest as well as faction retaliation, but the police report the dead to be linked to the drug trade. This is also true for the assassinations carried out in retaliation when dealers misstep. The news media report what is officially reported by the police, so it is essentially their word against that of the favela residents. The middle-class and wealthy want to believe that the police are making progress in the drug war because the favela

43 See http://www.brazilsf.org/visa_mission_eng.htm for the application process.
44 Although dated, Rubem Cesar Fernandes estimated that between 1993 and 1994 an average of over 100,000 citizens of Rio de Janeiro converted to a protestant religion.
45 This occurred after the Vitorio Geral incident.
residents are seen as marginal and are all believed to be part of drug trade (Dowdney 2003). However, a cover up of this sort is improbable if it were to involve international missionaries who are tracked by the federal government, belong to highly reputed organizations and have reputations with local residents. Therefore, the costs would be extremely high for the police if any missionary were a victim of its attempt to gain control of a favela. This helps explain why allowing missionaries to operate in the favelas is rational in the eyes of the traffickers. It reduces the risk of infiltration by police seeking to establish themselves in the favela.

4.3 The Model

The following section models the objectives of the drug factions and the police. Missionaries are not modeled as independent agents, but are a choice variable of the drug factions which maintain dominant positions in the favela. It is assumed that there is one police force and a total of \( D \) drug factions. Both entities are modeled as if headed by a single individual. That is, obstacles to internal decision making within the groups are ignored.

Each drug faction \( d \) is of equal size \( N_d, d = 1, \ldots, D \) and each controls a single favela, all of which are of equal size.\(^{46}\) The police seek to takeover a favela and supplant the current faction, or at least establish a source of revenue through extortion. This payoff is represented by \( W \). If a missionary is hurt or killed in a skirmish with a drug faction the payoff to the police is \( L \), and it is assumed \( W > 0 > L \). That is, there is a large cost, \( C \), if a missionary is involved where \( C = W - L \). There is no direct cost for involving a favela citizen in territorial disputes due to the bias in the media and upper classes.

A simple approach would assume any faction \( d \) has the choice to allow (\( A \)) missionaries to operate in its favela or not (\( DA \)) and assume the number of missionaries is equal in any favela where they are allowed to work. That is, each faction has a choice set \( X = \{Allow, Do \ Not \ Allow\} \). Allowing missionaries to operate reduces profits but reduces the chance of police attack. In general the payoffs for faction \( i \) can be expressed in the following way:

\[
U_d = R_d(N_d) - c_d(m_d) \quad \text{(4.1)}
\]

\[
U_d = R_d(N_d) - W - c_d(m_d) \quad \text{(4.2)}
\]

\(^{46}\) In reality, a single faction controls many favelas, but each dono operates largely independent from the others. For a detailed description of the hierarchy within the factions see Dowdney 2003.
The equations (4.1) and (4.2) express the payoff when an attack is avoided and when it is not. The first term on the right hand side of both equations represents the profitability of illicit activities in favela $d$ given the faction’s size $N_d$. The term $W$ represents the share the police are able to extract from favela profits. When the police are able to take complete control of the favela they capture all profits such that $W = R_d(N_d)$. If the police set up extortion payments in exchange for allowing operation then $W < R_d(N_d)$. The function $c(.)$ is the loss function attributed to missionary activity. It is assumed that $c(0) = 0$ and that the function is convex.

If the problem is approached as a type of sequential prisoner’s dilemma where the police refuse to attack any territory with missionary operations and randomly choose from the subset of factions that play DA, then it is straightforward to show that the one-shot pure strategy Nash equilibrium is for all factions to play $A$ if $W \geq c_i(m_i)$ for all $i$ as the probability of being attacked approaches one as the number of factions playing DA decreases. Each faction would be better off without missionaries operating in the favelas, but this is not a stable equilibrium and we find missionaries working to undermine the drug factions without interference. This implies that the police never attack any of the factions. We know this to be false, so structuring a more detailed problem will be insightful.

This problem can also be framed as a tournament where factions choose the number of missionaries allowed in the favela (see Lazear and Rosen 1981, Bull, Schotter and Weigelt 1987, and Orrison, Schotter and Weigelt 2004). Here the factions compete to not have the fewest number of missionaries operating in its favela. Once again, there are $D$ drug factions of size $N_d$, $d = 1, ..., D$. The faction $d$ chooses, $m_d$, the number of missionaries allowed to operate within its favela. The number can be anywhere on the range $[0, \bar{m}]$. There is imperfect detection by the police so that they perceive the number of missionaries in any favela $d$ to be:

$$y_d = m_d + \xi_d$$

(4.3)

The random variable $\xi_d$ is assumed to be identically and independently distributed uniformly on the support $[-a,a]$. This noise variable represents the difficulty the police have accurately monitoring missionary activity within a favela prior to deciding where to attack. This largely rules out the necessity of the police to randomize its choice of faction. Faction payoffs displayed in (4.4) and (4.5) show when it is able to avoid an attack and when it is not. A functional form is now given for the impact missionaries have on profits.

$$U_d = R_d(N_d) - \alpha_d m_d^2$$

(4.4)
The equation (4.5) shows that the amount of profit given up to the police is determined by the ratio of the number of faction members to the combined members of the faction and police where the size of the police force is \( P \). This is the classic Tullock contest success function that allows us to model the faction’s decision on expanding its numbers (Tullock 1980, Skaperdas 1992). Clearly, I am assuming that each faction member is armed and is involved in open conflict over territory. The profitability is now shown to be a function of \( N_d \) and is assumed to be concave. That is, a faction could increase its size to sell more drugs and to increase success against attack, but this comes at a cost, which is assumed to be captured in \( R_d(N_d) \). For now I will only address the symmetric pure strategy Nash equilibrium regarding missionary activity and assume that \( R_d = R_{d'} = R \ast \) and \( N_d = N_{d'} = N \ast \) for all \( d \neq d' \) thereby avoiding the factions’ decision regarding size and its impact on the police’s decision of which faction to attack.

Consider \( \lambda \) as the fraction of factions that avoid attack. For now \( \lambda N = N - 1.47 \) Define \( q(m_d, m_{-d}) \) as the probability that \( d \) is not attacked given the choices of its \( N - 1 \) rivals, \( m_{-d} \).

