Modeling Targeted Distribution with Multi-Actor Parties

Edwin JW Camp

Yale University

Department of Political Science

October 19, 2011

This writing sample is chapter 2 from my dissertation: "Making the Mare Go: The Internal Organization and Electoral Success of Political Machines."

The neoclassical literature on clientelism finds that targeted and contingent resources can boost vote share and mitigate risk through a variety of mechanisms.[1] Yet, many scholars have observed that the intermediaries who are responsible for boosting vote share and mitigating risks often prioritize their own power or consumption of resources over the objectives of party leaders.[2] I also contend that intermediaries use targeted and contingent resources to augment their power. However, I assume that these intermediaries must bargain with party leaders who use resources to win elections.[3] With this approach, the formal analysis developed in this chapter answers a central puzzle for this thesis: *How do party leaders extract the effort from party intermediaries that is necessary to make political machines effective vote-getting organizations?* The analysis also specifies the costs of relying upon a large number of intermediaries to undertake a substantial amount of work.

By making intra-party dynamics between brokers and party leaders a central focus for this thesis, the framework shows how a broker's pursuit of his own power and resources can be both a source of strength and weakness for a political machine. Brokers who pursue their own power can bargain for too many resources, which limits their party's vote-getting capacity. However, through the pursuit brokers of their own power can be driven to undertake a substantial amount of effort to increase their party's vote-getting capacity. By identifying mechanisms through which brokers can both hinder and advance their party's efforts to win elections, the analysis gener-

[1] e.g. Nickerson 2008, Kitschelt and Wilkinson 2007, Stokes 2007, 2005; Medina 2007; Magaloni et al 2004; Diaz-Cayeros et. al. 2006.

[2] e.g. Szwarcberg 2009; Auyero 1999, 2000, 2006; Scott 1977, Scott 1969

[3] I do not consider how targeted and contingent resources can be used to mitigate risk, although in future research, this objective should be considered in a multi-actor framework.

ates predictions regarding the internal organization and electoral success of political machines.

1 The General Framework

In the model two parties, $p \in \{1, 2\}$ compete for the support of G groups of voters. Each party has an exogenously fixed amount of resources that is defined as R_p. Each party must propose a division of R_p between the groups of voters. Thus, the proposals for party p consist of a vector that specifies the share of the per-capita resources it will distribute to each group: $\gamma^p = \{\gamma_{pg}\}\ \forall g \in G$.[4] The first subscript on the policy parameter denotes the party that is proposing the policy. The second subscript on the policy parameter denotes the group that is targeted for a particular policy proposal.

Within each group of voters, there is a continuum of voters who are indexed by a partisan preference for party 2, which is defined X_{gi} where g denotes the group and i denotes each individual within a group. X_{gi} is normally distributed over the support

[4] Polices of this nature might include the social welfare and employment programs such as Argentina's various Planes programs, Mexico's PRONASOL and New Haven's 1974 jobs program under Title I of CETA. Resources may also consist of more quotidian items such as food distributed through soup kitchens and other resources that brokers use to solve everyday problems of voters. At a more abstract level these policies might characterize discretionary resource distribution generally.

Currently the model does not include public goods. While the omission of public goods may strike some as an unrealistic simplification, programs such as Argentina's Trabajar, Mexico's PRONASOL and New Haven's CETA underscore the relevance of this model. In the analysis of these programs, scholars often ask how electoral calculations affect the distribution of targeted resources. In these articles, scholars do not analyze broad policy platforms, but instead focus upon targeted distribution within narrowly defined programs (e.g. Calvo and Murillo 2007; Diaz-Cayeros et. al. forthcoming; Giraudy 2007; Johnston 1979; Weitz-Shapiro 2006). Adding public goods to the model could provide an interesting extension, but it would also introduce additional assumptions about the relationship between public and targeted goods.

$(-\infty, \infty)$ with a cumulative distribution function of $\Phi_g(.)$. $\Phi_g(.)$ has a mean of μ_g and a standard deviation of σ_g. Group g has a population share of the total polity that is defined as F_g, where $\sum_{g \in G} F_g = 1$.

An individual i from group g will derive the following utilities from party 1's and party 2's policy proposals:

$$u_{ig}(\gamma_{1g}) = Log[\gamma_{1g} + 1] \tag{1}$$

$$u_{ig}(\gamma_{2g}) = Log[\gamma_{2g} + 1] + X_{gi} \tag{2}$$

An individual's voting decision is determined by the policy proposals of the two parties and the individual's partisan bias towards party 2. Each individual's utility functions are positive strictly concave functions of the per-capita resources that each party proposes to give to the individual's group. Also, each individual derives additional utility of X_{gi} from voting for party 2.

The voter i in group g who is indifferent between voting for party 1 and 2 is defined by equation (3).

$$X^*_{gi} = Log[\gamma_{1g} + 1] - Log[\gamma_{2g} + 1] \tag{3}$$

Party 1's vote-share is a weighted sum of the vote shares from each group that party 1 receives and will be defined as:

$$\pi(\gamma^1, \gamma^2) = \sum_{g \in G} F_g * \Phi_g(X^*_{gi}(\gamma_{1g}, \gamma_{2g})) \tag{4}$$

Each party is comprised of a party leader and a broker who are engaged in Nash bargaining. A party leader prefers a resource allocation among the groups that maximizes the vote share for her party. Conversely, each broker represents a particular group and attempts to maximize the amount of resources that a party distributes to the group that she represents.