Equation (3.6) shows the faction’s expected payoff.

\[
E(U_d) = q(m_d, m_{-d})R_d(N_d) + (1 - q(m_d, m_{-d})) \left( \frac{N_d}{N_d + P} \right) R_d(N_d) - \alpha_d m_d^2
\]

This simplifies to (4.7).

\[
E(U_d) = \left( \frac{N_d}{N_d + P} \right) R_d(N_d) + q(m_d, m_{-d}) \left( \frac{P}{N_d + P} \right) R_d(N_d) - \alpha_d m_d^2
\]

The unique interior pure strategy Nash equilibrium is found using each factions first order condition.

\[
\frac{\partial E(U_d)}{\partial m_d} = \frac{\partial q(m_d, m_{-d})}{\partial m_d} \left( \frac{P}{N_d + P} \right) R_d(N_d) - 2 \alpha_d m_d = 0
\]

The first term of the second equality is the marginal benefit to a faction for allowing more missionaries. This is equal to the increased probability of avoiding attack, \( \frac{\partial q(m_d, m_{-d})}{\partial m_d} \), multiplied by the net benefit of avoiding attack, \( \left( \frac{P}{N_d + P} \right) R_d(N_d) \). The last term is simply the marginal cost of doing so. A unique maximum is insured by the assumed concavity of the profit function and

\[\text{In fact, this proportion could be decreased so that police attack more than one favela and the resulting equilibrium level of missionary activity will not change due to the assumption of the distribution of } \xi_d \text{, } d = \{1, \ldots, D\}.\]
convexity of the cost function. A symmetric equilibrium where \( m_d = m_d^* = m \) and \( \frac{\partial q(m_d, m - d)}{\partial m_d} = 1/2a \) leads to a clean closed form solution in (4.9).

\[
\frac{1}{2a} \left( \frac{P}{N_d + P} \right) R_d(N_d) = 2 \propto_d m_d \tag{4.9}
\]

Solving for \( m^* \) leads to (3.10).

\[
m^* = \frac{1}{4a \propto_d} \left( \frac{P}{N_d + P} \right) R_d(N_d) \tag{4.10}
\]

The necessary and sufficient condition that the equilibrium in (4.10) exists is \( 0 < \frac{1}{\propto_d} \left( \frac{P}{N_d + P} \right) R_d(N_d) < 4a \bar{m} \). The equilibrium level of missionary activity is greater than zero, and once again we see that although the faction’s payoffs would be larger by not allowing missionaries in the favelas, \( m^* = 0 \) is not a stable equilibrium as each faction has the incentive to encourage the police to attack one of its rivals. In the symmetric equilibrium each faction chooses the same level of missionary activity and faces the ex-ante probability of attack, \( \frac{1}{N_d} \). An intuitive result from (4.10) is that an increase in the size of the police, \( P \), leads to an increase in the equilibrium choice of \( m_d \), holding \( N_d \) fixed. This is because the loss from attack is greater and the faction is determined to avoid attack.

A common theme in the tournament literature is the existence of unequal participants where some are advantaged in sense of productivity or efficiency (O’Keeffe, Viscusi and Zeckhauser 1984). Intuitively, the effort of advantaged participants is a multiple (greater than one) of the effort of disadvantaged participants in equilibrium. In this context this would translate to more profitable factions allowing more missionary activity than the less profitable ones because the more profitable factions can afford the costs of missionary activity in order to avoid attack. The irony of this result is that missionary efforts are concentrated in areas where success is more difficult to achieve, based on the faction advantages.

Another way we might think of this problem is modeling faction bosses that control various favelas. This is perhaps more realistic because there exist a handful of factions that reign over several favelas. Suppose that each faction boss has inside information on the profitability of each faction controlled favela. We can model overall faction profit as the sum of profits from highly profitable favelas and not-so profitable favelas. For simplicity, assume that each faction controls two favelas where one is highly profitable and the other is not. Before explaining the model, I should point out that if we assume separability of profit functions, then nothing changes in equilibrium. Therefore I
assume that there are profit spillovers from missionary efforts within a faction but between favelas. Spillovers occur because some customers are mobile and increased missionary efforts in one favela make it more costly to buy where they normally do. I will call $B_i$ the expected profits for faction $i$, $i = 1, 2$. Each faction has a highly profitable favela, $d_i$, and not so profitable favela, $d_i'$. 

$$B_i = \left(\frac{N_{d_i}}{N_{d_i}+p}\right)R_{d_i}(N_{d_i}) + q(m_{d_i}, m_{d_i})\left(\frac{P}{N_{d_i}+p}\right)R_{d_i}(N_{d_i}) - \alpha_{d_i} m_{d_i}^2 + \gamma_{d_i} m_{d_i}^2 + \left(\frac{N_{d_i}}{N_{d_i}+p}\right)R_{d_i'}(N_{d_i'}) + q(m_{d_i'}, m_{d_i'})\left(\frac{P}{N_{d_i'}+p}\right)R_{d_i'}(N_{d_i'}) - \alpha_{d_i'} m_{d_i'}^2 + \gamma_{d_i'} m_{d_i'}^2 \quad (4.11)$$

This is simply the sum of the expected profit from both favelas. Notice the spillover coefficients $\gamma_{d_i}$ and $\gamma_{d_i'}$. The former represents the positive effect on profitability in the high profit favela from allowing missionaries into the low profit favela. The latter term is the equivalent for the low profit favela. In each case the spillover is less than perfect meaning $\alpha_{d_i} > \gamma_{d_i}$ and $\alpha_{d_i'} > \gamma_{d_i'}$.

The first order conditions for $m_{d_i}$ and $m_{d_i'}$ are

$$\frac{\partial E(B_i)}{\partial m_{d_i}} = \frac{\partial q(m_{d_i}, m_{d_i})}{\partial m_{d_i}}\left(\frac{P}{N_{d_i}+p}\right)R_{d_i}(N_{d_i}) - 2 \alpha_{d_i} m_{d_i} + 2 \gamma_{d_i} m_{d_i} = 0, \quad (4.12)$$

and

$$\frac{\partial E(B_i)}{\partial m_{d_i'}} = \frac{\partial q(m_{d_i'}, m_{d_i'})}{\partial m_{d_i'}}\left(\frac{P}{N_{d_i'}+p}\right)R_{d_i'}(N_{d_i'}) - 2 \alpha_{d_i'} m_{d_i'} + 2 \gamma_{d_i'} m_{d_i'} = 0. \quad (4.13)$$

Solving for both choice variables reveals how faction bosses will decide how to regulate missionary efforts.

$$m_{d_i} = \frac{1}{4(\alpha_{d_i} - \gamma_{d_i})}\left(\frac{P}{N_{d_i}+p}\right)R_{d_i}(N_{d_i}) \quad (4.14)$$

$$m_{d_i'} = \frac{1}{4(\alpha_{d_i'} - \gamma_{d_i'})}\left(\frac{P}{N_{d_i'}+p}\right)R_{d_i'}(N_{d_i'}) \quad (4.15)$$

Given the assumption that favela $d$ is more profitable based on the cost coefficient i.e. $\alpha_{d} > \alpha_{d'}$, and assuming that the spillover coefficient is equal in both directions ($\gamma_{d} = \gamma_{d'}$), it is easy to see that missionary effort will be higher in the more profitable favela. Also, if the spillover into the more profitable favela increases, more missionaries will be allowed to operate in the less profitable area.

Further expansions of the model might include spillover effects from the police attacking a rival such as increased drug sales, territorial expansion or deciding the size of troops ($N_d$ in the case of the factions and $P$ in the case of the police).