For each party there is one set of groups that are represented by brokers in the party and this set's complement defines the groups that are not represented by brokers in the party. $\dot{G}$ is the set of groups that have brokers in party 1 and its complement $\dot{G}^c$ defines the groups that do not have a broker in party 1. $\ddot{G}$ is the set of groups that have a broker in party 2 and its complement $\ddot{G}^c$ defines the groups that do not have a broker in party 2. A group cannot have a broker in both parties and thus, $\dot{G} \cap \ddot{G}$ is an empty set. If all groups have a broker in one of the two parties, then a group that does not have a broker in one party will have a broker in the opposing party and thus, $\dot{G} \equiv \ddot{G}^c$ and $\ddot{G} \equiv \dot{G}^c$. Finally, brokers do not represent more than one group.

In party 1, the party leader's utility function is defined as:

$$U_1(\gamma^1, \overline{\gamma}^2) = \pi(\gamma^1, \overline{\gamma}^2) \tag{5}$$

where $\overline{\gamma}^2$ is the vector party 2's policy proposals in the model's equilibrium, which is defined below.

In party 2, the party leader's utility function is defined as:

$$U_2(\overline{\gamma}^1, \gamma^2) = 1 - \pi(\overline{\gamma}^1, \gamma^2) \tag{6}$$

where $\overline{\gamma}^1$ is the vector of party 1's policy proposals in the model's equilibrium which is defined below.

A broker's utility functions is defined as:

$$U_{pg}(\gamma_{pg}) = (Log[\gamma_{pg} + 1])^r \tag{7}$$

Since the broker is bargaining with a party leader over the distribution of resources and the distribution of resources occurs after the bargain has taken place, the broker's utility function defines a broker's expected utility. The utility function is a Von Neumann-Morgenstern utility function. By taking the logarithm of $\gamma_{pg} + 1$, I am assuming that the broker is risk adverse because he experiences diminishing increases in utility with increases in per capita resources. r is defined as $r \in [0, 1]$ and is a weight on the broker's utility function that is designed to prevent corner solutions, in which the broker's group receives all of the resources that a party can allocate. In the comparative statics below, I set $r < 1$ to generate more interior solutions that better illustrate the insights of the model.

The utility function assumes that brokers are perfect agents of the districts or groups that they represent because their power is based on the number of voters they can control.[5] Implicitly, I assume that brokers maximize these resources as a means to obtaining power in their community and party.[6] Additional resources give brokers

[5]Other assumptions regarding a broker's motives are plausible. Instead of maximizing access to resources a broker may be motivated purely by ideology or the private consumption of state resources. Empirically brokers are probably motivated by a combination of power, consumption and ideology. The intensity of each motivation probably varies with context. However, in this thesis I present evidence that brokers are not motivated purely by ideology. Supporting this assumption, Kitschelt (2010) uses the degree of ideological cohesion of party actors as a criterion to distinguish programmatic and non-programmatic parties. Camp and Szwarcberg (2010) assume that brokers are primarily motivated by private consumption. Personal empowerment and consumption have enough empirical support to rigorously consider their theoretical and empirical implications.

[6]In the model a broker's power is defined quite precisely as the amount of voters in her group

more control over the distribution of resources in their party and more control over the voters' behavior in their networks.

Finally, the per-capita, rather than total, amount of resources is an appropriate measure of a broker's power in his community. A broker is more powerful within his community when he has more resources relative to the amount of voters that he is trying to organize. Effectively this means that brokers who organize small groups of voters will place a high priority on receiving resources, even if the amount of these resources is very small relative to the party's overall budget. For example, while a party might have thousands of monthly subsidies to distribute to voters, receiving just a few of these subsidies could have important implications for a neighborhood broker. With just a few subsidies, a broker might be able to make several families indebted to him, which could have substantial implications for his power in a small neighborhood.

Each party has a budget constraint that defines the total amount of resources the party can distribute and the amount of resources that are wasted when a party distributes resources to a particular group. The budget constraint is defined as:

$$B(\gamma^p) = R_p - \sum_{g \in G} F_g * (\gamma_{pg} + \eta_{pg}\gamma_{pg}) \geq 0 \tag{8}$$

where R_p denotes the per-capita amount of resources available for a party to distribute with discretion and γ^p is the vector of policy proposals for party p. R_p is

that support her party. For example, consider a broker who organizes a neighborhood. Within his community, a measure of his power could be the percentage of voters in his neighborhood that he can deliver for any given candidate, because it indicates the amount of influence he has in his community. This same measure could measure the power that a broker holds within his party, because it is the basis of his bargaining strength against party leaders who distribute resources and appointments to political offices and state jobs.

exogenous.[7] $\eta_{pg}\gamma_{pg}$ is the cost of distributing targeted resources to a particular group and $\eta_{pg} \in [0, 1]$.[8] $\gamma_{pg} \geq 0, \forall p, g$, which means that a party cannot extract resources from any particular group.

I interpret η_{pg} as a measure of a broker's inefficiency in converting resources into votes. As a broker becomes more effective, she lowers η_{pg}. η_{pg} is similar to a leaky bucket parameter in Dixit and Londregan (1996). However, instead of viewing this parameter as a fixed characteristic that defines the relationship between a group and their party, I assume that brokers can affect its value. While η_{pg} is defined exogenously, I assume that the broker is the actor who can make voters within his group more responsive to resources. However, decreasing η_{pg} requires costly effort on the part of the broker, which prevents her from simply setting this parameter to its lowest possible value. In the current framework, I leave this parameter as a black box to because the model is already complicated. However, in future work this parameter could be endogenized to a broker's decision regarding the amount of costly effort that he will supply.