### 4.4 Conclusion
In the favelas of Brazilian cities like Rio de Janeiro, illicit activity is mixed with work done by NGOs and religious groups that aim to quell the effects of drugs and violence. Drug factions fight for complete control of every aspect of these communities, so the fact that they allow these ‘missionaries’ to operate within the favelas is a perplexing phenomenon. I propose a possible explanation that does not rely on irrationality or perverse altruism, but does rely on the existence of extreme police corruption. Although factions provide some services, they are the product of ulterior motives – making a profit, keeping order in the community and keeping the police out. Because of the ruinous effect of involving peace workers in territorial conflict, factions use missionaries to prevent attack from corrupt police forces. Thus in ultimate irony, the groups that profit from selling destructive goods promote, or at least do not inhibit, the work of those offering substitutes in order to protect operations from the envious grasp of those appointed to protect the citizens.
APPENDIX A

CHAPTER TWO EXPERIMENT INSTRUCTIONS
Thank you for coming on time and participating in today’s experiment. This is an experiment on decision-making and you will have the opportunity to earn money according to the choices you make. You are free to withdraw from the experiment without additional compensation and without incurring the ill will of the experimenters at any time. If you do so, you may keep the $10 show-up fee. Please do not talk during the experiment and do not use any device such as a cell phone, mp3 player or texting device. If you have a question, please raise your hand and I will be by to answer your question privately.

ROUND ONE

You have completed a short survey that included questions involving your preferences regarding certain political issues. While your responses will not directly affect your payoff, they will be used in today’s experiment.

The experiment consists of three rounds. The first round will last five periods. The second and third rounds will last ten periods each.

In today's experiment, each of you will be assigned roles. You have been randomly selected to be either a Type A player or a Type B player. There will be five groups of players in the experiment, and each group will have three Type A players and one Type B player. There are a total of 15 Type A players and 10 Type B players in the experiment. This means that at any point in time, half of the Type B players will be in a group and half of them will not. You will be informed of your role shortly, but first we will discuss the differences between types and how the groups work.

Type A players receive an endowment of 45 cents each period, which they will either keep or contribute to a public account that will be divided among the groups. Each period the Type B players from each group vote to decide how the Type A players will use their endowments. The outcome is determined by a simple majority rule. That is, if at least three Type B players vote for keeping the endowment, the Type A players keep their endowments that period. If at least three Type B players vote for contributing to the public account, the Type A players will contribute their endowments to the public account and may receive a portion of the overall sum. Type A players will see the outcome of the vote as well as the vote cast by the Type B player from their group. This will happen every period.

Type B players are either Active or Inactive. Whether a Type B player is Active or Inactive can change from period to period. Active Type B players belong to groups, vote and receive a salary of 60 cents each period for their participation in their groups. Inactive Type B players do not belong
to any group, do not vote and do not earn a salary. They are waiting for the opportunity to replace an Active Type B player. While they are waiting they will have a chance to earn some money in another activity decoding words for 2.5 cents for every correct code. I will explain how that works shortly.

After Active Type B players vote to determine how Type A players will use their endowments, the Type A players will see the outcome and vote within their group whether to keep the Type B player for the next period or replace them. If at least two Type A players from the group vote to keep the Type B player, he or she will stay for at least one more period. If at least two of the Type A players vote to replace the Type B player, that Active Type B player becomes Inactive and is replaced by a randomly chosen Inactive Type B player. Type A players will vote every period.

The table below summarizes the different roles and group make up.

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Now I will explain how the public account is split up. The amount a group receives from the public account is based on the tenure rank of its Type B player. That is, the Active Type B players will be ranked based on the number of consecutive periods they have been Active and this determines the amount their group gets from the public account. The Active Type B player that is ranked first has the highest number of consecutive periods as an Active Type B player, the second ranked has the second highest number of consecutive periods as an Active Type B player, and so on.

Tenure rank can change based on the groups’ decisions to keep or replace their Active Type B players. For example, if you are in a group whose Active Type B player is ranked 3rd, he or she has the third highest amount of consecutive periods of activity. If the 2nd ranked Active Type B player is replaced, then all the Active Type B players ranked lower than 2nd will move up in the
ranking. That is, the 3rd ranking Active Type B player will become the 2nd ranked Active Type B player, the 4th ranking Active Type B player will become the 3rd ranked, and so on. The Active Type B player ranked first will not be affected. If an Inactive Type B player becomes Active, they will begin at the bottom of the ranking. If more than one Type B player is activated at the same time, and thus have the same tenure, their ranks will be determined randomly.

The Type A players will know the ranks of each group’s Active Type B player. This will be indicated on the screen next to “Group X Rank: #”. The Active Type B players will know their own rank.

The three groups whose Active Type B players are ranked 1st, 2nd, and 3rd will receive 1/3 of the public account. This 1/3 will then be divided evenly among all the Type A players within those groups. The two groups whose current Type B players are ranked 4th and 5th will contribute to the public account, but will not receive a share when it is split up. To begin each round, the tenure rank will be randomly assigned to the Active Type B players. Thereafter, the tenure rank is determined by the number of periods as an Active Type B player.

If the Type A players keep their endowments, the public account contains nothing. If each Type A player contributes their 45 cents to the public account, there is 15 x 45 = 675 cents in the public account to be split up. (There are a total of 15 Type A players and each has 45 cents.) If your group receives 1/3 of the public account, it will receive 225 cents (675 x 1/3) to split among the Type A players, or 75 cents for each Type A player (225 x 1/3). When voting to determine how the Type A players will use their endowments, the Active Type B players as well as the Type A players will know how much their group will receive if the endowments are put into the public account.

To begin, the first round of five periods will function as I have explained. Half of the Type B players are Active and half are Inactive. The rank of Active Type B players has been randomly determined to begin the round.

The next screen will show you your role. If you are a Type A player you will also see your group number for this round. Remember you will be a Type A player for the entire experiment, but you will be in a new group each round. If you are a Type B player you will see whether you are Active or Inactive. Remember, you will be a Type B player for the entire experiment. When voting begins, the top of the screen will remind you of the Round and Period numbers and your role. If you are a Type A player you will see your Group number and your earnings for the entire experiment. If you are a Type B player you will see whether you are active or inactive, your tenure rank if you are active and your earnings for the entire experiment.
Decoding

I will quickly explain what the Inactive Type B players are doing while the others are voting. If you are Inactive you will see a screen like the one shown at the front of the room. You will be decoding lines of text and can earn 2.5 cents for every line of text you decode correctly. Notice the first box contains instructions and the second box contains the decoding key. You will use this to find the numbers that correspond to the letters given to you as shown. You will enter each number and hit “OK”. Notice the box in the lower left corner keeps track of the number of correct and incorrect codes, along with your earnings from decoding. These earnings will be added to any earnings you receive while playing as an Active Type B player. There is no limit on how many codes you can be paid for, but your time is limited by the amount of time it takes for the Active Type B players and Type A players to vote. After the Active Type B players vote there will be a short pause informing you that the Type B players have voted and where you will see your current status. After that you will continue decoding while the Type A players make their decisions.

If there are no questions we will begin the first round of the experiment. Please click the OK button at the bottom of your screen.

ROUND TWO

Type A players will now be assigned a new group and will remain in this group for the entire round. Your role as either a Type A or Type B player is the same as the previous round. Half of the Type B players begin the round Active and half begin Inactive. The group and rank of Active Type B players have been randomly determined to begin the round.

This round will last ten periods and will function similarly to the first round, but a new dimension has been added to the choice of the Type B players. Each period there is a sum of money to be donated to one of two foundations. Not only will the Active Type B players vote to determine how the Type A players use their endowments, they also vote to determine which foundation receives the donation. Remember that this sum of money does NOT affect your payoffs at the end of the experiment.

Each period there are 200 cents available to donate to one of two foundations. Those foundations are Pro-Choice America and the Pro-Life Action League. You have been given a description of each foundation. If at least three Active Type B players vote for Pro-Choice America, then the 200 cents will be added to a pot of money that will be sent to that foundation at the end of
the experiment. If at least three Active Type B players vote for the Pro-Life Action League, the 200
cents will go to that foundation at the end of the experiment. Type A players will see the outcome of
the vote as well as the vote cast by their group’s Type B player.

Active Type B players first vote on how Type A players will use their endowments, and then
vote on the donation. Before the vote the Type A players and Active Type B players will be shown
the foundation that the majority of Type A players in their group prefer. These preferences were
taken from the surveys you completed prior to participating in the experiment. Remember, the
foundation you prefer does not affect your payoffs, nor does the donation. After the Type B players
vote on both issues, the Type A players will see the outcomes of both votes and then vote on the
group’s Active Type B player just as you saw in Round One. The voting rules are the same in this
round.

Remember, the groups and the rankings of the Active Type B players have been randomly
determined to begin the round. The public account is divided in the same way as the previous
round. If there are no further questions, we will begin the second round.

ROUND THREE
Type A players will now be assigned a new group and will remain in this group for the entire round.
Your role as either a Type A or Type B player is the same as in the previous round. Half of the Type
B players will begin the round as Active and half will begin as Inactive. The group and rank of
Active Type B players have been randomly determined to begin the round.

This round will last ten periods and will function similarly to the second round. Each period,
Type B players vote to determine the use of Type A player’s endowments as well as vote to decide
how the donation will be allocated.

In this round Type B players will be limited in how many consecutive periods they can be
Active for a particular group. That limit is 2 consecutive periods. When an Active Type B player
reaches the 2 period limit, they automatically become Inactive and are replaced by a randomly
chosen Inactive Type B player. The Type A players of that group are informed that the Type B
player has reached the limit and they will not vote.

To begin the round, the three highest ranking Active Type B players face the limit after two
periods if they are not voted Inactive by their group members prior to the second period. The other
Active Type B players ranked 4th and 5th will then move up in rank and will face the 2 period limit in
the 3rd period if they are not voted Inactive by their group prior to the third period. If any Active
Type B player is voted Inactive in any period, the incoming Type B player faces the 2 period limit two periods after becoming Active regardless of their group or rank if they are not replaced before reaching the limit.

To be clear, the groups that begin the round with Active Type B players ranked 1st, 2nd and 3rd will face the two period limit in the second period of the round unless they vote to replace the Active Type B player before reaching the second period. The groups that begin the round with Active Type B players ranked 4th and 5th will face the two period limit in the third period of the round unless they vote to replace the Active Type B player before reaching the third period.

Remember, the groups and the rankings of the Active Type B players have been randomly determined to begin the round. The public account is divided in the same way as the previous rounds. The donation is determined the same way as before. If there are no further questions, we will begin the third round.
Welcome and thank you for participating in this survey. The following questions relate to current political issues. Completing this survey will allow you the chance to participate in a future study at XSFS, but you are not obligated to do so. Your answers are confidential and secured and will not be distributed to any other party for any other purpose. You are not required to answer any of the questions, but you are encouraged to answer as accurately as possible.

Participation in the survey is purely voluntary and does not affect your eligibility to participate in other XSFS studies. If you choose, you can leave the survey at any time and doing so will not prevent you from participating in other experiments.

1. The Pro-Life Action League was founded by in 1980 with the aim of saving unborn children through non-violent direct action. Members spread their message through non-violent protests, confronting abortionists, sidewalk counseling outside of abortion clinics and youth outreach programs.

How well do you identify with the Pro-Life Action League?

Strongly Do Not Identify
Do Not Identify
Somewhat Do Not Identify
Neutral
Somewhat Identify
Identify
Strongly Identify

2. For 40 years, NARAL Pro-Choice America has been the nation's leading advocate for privacy and a woman's right to choose. The organization works to elect Pro-Choice candidates and lobbies Congress to support Pro-Choice legislation.

How well do you identify with NARAL Pro-Choice America?

Strongly Do Not Identify
Do Not Identify
Somewhat Do Not Identify
Neutral
Somewhat Identify
3. As America's oldest civil rights organization, the Nation Rifle Association's (NRA) mission is to preserve and defend the U.S. Constitution, especially the inalienable right to keep and bear arms guaranteed by the Second Amendment.

When restrictive “gun control” legislation is proposed at the local, state or federal level, NRA members and supporters are alerted and respond with individual letters, faxes, e-mails and calls to their elected representatives to make their views known.

How well do you identify with the NRA?

Strongly Do Not Identify
Do Not Identify
Somewhat Do Not Identify
Neutral
Somewhat Identify
Identify
Strongly Identify

4. The Coalition to Stop Gun Violence (CSGV) seeks to secure freedom from gun violence through research, strategic engagement and effective policy advocacy.

CSGV is comprised of 48 national organizations working to reduce gun violence including religious organizations, child welfare advocates, public health professionals, and social justice organizations.

How well do you identify with CSGV?

Strongly Do Not Identify
Do Not Identify
Somewhat Do Not Identify
Neutral
5. Friends of the Earth are the world's largest grassroots environmental network and campaigns on today's most urgent environmental and social issues. It challenges the current model of economic and corporate globalization, and promotes solutions that will help to create environmentally sustainable and socially just societies.

How well do you identify with the Friends of the Earth?

Strongly Do Not Identify
Do Not Identify
Somewhat Do Not Identify
Neutral
Somewhat Identify
Identify
Strongly Identify

6. Generally speaking, do you consider yourself to be a(n):

Democrat
Independent
Republican
Libertarian
Socialist
Other (please specify) _________
Don't Know

7. Would you describe yourself as religious? Yes No

8. What, if any, is your religious preference?
Protestant
Catholic
LDS / Mormon
Jewish
Muslim
Other (specify) __________
No Preference / No religious affiliation
Prefer not to say

9. What is your age? _______

10. Are you male or female? _______

11. Are you?
   Single    Married    Divorced    Remarried    Committed

12. Are you a parent? Yes  No

13. What is your major? _____________

14. Which of the following best describes you?
   American Indian/ Native American
   Caucasian/ White
   African American/ Black
   Hispanic / Latino
   Asian
   Pacific Islander
   Other __________

15. What is your home state, district or territory? _______

16. How much of the time do you think you can trust government in Washington to do what is right?
17. Do you consider yourself politically active? Yes No
18. Did you vote in the last presidential election? Yes No
19. Did you vote in the last congressional election? Yes No
20. Did you vote in the last state elections? Yes No
21. If you would like to participate in a study related to this survey, please provide your name and the email address you use to receive emails from XSFS so that you can be invited to participate. ___________________ _______________

Thank you for completing the survey. Because of your participation, you are now eligible to participate in an upcoming experiment related to this survey.