Empirically, I assume that η_{pg} will be determined by a broker's charisma, mobilizational skills, effort and reputation. Brokers target resources and make resources

[7]While clientelistic resources may come from taxation, the primary objective of this model is to analyze targeted distributions through intra-party bargaining dynamics in a setting of inter-party competition. Conflict over redistributive as well as distributive policies may add additional insights, however, recognizing the distinct priorities and power of brokers within clientelistic parties is a primary step towards a more nuanced understanding of clientelistic strategies and their political implications.

[8]Theoretically, I could define the bounds on η_{pg} as $\eta_{pg} \in (-\infty, \infty)$. However, it is more reasonable to define η_{pg} as $\eta_{pg} \in [0, 1]$. Placing the lower bound at 0 is justified by assuming that a party cannot gain additional resources by expending resources on a particular group. Placing the upper bound at 1 is justified by assuming that a party cannot lose more resources that it expends on a group. Equilibria outside of this range for η_{pg} exist but are much less plausible than the equilibria that exist in this range.

contingent by monitoring voting behavior. Brokers make exchanges more credible by maintaining ongoing relationships with the voters that they organize. Brokers establish reputations in their neighborhood, which allows voters to evaluate the credibility of their promises. Brokers persuade voters and mobilize voters through meetings and discussion. Brokers resolve everyday problems for voters and help voters access labyrinthine state bureaucracies by facilitating the flow of information and resources between voters and the state. Finally, brokers are entrepreneurial in creating organizations that provide a variety of services that range from soccer clubs to funeral services.

Within parties, a party leader and a broker within a party are engaged in Nash bargaining over the party's distribution of resources. A party leader and a broker must come to an agreement over the distribution of resources or respectively accept a default vote share and amount of resources. Throughout the discussion below, I will refer to these default positions as the actor's threat point or exit option. I define the party leaders' threat points as:

$$\hat{\pi}_1 = \sum_{g \in \dot{G}^c} F_g * \Phi_g(X^*_{gi}(\overline{\gamma}_{1g}, \overline{\gamma}_{2g})) + \sum_{g \in \dot{G}} \alpha_g F_g * \Phi_g(X^*_{gi}(\overline{\gamma}_{1g}, \overline{\gamma}_{2g})) \tag{9}$$

$$\hat{\pi}_2 = \sum_{g \in \ddot{G}^c} F_g - F_g * \Phi_g(X^*_{gi}(\overline{\gamma}_{1g}, \overline{\gamma}_{2g})) + \sum_{g \in \ddot{G}} \alpha_g (F_g - F_g * \Phi_g(X^*_{gi}(\overline{\gamma}_{1g}, \overline{\gamma}_{2g}))) \tag{10}$$

where $\alpha_g \in [0, 1]$ $\forall g \in \dot{G}$ and $\forall g \in \ddot{G}$.

$\hat{\pi}_p$ is the vote share that the party leader from party p will retain, if she does not reach an agreement with her broker. This vote share is equal to the vote share that the party would have received given each party's equilibrium policies, $\{\overline{\gamma}^1, \overline{\gamma}^2\}$, minus a fraction of voters that the broker can withhold.[9] The party leader retains all of the voters that she would have won in the equilibrium outcome from the opposing group and retains a share, equal to α_g, of the voters that she would have won in the equilibrium outcome from each group that is organized by a broker in her party.

If a party leader and a broker cannot reach an agreement, a broker abandons the party leader with portion of the voters in the broker's group . In the model, this portion defined as $1-\alpha_g$. In the model, all voters must vote, which means the voters who a broker withdraws from his party automatically vote for the opposing party.[10] I refer to the portion of voters that a broker can credibly threaten to withdraw from a party leader as the voters that a broker controls. A broker's bargaining strength increases as he increases the number of voters that he controls. In terms of the parameter, a broker's bargaining strength decreases with increases in α_g.

The threat point for the broker is an exogenously defined amount of resources that the broker will receive if he and the party leader cannot reach an agreement.[11] This threat point has an exogenously defined value of $V_g \in [0, U_{pg}(\frac{R_p}{F_g(1+\eta_{pg})})]$. By assuming that V_g has a closed lower bound of 0, I am assuming that a broker cannot be worse off than simply not receiving any resources. One could imagine worse off outcomes for a broker, if, for example, he faced a threat of violence. By assuming

[9] See the appendix for an explanation of the algorithm that I used to calculate the threat points. I owe a special thanks to John Roemer for this endogenization method. Please contact the author for the Mathematica code.

[10] It is possible to devise a more complicated threat point, in which a broker simply encourages voters not to vote. However, this modification would complicate an already complicated threat-point without adding any real predictive power.

[11] In future research this parameter could be endogenized to offers from opposing parties.

that V_g has a closed upper bound of $U_{pg}(\frac{R}{F_g(1+\eta_{pg})})$, I am assuming that a broker's outside options cannot exceed the per-capita resources that party p could give to group g if the party did not give any resources to any other group. One could imagine that a broker who works for a party that does not control many resources could find an outside option that exceeds all of the per-capita resources that his party can distribute to his group. However, this situation seems like it would rarely arise. Moreover, in this framework the broker would simply abandon his party, if another party could offer him more per-capita resources than the amount of per-capita resources his current party controls.

A larger value of V_g increases a broker's bargaining strength because it decreases the amount of resources that the broker loses when abandoning the party leader. V_g represents the opportunities available to a broker, if the broker abandon's his party leader. Opposing parties are the most likely source of outside options for a broker.[12] By building a large following of voters, brokers become valuable to competing parties. Competing parties have access to resources, can provide brokers with valuable exit options. As the value of these exit options increase for a broker, the broker gains bargaining strength because she has less to lose if she does not reach a deal with her party leader.[13]

[12] However, opposing parties are not the only sources of outside options. Competing party leaders within a party often provide valuable exit options for a broker. In this framework, brokers could pursue exit options from competing party leaders, if the party structure conceptualized in this model is interpreted as a nested game within a more complex party structure. I develop this idea in detail below. A broker could also leave politics altogether. From this perspective the model provides an alternative explanation for the negative effect of wealth on political machines. If brokers have better options in the private sector, the may be less willing to accept the dictates of a party leader.

[13] Assuming that brokers can punish their party leader by withholding voters has empirical support will be empirically tested in later chapters but consider two illustrative examples from my fieldwork in which city council members switched parties. One city council woman was elected as

1.1 Equilibrium for two groups

First I define the equilibrium of the model for two groups: $g \in G = \{1, 2\}$. For this equilibrium, party 1 has a broker from group 1, $\dot{G} = \{1\}$, and party 2 will have a broker from group 2, $\ddot{G} = \{2\}$. Although the polity and parties in this case are relatively simple, this equilibrium will provide the basis for most of the results in the following sections and generates important insights into the internal organization and electoral success of political machines. In the next section, I will define a slightly more complicated equilibrium that will also be used for the succeeding results.

Roemer (2001) develops an equilibrium concept that he calls a Party Unanimity Nash Equilibrium (PUNE), which describes party strategy as the outcome of an intra-party bargain in a system of inter-party competition.[14] I use this equilibrium

---

a candidate for Unión Pro, which was a opposition party in congress and in her city council. After winning elections she switched to the mayor's party, Partido Justicialista. In a different municipality a city council man was a member of Partido Justicialista, which was also the mayor's party in his municipality. After losing an election, the city council member left his party and began working for a provincial congressman from the Unión Pro. In the two cases the city council members made the opposite transition and many of their colleagues claimed that they were simply pursuing access to larger amounts of resources. The city council man justified his change in alliances, arguing that all voters simply vote for their "economic convenience."

In both cases, the city council members maintained much of their support as they changed their political affiliations. The city council woman told me she maintained many of her voters and I saw her at two rallies accompanied by many voters. A broker who worked in her political group said that she brought support from her work with social movements. The city council man told me that he maintained his structure, referring to this structure as "his territory." After this city council member changed parties, I interviewed one of his brokers, who confirmed that he still works politically with this city council member. During the interview he said, "He [the city council member] is a politician and I am in the periphery. So I have a guide to follow. I don't have the contacts that he has because he is a politician and I'm not. So I move with him." Later he noted that many political actors maintain their structure as they change political alliances. He said, "There are many people [in this municipality] who have around 20 to 30 people who accompany them where ever they go." He said that the motivations for following a leader range from ideological affinity to seeking resources for private consumption. In the following chapters, I will present more systematic evidence disputes over resources induce brokers to leave their party leaders.

[14]The party strategy is an outcome of an intra-party bargain because the party leader and party

concept to capture the internal bargaining dynamics of a machine as it competes in a system of inter-party competition. For a fixed set of values $\{V_1, V_2, \alpha_1, \alpha_2\}$, an equilibrium consists of a set of policies $\{\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}\}$ and a pair of numbers $\{\hat{\pi}_1, \hat{\pi}_2\}$ such that party 1 solves:

$$\max_{\gamma_{11},\gamma_{12}} ((\pi(\gamma_{11}, \gamma_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}) - \hat{\pi}_1))(U_{11}(\gamma_{11}) - V_1)) \tag{11}$$

$$s.t. B(\gamma_{11}, \gamma_{12}) \geq 0, \gamma_{11} \geq 0, \gamma_{12} \geq 0 \tag{12}$$

and party 2 solves:

$$\max_{\gamma_{21},\gamma_{22}} ((1 - \pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \gamma_{21}, \gamma_{22}) - \hat{\pi}_2))(U_{22}(\gamma_{22}) - V_2)) \tag{13}$$

$$s.t. B(\gamma_{22}, \gamma_{22}) \geq 0, \gamma_{21} \geq 0, \gamma_{22} \geq 0 \tag{14}$$

where, $\hat{\pi}_1$ and $\hat{\pi}_2$ are respectively defined by equations (9) and (10).

In other words, the equilibrium concept combines Nash *bargaining* within parties, between party leaders and brokers Equation, (11) and (13), are each a product of the utilities of the party leader and the broker minus each actor's threat point, which is the the function that Nash uses to define his bargaining solution.

---

broker are engaged in Nash bargaining over the policy. The broker wants the party to expend all of the resources on his group. The party leaders want to expend the resources to maximize their vote share. The bargain takes place in a system of inter-party competition. The bargain between a party leader and a broker is not independent of the policy that the opposing party proposes. Any policy that a party proposes will affect the vote share of the opposing party and will affect their bargaining problem.