The experiment connected to this survey will begin running in the near future and invitations for participating in it will be sent at that time.
No Information Treatment
Thank you for coming on time and participating in today’s experiment. This is an experiment on decision-making and you will have the opportunity to earn money according to the choices you make. Please do not talk during the experiment and do not use any device such as a cell phone, mp3 player or texting device. If you have a question, please raise your hand and I will be by to answer your question privately.

ROUND ONE

The experiment consists of two rounds. The first round will last five periods. First we will go over the instructions for Round One. In today’s experiment you will be assigned a role. You will be randomly selected to be either a Type A player or a Type B player. There will be five groups of players in the experiment, and each group will have three Type A players and one Type B player. There are a total of 15 Type A players and 10 Type B players in the experiment. This means that at any point in time, half of the Type B players will be in a group and half of them will not. You will be informed of your role shortly, but first we will discuss the differences between types and how the groups work.

Type A players receive an endowment of 45 cents each period, which they will either keep or contribute to a public account that will be divided among the groups. Each period the Type B players from each group vote to decide how the Type A players will use their endowments. The outcome is determined by a simple majority rule. That is, if at least three Type B players vote for keeping the endowment, the Type A players keep their endowments that period. If at least three Type B players vote for contributing to the public account, the Type A players will contribute their endowments to the public account and may receive a portion of the overall sum. This will happen every period.

Type B players are either Active or Inactive. Whether a Type B player is Active or Inactive can change from period to period. Active Type B players belong to groups, vote and receive a salary of 60 cents each period for their participation in their groups. Inactive Type B players do not belong to any group, do not vote and do not earn a salary. They are waiting for the opportunity to replace an Active Type B player. While they are waiting they will have a chance to earn some money in another activity decoding words for 2.5 cents for every correct code. I will explain how that works shortly.

After Active Type B players vote to determine how Type A players will use their endowments, the Type A players will see their own payoff and vote within their group whether to keep the Type B player for the next period or to replace them. The Type A players will not see the choice made by their group’s Active Type B player. The outcome is based on what the majority of the Type A players in the group vote for. If at least two Type A players from the group vote to keep the Type B player, he or she will stay for at least one more period. If at least two of the Type A players vote to
replace the Type B player, that Active Type B player becomes Inactive and is replaced by a randomly chosen Inactive Type B player. Type A players will vote every period.

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Now I will explain how the public account is split up. The amount a group receives from the public account is based on the tenure rank of its Type B player. That is, the Active Type B players will be ranked based on the number of consecutive periods they have been Active and this determines the amount their group gets from the public account. The Active Type B player that is ranked first has the highest number of consecutive periods as an Active Type B player, the second ranked has the second highest number of consecutive periods as an Active Type B player, and so on.

Tenure rank can change based on the groups’ decisions to keep or replace their Active Type B players. For example, if you are in a group whose Active Type B player is ranked 3rd, he or she has the third highest amount of consecutive periods of activity. If the 2nd ranked Active Type B player is replaced, then all the Active Type B players ranked lower than 2nd will move up in the ranking. That is, the 3rd ranking Active Type B player will become the 2nd ranked Active Type B player, the 4th ranking Active Type B player will become the 3rd ranked, and so on. The Active Type B player ranked first will not be affected. If an Inactive Type B player becomes Active, they will begin at the bottom of the ranking. If more than one Type B player is activated at the same time, and thus have the same tenure, their ranks will be determined randomly.

The Type A players will know the ranks of each group’s Active Type B player. The Active Type B players will know their own rank.

The three groups whose Active Type B players are ranked 1st, 2nd, and 3rd will receive 1/3 of the public account. This 1/3 will then be divided evenly among all the Type A players within those groups. The two groups whose current Type B players are ranked 4th and 5th will contribute to the public account, but will not receive a share when it is split up. To begin each round, the tenure rank will be randomly assigned to the Active Type B players. Thereafter, the tenure rank is determined by the number of periods as an Active Type B player.
The public account is subject to efficiency problems such that the total amount distributed from the account may be less than the amount contributed by all of the Type A players. We’ll call this efficiency variable \( \alpha \) and it is randomly drawn between 1/3 and 1. It will be randomly drawn each period.

If the Type A players keep their endowments, the public account contains nothing. If each Type A player contributes their 45 cents to the public account, there is \( (15 \times 45) = 675 \) cents in the public account to be split up. (There are a total of 15 Type A players and each has 45 cents.) If your group receives 1/3 of the public account, it will receive \( \alpha \times 225 \) cents \( (\alpha \times 675 \times 1/3) \) to split among the Type A players, or \( \alpha \times 75 \) cents for each Type A player \( (\alpha \times 225 \times 1/3) \). That means that a Type A player that receives a positive share of the public account can receive as much as 75 cents if \( \alpha = 1 \) and as little as 25 cents if \( \alpha = 1/3 \). Remember that each Type A player begins with 45 cents each period.

For example, suppose that the Active Type B players decide that the Type A players will contribute their endowments to the public account. Also, suppose the randomly drawn value of \( \alpha \) is 0.85. The payoff to the Type A players in this group would be \( 0.85 \times 75 = 63.75 \) cents for that period. The Active Type B player’s payoff would be 60 cents for that period.

The Type B players DO NOT know the value of \( \alpha \) when making their decision regarding the endowments of the Type A players. However, while the Active Type B players are making their decisions, they will have a calculator that they can try different values of the efficiency variable, \( \alpha \), to see what payoffs are possible for the Type A players if they contribute their endowments to the public account. The Type A players will also have the same calculator. After the Type B players’ votes are counted the Type A players will not see the value of the efficiency variable, \( \alpha \), nor the vote cast by the group’s Active Type B player or the result, but they will see their resulting payoffs. They will then make their decisions regarding the group’s Type B player.

We will go through a few examples using the calculator so you have an idea how it works and what the numbers mean.

To begin, the first round of five periods will function as I have explained. Half of the Type B players are Active and half are Inactive. The rank of Active Type B players has been randomly determined to begin the round.

If you are a Type A player you will also see your group number for this round. Remember you will be a Type A player for the entire round. If you are a Type B player you will see whether you are Active or Inactive. Remember, you will be a Type B player for the entire round. When voting begins, the top of the screen will remind you of the Round and Period numbers and your role. If you are a Type A player you will see your Group number and your earnings for the entire experiment. If you
are a Type B player you will see whether you are active or inactive, your tenure rank if you are active and your earnings for the entire experiment.