We can now take monotonic transformations of equations (11) and (13) to get the same maximization problem with a more accessible functional form. For a fixed set of values $\{V_1, V_2, \alpha_1, \alpha_2\}$, a PUNE is a set of policies $\{\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}\}$ and a pair of numbers $\{\hat{\pi}_1, \hat{\pi}_2\}$ that solve the following maximization problems:

$$\max_{\gamma_{11},\gamma_{12}} (Log[\pi(\gamma_{11}, \gamma_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}) - \hat{\pi}_1] + Log[U_{11}(\gamma_{11}) - V_1]) \tag{15}$$
$$s.t. B(\gamma_{11}, \gamma_{12}) \geq 0, \gamma_{11} \geq 0, \gamma_{12} \geq 0$$

$$\max_{\gamma_{21},\gamma_{22}} (Log[1 - \pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \gamma_{21}, \gamma_{22}) - \hat{\pi}_2] + Log[U_{22}(\gamma_{22}) - V_2]) \tag{16}$$
$$s.t. B(\gamma_{22}, \gamma_{22}) \geq 0, \gamma_{21} \geq 0, \gamma_{22} \geq 0$$

To derive the conditions under which equations (15) and (16) are satisfied we must first define the Lagrangian equations as:

$$\begin{aligned} L(\gamma_{11}, \gamma_{12}, \lambda_1) =& Log[\pi(\gamma_{11}, \gamma_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}) - \hat{\pi}_1] \\ &+ Log[U_{11}(\gamma_{11}) - V_1] + \lambda_1(B(\gamma_{11}, \gamma_{12})) \end{aligned} \tag{17}$$

$$\begin{aligned} L(\gamma_{21}, \gamma_{22}, \lambda_2) =& Log[1 - \pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \gamma_{21}, \gamma_{22}) - \hat{\pi}_2] \\ &+ (1 - \alpha_2) Log[U_{22}(\gamma_{22}) - V_2] + \lambda_2(B(\gamma_{21}, \gamma_{22})) \end{aligned} \tag{18}$$

I do not include the non-negativity constraints for γ_{11}, γ_{12}, γ_{21} and γ_{22} in equations (17) and (14) because in the comparative statics below, I only present interior solutions. The interior solutions are of greatest substantive interest.

Equation (17) yields the following necessary first order conditions:

$$\begin{aligned}\frac{dL}{d\gamma_{11}} =& \frac{1}{\pi(\gamma_{11},\gamma_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})-\hat{\pi}_1}\frac{\partial\pi(\gamma_{11},\gamma_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\partial\gamma_{11}} \\ &+ \frac{1}{U_{11}(\gamma_{11})-V_1}\frac{\partial U_{11}(\gamma_{11})}{\partial\gamma_{11}} + \lambda_1(\frac{\partial B(\gamma_{11},\gamma_{12})}{\partial\gamma_{11}}) = 0\end{aligned} \tag{19}$$

$$\begin{aligned}\frac{dL}{d\gamma_{12}} =& \frac{1}{\pi(\gamma_{11},\gamma_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})-\hat{\pi}_1}\frac{\partial\pi(\gamma_{11},\gamma_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\partial\gamma_{12}} \\ &+ \lambda_1(\frac{\partial B(\gamma_{11},\gamma_{12})}{\partial\gamma_{12}}) = 0\end{aligned} \tag{20}$$

$$\lambda_1(B(\gamma_{11},\gamma_{12})) = 0 \tag{21}$$

In addition to equations (19), (20) and (21), it must also be the case that $\lambda_1 \geq 0$.

Equation (18) yields the following first order conditions:

$$\begin{aligned}\frac{dL}{d\gamma_{21}} =& -\frac{1}{1-\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\gamma_{21},\gamma_{22})-\hat{\pi}_2}\frac{\partial\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\gamma_{21},\gamma_{22})}{\partial\gamma_{21}} \\ &+ \lambda_2(\frac{\partial B(\gamma_{21},\gamma_{22})}{\partial\gamma_{21}}) = 0\end{aligned} \tag{22}$$

$$\begin{aligned}\frac{dL}{d\gamma_{22}} =& -\frac{1}{1-\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\gamma_{21},\gamma_{22})-\hat{\pi}_2}\frac{\partial\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\gamma_{21},\gamma_{22})}{\partial\gamma_{22}} \\ &+ \frac{1}{U_{22}(\gamma_{22})-V_2}\frac{\partial U_{22}(\gamma_{22})}{\partial\gamma_{22}} + \lambda_2(\frac{\partial B(\gamma_{21},\gamma_{22})}{\partial\gamma_{22}}) = 0\end{aligned} \tag{23}$$

$$\lambda_2(B(\gamma_{21},\gamma_{22})) = 0 \tag{24}$$

In addition to equations (22), (23) and (24), it must also be the case that $\lambda_2 \geq 0$.

Therefore, equations (17) and (18) yield a system of six equations and six unknowns. If there exist solutions to the six equations where $\lambda_1 \geq 0$ and $\lambda_2 \geq 0$, we can expect the solutions to be locally unique.[15]

1.2 Extension: Incorporating Two Brokers into One Party

I now define an equilibrium for a slightly more complicate framework, in which a polity has an additional group and party 1 has an additional broker. In this framework, there are three groups, $g \in G = \{1, 2, 3\}$. Party 1 has brokers from groups 1 and 2, $\dot{G} = \{1, 2\}$ and party 2 has a broker from group 3, $\ddot{G} = \{3\}$. The results in this equilibrium will be used to illustrate the dynamics of intra-party competition in the results below.

For a fixed set of values, $\{V_1, V_2, V_3, \alpha_1, \alpha_2, \alpha_3\}$, an equilibrium consists of a set of policies $\{\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{13}, \overline{\gamma}_{21}, \overline{\gamma}_{22}, \overline{\gamma}_{23}\}$ and a pair of numbers $\{\hat{\pi}_1, \hat{\pi}_2\}$ such that party 1 solves:

$$\begin{aligned} &\max_{\gamma_{11},\gamma_{12},\gamma_{13}} ((\pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2) - \hat{\pi}_1)(U_{11}(\gamma_{11}) - V_1)(U_{12}(\gamma_{12}) - V_2)) \qquad (25) \\ &s.t. B(\gamma_{11}, \gamma_{12}, \gamma_{13}) \geq 0, \gamma_{11} \geq 0, \gamma_{12} \geq 0, \gamma_{13} \geq 0 \end{aligned}$$

and party 2 solves:

[15] See the appendix for an explanation of the algorithm that was used to solve this system of equations. Contact the author for the code.

$$\max_{\gamma_{21},\gamma_{22}} ((1-\pi(\overline{\gamma}^1,\gamma_{21},\gamma_{22},\gamma_{23})-\hat{\pi}_2)(U_{23}(\gamma_{23})-V_3)) \tag{26}$$
$$s.t. B(\gamma_{22},\gamma_{22},\gamma_{23}) \geq 0, \gamma_{21} \geq 0, \gamma_{22} \geq 0, \gamma_{23} \geq 0$$

where, $\hat{\pi}_1$ and $\hat{\pi}_2$ are respectively defined by equations (9) and (10).

We can now take monotonic transformations equations (25) and (26) to get the same maximization problem with a more accessible functional form. For a fixed set of values, $\{V_1, V_2, V_3, \alpha_1, \alpha_2, \alpha_3\}$, an equilibrium consists of a set of policies $\{\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{13}, \overline{\gamma}_{21}, \overline{\gamma}_{22}, \overline{\gamma}_{23}\}$ and a pair of numbers $\{\hat{\pi}_1, \hat{\pi}_2\}$ that solve the following maximization problems:

$$\max_{\gamma_{11},\gamma_{12},\gamma_{13}} (Log[\pi(\gamma_{11},\gamma_{12},\gamma_{13},\overline{\gamma}^2)-\hat{\pi}_1] + Log[U_{11}(\gamma_{11})-V_1] \tag{27}$$
$$+ Log[U_{12}(\gamma_{12})-V_2])$$
$$s.t. B(\gamma_{11},\gamma_{12},\gamma_{13}) \geq 0, \gamma_{11} \geq 0, \gamma_{12} \geq 0, \gamma_{13} \geq 0$$

$$\max_{\gamma_{21},\gamma_{22},\gamma_{23}} (Log[1-\pi(\overline{\gamma}^1,\gamma_{21},\gamma_{22},\gamma_{23})-\hat{\pi}_2] + Log[U_{23}(\gamma_{23})-V_3]) \tag{28}$$
$$s.t. B(\gamma_{22},\gamma_{22},\gamma_{23}) \geq 0, \gamma_{21} \geq 0, \gamma_{22} \geq 0, \gamma_{23} \geq 0$$

To derive the conditions under which equations (27) and (28) are satisfied we must first define the Lagrangian equations as:

$$L(\gamma_{11}, \gamma_{12}, \gamma_{13}, \lambda_1) = Log[\pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2) - \hat{\pi}_1] + Log[U_{11}(\gamma_{11}) - V_1] + Log[U_{12}(\gamma_{12}) - V_2] + \lambda_1(B(\gamma_{11}, \gamma_{12}, \gamma_{13})) \quad (29)$$

$$L(\gamma_{21}, \gamma_{22}, \gamma_{23}, \lambda_2) = Log[1 - \pi(\overline{\gamma}^1, \gamma_{21}, \gamma_{22}, \gamma_{23}) - \hat{\pi}_2] + Log[U_{23}(\gamma_{23}) - V_3] + \lambda_2(B(\gamma_{21}, \gamma_{22}, \gamma_{23})) \quad (30)$$

I did not include the non-negativity constraints for γ_{11}, γ_{12}, γ_{13} γ_{21}, γ_{22} and γ_{23} in equations (29) and (30) because in the results below I present interiors solutions, which better illustrate the important insights of the model.