Decoding

I will quickly explain what the Inactive Type B players are doing while the others are voting. If you are Inactive you will see a screen like the one shown at the front of the room. You will be decoding lines of text and can earn 2.5 cents for every line of text you decode correctly. Notice the first box contains instructions and the second box contains the decoding key. You will use this to find the numbers that correspond to the letters given to you as shown. You will enter each number and hit “OK”. Notice the box in the lower left corner keeps track of the number of correct and incorrect codes, along with your earnings from decoding. In order for the code to count as correct, you must get the entire string correct. These earnings will be added to any earnings you receive while playing as an Active Type B player. There is no limit on how many codes you can be paid for, but your time is limited by the amount of time it takes for the Active Type B players and Type A players to vote. After the Active Type B players vote there will be a short pause informing you that the Type B players have voted and where you will see your current status. After that you will continue decoding while the Type A players make their decisions.

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The public account is subject to efficiency problems such that the total amount distributed from the account may be less than the amount contributed by all of the Type A players. We’ll call this efficiency variable $\alpha$ and it is randomly drawn between (1/3) and 1. It will be randomly drawn each period.

If the Type A players keep their endowments, the public account contains nothing. If each Type A player contributes their 45 cents to the public account, there is $(15 \times 45) = 675$ cents in the public account to be split up. (There are a total of 15 Type A players and each has 45 cents.) If your group receives 1/3 of the public account, it will receive $\alpha \times 225$ cents ($\alpha \times 675 \times 1/3$) to split among the Type A players, or $\alpha \times 75$ cents for each Type A player ($\alpha \times 225 \times 1/3$). That means that a Type A player that receives a positive share of the public account can receive as much as 75 cents if $\alpha = 1$ and as little as 25 cents if $\alpha = 1/3$. Remember that each Type A player begins with 45 cents each period.

For example, suppose that the Active Type B players decide that the Type A players will contribute their endowments to the public account. Also, suppose the randomly drawn value of $\alpha$ is 0.85. The payoff to the Type A players in this group would be $0.85 \times 75 = 63.75$ cents for that period. The Active Type B player’s payoff would be 60 cents for that period.
The Type B players DO NOT know the value of \( \alpha \) when making their decision regarding the endowments of the Type A players. However, while the Active Type B players are making their decisions, they will have a calculator that they can try different values of the efficiency variable, \( \alpha \), to see what payoffs are possible for the Type A players if they contribute their endowments to the public account. The Type A players will also have the same calculator. After the Type B players’ votes are counted the Type A players will see the value of the efficiency variable, \( \alpha \), the vote cast by the group’s Active Type B player, and the voting result as well as their resulting payoffs. They will then make their decisions regarding the group’s Type B player.

We will go through a few examples using the calculator so you have an idea how it works and what the numbers mean.

To begin, the first round of five periods will function as I have explained. Half of the Type B players are Active and half are Inactive. The rank of Active Type B players has been randomly determined to begin the round.

The next screen will show you your role. If you are a Type A player you will also see your group number for this round. Remember you will be a Type A player for the entire round. If you are a Type B player you will see whether you are Active or Inactive. Remember, you will be a Type B player for the entire round. When voting begins, the top of the screen will remind you of the Round and Period numbers and your role. If you are a Type A player you will see your Group number and your earnings for the entire experiment. If you are a Type B player you will see whether you are active or inactive, your tenure rank if you are active and your earnings for the entire experiment.

**Decoding**

I will quickly explain what the Inactive Type B players are doing while the others are voting. If you are Inactive you will see a screen like the one shown at the front of the room. You will be decoding lines of text and can earn 2.5 cents for every line of text you decode correctly. Notice the first box contains instructions and the second box contains the decoding key. You will use this to find the numbers that correspond to the letters given to you as shown. You will enter each number and hit “OK”. Notice the box in the lower left corner keeps track of the number of correct and incorrect codes, along with your earnings from decoding. In order for the code to count as correct, you must get the entire string correct. These earnings will be added to any earnings you receive while playing as an Active Type B player. There is no limit on how many codes you can be paid for, but your time is limited by the amount of time it takes for the Active Type B players and Type A players to vote. After the Active Type B players vote there will be a short pause informing you that the Type B players have voted and where you will see your current status. After that you will continue decoding while the Type A players make their decisions.
If there are no questions we will begin the first round of the experiment. Please click the OK button at the bottom of your screen.

**Costly Information Treatment**

Thank you for coming on time and participating in today’s experiment. This is an experiment on decision-making and you will have the opportunity to earn money according to the choices you make. Please do not talk during the experiment and do not use any device such as a cell phone, mp3 player or texting device. If you have a question, please raise your hand and I will be by to answer your question privately.

**ROUND ONE**

The experiment consists of two rounds. The first round will last five periods. First we will go over the instructions for Round One. In today’s experiment you will be assigned a role. You will be randomly selected to be either a Type A player or a Type B player. There will be five groups of players in the experiment, and each group will have three Type A players and one Type B player. There are a total of 15 Type A players and 10 Type B players in the experiment. This means that at any point in time, half of the Type B players will be in a group and half of them will not. You will be informed of your role shortly, but first we will discuss the differences between types and how the groups work.

Type A players receive an endowment of 45 cents each period, which they will either keep or contribute to a public account that will be divided among the groups. Each period the Type B players from each group vote to decide how the Type A players will use their endowments. The outcome is determined by a simple majority rule. That is, if at least three Type B players vote for keeping the endowment, the Type A players keep their endowments that period. If at least three Type B players vote for contributing to the public account, the Type A players will contribute their endowments to the public account and may receive a portion of the overall sum. Type A players will see their payoff for the period. This will happen every period.

Type B players are either Active or Inactive. Whether a Type B player is Active or Inactive can change from period to period. Active Type B players belong to groups, vote and receive a salary of 60 cents each period for their participation in their groups. Inactive Type B players do not belong to any group, do not vote and do not earn a salary. They are waiting for the opportunity to replace an Active Type B player. While they are waiting they will have a chance to earn some money in another activity decoding words for 2.5 cents for every correct code. I will explain how that works shortly.

After Active Type B players vote to determine how Type A players will use their endowments, the Type A players will see their own payoff and vote within their group whether to keep the Type B player for the next period or to replace them. The Type A players will not see the choice made by their group’s Active Type B player. The outcome of the vote is based on what the majority of the
Type A players in the group vote for. If at least two Type A players from the group vote to keep the Type B player, he or she will stay for at least one more period. If at least two of the Type A players vote to replace the Type B player, that Active Type B player becomes Inactive and is replaced by a randomly chosen Inactive Type B player. Type A players will vote every period.