Equation (29) yields the following first order conditions:

$$\frac{dL}{d\gamma_{11}} = \frac{1}{\pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2) - \hat{\pi}_1} \frac{\partial \pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2)}{\partial \gamma_{11}} + \frac{1}{U_{11}(\gamma_{11}) - V_1} \frac{\partial U_{11}(\gamma_{11})}{\partial \gamma_{11}} + \lambda_1(\frac{\partial B(\gamma_{11}, \gamma_{12}, \gamma_{13})}{\partial \gamma_{11}}) = 0 \quad (31)$$

$$\frac{dL}{d\gamma_{12}} = \frac{1}{\pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2) - \hat{\pi}_1} \frac{\partial \pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2)}{\partial \gamma_{12}} + \frac{1}{U_{12}(\gamma_{12}) - V_2} \frac{\partial U_{22}(\gamma_{12})}{\partial \gamma_{12}} + \lambda_1(\frac{\partial B(\gamma_{11}, \gamma_{12}, \gamma_{13})}{\partial \gamma_{12}}) = 0 \quad (32)$$

$$\frac{dL}{d\gamma_{13}} = \frac{1}{\pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2) - \hat{\pi}_1} \frac{\partial \pi(\gamma_{11}, \gamma_{12}, \gamma_{13}, \overline{\gamma}^2)}{\partial \gamma_{13}} + \lambda_1(\frac{\partial B(\gamma_{11}, \gamma_{12}, \gamma_{13})}{\partial \gamma_{13}}) = 0 \quad (33)$$

$$\lambda_1(B(\gamma_{11}, \gamma_{12}, \gamma_{13})) = 0 \tag{34}$$

In addition to equations (31), (32), (33) and (34), it must also be the case that $\lambda_1 \geq 0$.

Equation (30) yields the following first order conditions:

$$\begin{aligned} \frac{dL}{d\gamma_{21}} = &- \frac{1}{1 - \pi(\overline{\gamma}^1 \gamma_{21}, \gamma_{22}, \gamma_{23}) - \hat{\pi}_2} \frac{\partial \pi(\overline{\gamma}^1 \gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{21}} \\ &+ \lambda_2(\frac{\partial B(\gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{21}}) = 0 \end{aligned} \tag{35}$$

$$\begin{aligned} \frac{dL}{d\gamma_{21}} = &- \frac{1}{1 - \pi(\overline{\gamma}^1 \gamma_{21}, \gamma_{22}, \gamma_{23}) - \hat{\pi}_2} \frac{\partial \pi(\overline{\gamma}^1 \gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{22}} \\ &+ \lambda_2(\frac{\partial B(\gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{22}}) = 0 \end{aligned} \tag{36}$$

$$\begin{aligned} \frac{dL}{d\gamma_{23}} = &- \frac{1}{1 - \pi(\overline{\gamma}^1, \gamma_{21}, \gamma_{22}, \gamma_{23}) - \hat{\pi}_2} \frac{\partial \pi(\overline{\gamma}^1, \gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{23}} \\ &+ \frac{1}{U_3(\gamma_{23}) - V_3} \frac{\partial U_{23}(\gamma_{23})}{\partial \gamma_{23}} + \lambda_2(\frac{\partial B(\gamma_{21}, \gamma_{22}, \gamma_{23})}{\partial \gamma_{23}}) = 0 \end{aligned} \tag{37}$$

$$\lambda_2(B(\gamma_{21}, \gamma_{22}, \gamma_{23})) = 0 \tag{38}$$

In addition to equations (35), (36), (37) and (38), it must also be the case that $\lambda_2 \geq 0$.

Therefore, equations (29) and (30) yield a system of eight equations and eight unknowns. If there exists solutions to the six equations where $\lambda_1 \geq 0$ and $\lambda_2 \geq 0$, we can expect the solutions to be locally unique.[16]

1.3 Results

In this section, I present results from the model that reveal both strengths and vulnerabilities of a political machine. First, I present results that show how brokers who pursue their own access to resources can diminish their party's vote share. Second, I present results that show how brokers can increase their party's vote share by making their voter's more responsive. This second set of results show how intra-party competition places pressure upon brokers to increase the responsiveness of voters in their group. From these results the model identifies conditions within the broader polity that are likely to affect the efficiency of political machines as vote-getting organizations.

The results in this section are based upon comparative statics that I simulated by using a Mathematica program that solves for equilibria under different sets of parameter values. The tables below contain elasticities that are approximated from the simulated results. For each table, I describe how the parameter values were selected.[17]

[16] To solve this system of equations I use a loop in Mathematica that is very similar to the basic model. Contact the author for the code.

[17] In the appendix, I describe the Mathematica algorithms and method of approximation that I use to generate the results.

1.3.1 Dynamics of Intra-Party Bargaining

Result (1) summarizes the general effects of changes in a broker's bargaining strength on the per-capita resources that the broker's group receives and the vote share of the broker's party for most parameter specifications in the simulations below.[18]

Result 1. *An increase in a broker's control over his group (a decrease in $\alpha_{g'}$) causes the party to allocate more resources to the broker's group (an increase in $\gamma_{p'g'}$) and causes a decreases the vote share of the broker's party.*[19]

- *For party 1,* $\frac{\Delta\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}/\frac{\Delta\alpha_1}{\overline{\alpha}_1} \geq 0$ *and* $\frac{\Delta\gamma_{11}}{\gamma_{11}}/\frac{\Delta\alpha_1}{\overline{\alpha}_1} \leq 0.$

Similarly an increase in the value of a broker's exit options (an increase in $V_{g'}$) causes the party to allocate more resources to the broker's group (an increase in $\gamma_{p'g'}$) and decreases the vote share of the broker's party.

- *For party 1,* $\frac{\Delta\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}/\frac{\Delta V_1}{\overline{V}_1} \leq 0$ *and* $\frac{\Delta\gamma_{11}}{\gamma_{11}}/\frac{\Delta V_1}{\overline{V}_1} \geq 0.$

To illustrate this result, I evaluate evaluate the effects a change in the portion of voters that a broker 1 controls and a change in the value of a broker 1's exit options on the per capita amount of resources that this broker receives and the vote share of this broker's party. Under most parameter specifications an increase in the portion of voters that a broker controls increases the per capita resources that the party allocates to the broker's group and decreases his party's vote share. Under all of the parameter specifications in the simulations, an increase in the value of the broker's

[18] There are some important exceptions to this result that are noted below.