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Tenure rank can change based on the groups’ decisions to keep or replace their Active Type B players. For example, if you are in a group whose Active Type B player is ranked 3rd, he or she has the third highest amount of consecutive periods of activity. If the 2nd ranked Active Type B player is replaced, then all the Active Type B players ranked lower than 2nd will move up in the ranking. That is, the 3rd ranking Active Type B player will become the 2nd ranked Active Type B player, the 4th ranking Active Type B player will become the 3rd ranked, and so on. The Active Type B player ranked first will not be affected. If an Inactive Type B player becomes Active, they will begin at the bottom of the ranking. If more than one Type B player is activated at the same time, and thus have the same tenure, their ranks will be determined randomly.

The Type A players will know the ranks of each group’s Active Type B player. The Active Type B players will know their own rank.

The three groups whose Active Type B players are ranked 1st, 2nd, and 3rd will receive 1/3 of the public account. This 1/3 will then be divided evenly among all the Type A players within those groups. The two groups whose current Type B players are ranked 4th and 5th will contribute to the public account, but will not receive a share when it is split up. To begin each round, the tenure rank
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After the Type B players’ votes are counted the Type A players will not see the value of the efficiency variable, $\alpha$, nor the vote cast by the group’s Active Type B player or the result, but they will see their resulting payoffs. They will then make their decisions regarding the group’s Type B player.

We will go through a few examples using the calculator so you have an idea how it works and what the numbers mean.

To begin, the first round of five periods will function as I have explained. Half of the Type B players are Active and half are Inactive. The rank of Active Type B players has been randomly determined to begin the round.
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Full and Relative Information Treatment

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If there are no questions we will begin the first round of the experiment. Please click the OK button at the bottom of your screen.
APPENDIX D

PERMISSION LETTERS AND HUMAN SUBJECTS APPROVAL LETTERS
Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM (for change in research protocol)

Date: 10/19/2009

To: Cortney Rodet

Address: 2180
Dept.: ECONOMICS

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research (Approval for Change in Protocol)
Project entitled: Seniority Advantage in Pork- Barrel Legislation

The form that you submitted to this office in regard to the requested change/amendment to your research protocol for the above-referenced project has been reviewed and approved.

Please be reminded that if the project has not been completed by 9/8/2010, you must request renewed approval for continuation of the project.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: David Cooper, Advisor
HSC No. 2009.3480
SUBJECT'S CONSENT FORM

PURPOSE
I am being invited to participate voluntarily in this research experiment to study the economics of decision-making.

SELECTION CRITERIA
I am a randomly recruited undergraduate student at Florida State University. Only persons 18 years of age or older may participate, and I affirm that I am 18 years of age or older.

PROCEDURE
This experiment will last up to 2 hours. I will be assigned to a computer terminal by chance, “like the flip of a coin” or “random arrival.” Prior to the experiment I completed a short survey about my attitudes towards various issues and I will be playing a series of games with other participants.

PARTICIPATION COSTS AND SUBJECT COMPENSATION
In addition to the $10 for showing up on time and participating, I have the opportunity to earn additional compensation, which will be based upon my decisions, the decisions of others who are in the experiment, and the rules within which those decisions are made. I am free to ask any questions about the rules as to how my compensation will be determined. Any compensation I receive as a result of my participation in this experiment may be reported for taxation purposes to appropriate federal and state agencies, but the results of the study will remain confidential and will not be forwarded to tax authorities. I am free to withdraw from the experiment without additional compensation and without incurring the ill will of the experimenters at any time. If I do so, I may keep my $10 show-up fee. I understand that I may be asked to leave the experiment, following a verbal warning, if I engage in disruptive behavior such as talking with other subjects during the experiment or using electronic devices such as a cell phone or pager. If I am asked to leave the session, I will be paid all earnings up to the time I leave and will bear no financial penalties.

RISKS AND BENEFITS
There are no known health risks or health benefits for this experiment beyond those from any other typical activity in a Florida State University classroom or computer lab.

CONFIDENTIALITY
The confidentiality of any personal information will be protected to the extent allowed by law. To the extent allowed by law, our rules is that only the researcher and any research assistants conducting this experiment may know what my earnings are (subject to tax reporting requirements above) and only researchers affiliated with the experimental economics research group at Florida State University may have access to the data with my name. My name will not be reported with any results related to this research.

CONTACTS
I can obtain further information from (If I have questions concerning my rights as a research subject, I should contact the Human Subjects Committee office at 850-644-8836.

BEFORE GIVING MY CONSENT THE METHODS, CONVECENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I HAVE BEEN ANSVERED ANY TIME AND I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING HARM FEELINGS. MY PARTICIPATION IN THIS PROJECT MAY BE END BY THE INVESTIGATOR OR BY THE SPONSOR FOR REASONS THAT WOULD BE EXPLAINED, BUT WHICH WOULD NO BAD EFFECTS BEYOND THIS EXPERIMENT. SHOULD NEW INFORMATION BECOME AVAILABLE DURING THE COURSE OF THE STUDY ABOUT RISKS OR BENEFITS THAT MIGHT AFFECT MY WILLINGNESS TO CONTINUE IN THIS RESEARCH PROJECT, IT WILL BE GIVEN TO ME AS SOON AS POSSIBLE. THIS CONSENT FORM WILL BE FILED IN A LOCKING FILE CABINET IN THE RESEARCHER'S OFFICE OR IN THE LOCKER PROVIDED TO AN AUTHORIZED REPRESENTATIVE OF THE FLORIDA STATE UNIVERSITY ECONOMICS DEPARTMENT. I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY MY CONSENT. A COPY OF THIS CONSENT FORM WILL BE GIVEN TO ME UPON REQUEST.

Name (Please Print) ___________________________ Date ____________

Signature ___________________________

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Please be reminded that if the project has not been completed by 9/8/2010,  
you must request renewed approval for continuation of the project.  

By copy of this memorandum, the chairman of your department and/or your major  
professor is reminded that he/she is responsible for being informed  
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should review protocols as often as needed to insure that the project is  
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There are no known health risks or health benefits for this experiment beyond those from any other typical activity in a Florida State University classroom or computer lab.

CONFIDENTIALITY
The confidentiality of any personal information will be protected to the extent allowed by law. To the extent allowed by law, our rule is that only the researcher and any research assistants conducting this experiment may know what my earnings are (subject to tax reporting requirements above) and only researchers affiliated with the experimental economics research group at Florida State University may have access to the data with my name. My name will not be reported with any results related to this research.

CONTACTS
I can obtain further information from the University Ethics Department. If I have further questions concerning my rights as a research subject, I should call the Human Subjects Committee office at 850-644-8836.

BEFORE GIVING MY CONSENT, THE METHODS, INCONVENIENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I MAY ASK QUESTIONS AT ANY TIME AND I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING BAD FEELINGS. MY PARTICIPATION IN THIS PROJECT MAY BE ENDED BY THE INVESTIGATOR OR BY THE SPONSOR FOR REASONS THAT WOULD BE EXPLAINED, BUT WHICH WILL CARRY NO BAD EFFECTS BEYOND THIS EXPERIMENT. SHOULD NEW INFORMATION BECOME AVAILABLE DURING THE COURSE OF THIS STUDY ABOUT RISKS OR BENEFITS THAT MIGHT AFFECT MY WILLINGNESS TO CONTINUE IN THIS RESEARCH PROJECT, IT WILL BE GIVEN TO ME AS SOON AS POSSIBLE. THIS CONSENT FORM WILL BE FILED IN A LOCKING FILE CABINET IN THE RESEARCHERS OFFICE WITH ACCESS RESTRICTED TO AN AUTHORIZED REPRESENTATIVE OF THE FLORIDA STATE UNIVERSITY ECONOMICS DEPARTMENT. I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY MY CONSENT. A COPY OF THIS CONSENT FORM WILL BE GIVEN TO ME UPON REQUEST.


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Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2742  
(850) 644-8673 · FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 9/22/2010
To: Cortney Rodet
Address: 2180
Dept.: ECONOMICS

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research  
Seniority Advantage in Pork-Barrel Legislation

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 9/20/2011, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are
advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc: David Cooper, Advisor
HSC No. 2010.4764
SUBJECT'S CONSENT FORM

PURPOSE
I am being invited to participate voluntarily in this research experiment to study the economics of decision-making.

SELECTION CRITERIA
I am a randomly recruited undergraduate student at Florida State University. Only persons 18 years of age or older may participate, and I affirm that I am 18 years of age or older.

PROCEDURE
This experiment will last up to 2 hours. I will be assigned to a computer terminal by chance, “like the flip of a coin” or “random arrival.” I will be completing a short survey about my attitudes towards various issues and playing a series of games with other participants.

PARTICIPATION COSTS AND SUBJECT COMPENSATION
In addition to the $10 for showing up on time and participating, I have the opportunity to earn additional compensation, which will be based upon my decisions, the decisions of others in the experiment, and the rules within which those decisions are made. I am free to ask any questions about the rules as to how my compensation will be determined.

Any compensation I receive as a result of my participation in this experiment may be reported for taxation purposes to appropriate federal and state agencies, but the results of the study will remain confidential and will not be forwarded to tax authorities. I am free to withdraw from the experiment without additional compensation and without incurring the ill will of the experimenters at any time. If I do so, I may keep my $10 show-up fee. I understand that if I may be asked to leave the experiment, following a verbal warning, if I engage in disruptive behavior such as talking with other subjects during the experiment or using electronic devices such as a cell phone or pager. If I am asked to leave the session, I will be paid all earnings up to the time I leave and will bear no further penalties.

RISKS AND BENEFITS
There are no known health risks or health benefits for this experiment beyond those from any other typical activity in a Florida State University classroom or computer lab.

CONFIDENTIALITY
The confidentiality of any personal information will be protected to the extent allowed by law. To the extent allowed by law, our rule is that only the researcher and any research assistants conducting this experiment may know what my earnings are (subject to tax reporting requirements above), and only researchers affiliated with the experimental economics research group at Florida State University may have access to the data with my name. My name will not be reported with any results related to this research.

CONTACTS
I can obtain further information from the experimenters at the Florida State University economics department. If I have questions concerning my rights as a research subject, I should call the Human Subjects Committee office at 850-644-8836.

BEFORE GIVING MY CONSENT, THE METHODS, INCONVENIENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I MAY ASK QUESTIONS AT ANY TIME AND AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING HARM TO OTHERS. MY PARTICIPATION IN THIS PROJECT MAY BE ENDED BY THE INVESTIGATOR OR BY THE SPONSOR FOR REASONS THAT WOULD BE EXPLAINED, BUT WHICH WILL CARRY NO BAD EFFECTS BEYOND THIS EXPERIMENT. SHOULD NEW INFORMATION BECOME AVAILABLE DURING THE COURSE OF THIS STUDY ABOUT RISKS OR BENEFITS THAT MIGHT AFFECT MY WILLINGNESS TO CONTINUE IN THIS RESEARCH PROJECT, IT WILL BE GIVEN TO ME AS SOON AS POSSIBLE. THIS CONSENT FORM WILL BE FILED IN A LOCKING FILE CABINET IN THE RESEARCHERS OFFICE WITH ACCESS RESTRICTED TO AN AUTHORIZED REPRESENTATIVE OF THE FLORIDA STATE UNIVERSITY ECONOMICS DEPARTMENT. I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY MY CONSENT. A COPY OF THIS CONSENT FORM WILL BE GIVEN TO ME UPON REQUEST.

Name (Please Print) ___________________________ Date ___________________________

Signature ___________________________

FSU Human Subjects Committee Approved 9/21/10. Void after 9/20/11. HSC # 2010.4764
REFERENCES


BIOGRAPHICAL SKETCH

Education

The Florida State University, PhD, Economics, 2011
The Florida State University, M.S., Economics, 2008
Southern Utah University, B.S., Economics, Summa Cum Laude, 2006

Major Fields of Interest

Political Economy, Public Choice, Experimental Economics

Dissertation

Title: Essays and Experiments in Political Economy
Committee: David J. Cooper (advisor), R. Mark Isaac, Randall J. Holcombe, Charles Barrilleaux, John T. Scholz

Teaching Experience

Instructor of Record- Political Economy, Principles of Macroeconomics, Principles of Microeconomics
Teaching Assistant- Introductory Econometrics, Business Mathematics

Research Experience

Research Assistant, Experimental Social Science at Florida State Research Group (XS/FS), 2008 – 2010, 2011
Research Assistant, David J. Cooper, 2007-2008
Research Assistant, R. Kim Craft, 2006

Publications


Working Papers


"Negative Reinforcement Spillovers," with Glenn Dutcher and David Dickinson

Awards

NSF Dissertation Improvement Grant 2010, $5,025
BB&T Bank Dissertation Fellowship 2009-2010
Young Scholars Award winner, Association for Private Enterprise Education, 2010
Irvin and Peggy Sobel Award for Best PhD Candidate, 2009
Chosen as Graduate Student Representative for FSU at Southern Economic Association Conference 2009, San Antonio, TX
John and Hallie Quinn Fellowship in Experimental Economics, 2008-2009
Chosen to participate in the IFREE workshop on Experimental Economics at Chapman University, 2009
John Gapinski Award, First Year Graduate Student of the Year, The Florida State University, 2007
The Wall Street Journal Award, Outstanding Student in Economics, Southern Utah University, 2006

Presentations
"Voter Behavior and Seniority Advantage in Pork Barrel Politics"
   Southern Economic Association Conference 2009, San Antonio, TX
   APEE meetings, 2010, Las Vegas, NV
   Public Choice Society Meetings, 2011, San Antonio, TX
"Praise and Profits: Cultural and Institutional Determinants of Entrepreneurship"
   APEE meetings, 2010, Las Vegas, NV
"Golf Trips to Scotland: An Experimental Investigation of Voter Incentives"
   Southern Economic Association Conference 2010, Atlanta, Georgia

Professional Associations

Service
Assistant Scout Master in Boy Scouts of America Troop 122, Tallahassee, Florida

Specialized Skills
Software: *Z-Tree, ORSEE, Stata*
Languages: English (native), Portuguese (fluent)