[19] $\overline{\alpha}_1$ *and* $\overline{V}_1$ *are the values of these parameters for a particular equilibrium.*

exit options increases the amount of per capita resources that the party allocates to the broker's group and decreases his vote share.

To evaluate the model's behavior over a large area of parameter values, I allow many of the model's parameters to be drawn from a uniform random distribution and limit the parameter values only by a few reasonable rules. I run two rounds of simulations to clarify the interpretation of the results while still evaluating the model's behavior over a large amount of parameter space. In the first round of simulation, I hold many of the parameters that define party 2 constant. In the second, round I allow these parameters to vary.

In the first simulation, I hold all of the parameters, except for $F_1, F_2, \eta_{11}, \alpha_1$ and V_1, constant at: $\eta_{12} = 1, \eta_{21} = 1, \eta_{22} = 1, \alpha_2 = .99, V_2 = 0$, $r = .2$, $\mu_1 = 0$, $\mu_2 = 0$,$\sigma_1 = 2$, $\sigma_2 = 2$ and $R = 1$. I allow the parameters for party 1 to be randomly selected from the distributions that I specified above when defining the model.[20] $F_1 \in U[0,1]$. $F_2 = 1 - F_1$. $\eta_{11} \in U[0,1]$. $\alpha_1 \in U[0,.99]$. $V_1 \in [0, U_1(\frac{R}{F_1(1+\eta_{11})})]$.[21] I ran the simulation 20,000 times, which generated 2552 equilibria.

After collecting the results for the first round of simulations, I relax the assumptions for party 2. In this round, I hold the following parameters constant: $r = .2$, $\mu_1 = 0$, $\mu_2 = 0$,$\sigma_1 = 2$, $\sigma_2 = 2$ and $R = 1$. I allow the rest of the parameters to be selected from to the following distributions: $F_1 \in U[0,1]$. $F_2 = 1 - F_1$. $\eta_{11} \in U[0, \eta_{12}]$. $\eta_{12} \in U[\eta_{22}, 1]$. $\eta_{21} \in U[\eta_{11}, 1]$. $\eta_{22} \in U[0, \eta_{21}]$.[22] $\alpha_1 \in U[0,1]$. $\alpha_2 \in U[0,1]$.

[20] α_1 is an exception. When defining the model, I defined $\alpha_1 \in [0,1]$. I define it as $\alpha_1 \in U[0,.99]$ so that $\alpha_1 \leq \alpha_2$, which eases interpretation. This restriction is relaxed in the second round.

[21] $U_1(\frac{R}{F_1(1+\eta_{11})})$ is the utility that the broker from party 1 would derive if his party gave all of its resources to his group.

[22] I set the η_{pg} parameters so that a party cannot distribute to an opposing group more efficiently than their own group and a party cannot distribute to an opposing group more efficiently than

$V_1 \in [0, U_1(\frac{R}{F_1(1+\eta_{11})})]$. $V_2 \in [0, U_2(\frac{R}{F_2(1+\eta_{22})})]$. I then run the simulation 20,000 times, which generated 1120 equilibria.

Tables (1) and (2) report the results for both simulations, by reporting descriptive statistics for the elasticities of $\overline{\gamma}_{11}$ and $\pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22})$ with respect to α_1 and V_1. These tables reveal the costs that powerful brokers impose upon their party. As a broker increases her control over the portion of voters that she can credibly threaten to withdraw from her party (decreases α_1), the amount of resources that she receives increases and her party's vote share decreases in almost every equilibrium.[23] As the value of exit options for a broker increase, the amount of resources that the broker receives increases and her party's vote share decreases in every equilibrium. The effects on a broker's per capital share of resources can be quite substantial. A 1% decrease in α_1 can increase a broker's resources by as much as 10.33% and a 1% increase in V_1 can increase a broker's resources by as much as 1.52%. A decrease in α_1 or an increase in V_1 decreases the party's vote share because the party is forced to make larger over-investments in the broker's group. In these equilibria a 1% decrease in α_1 can decrease the party's vote share by as much as .1464% and a 1% increase in V_1 can decrease the party's vote share by as much as .1595%. The effect on vote

the opposing party can distribute to this group. To ensure both of these conditions hold, I set the parameter values so that: $\eta_{11} \leq \eta_{12}$. $\eta_{11} \leq \eta_{21}$. $\eta_{22} \leq \eta_{21}$. $\eta_{22} \leq \eta_{12}$.

[23]The reader may notice that when the parameter specifications are relaxed for party 2, the model's predictions are not always consistent. For example, in one equilibrium a decrease in the broker's control over his group actually increases the amount of resources that he receives. Several points should be noted about these inconsistencies. First, the equilibria that generate these inconsistencies are few and occur under a small amount of the parameter space. An increase in α_1 only has a positive effect on in one equilibrium out of the 1120 that were generated. An increase in α has a negative effect on π in only 2.95% of the equilibria. An increase in V_1 has a positive effect on π in 1.61% of the equilibria. Generally, these results occur when α_1 is much larger than α_2. While the effect needs to be further developed, its seems to be driven by the behavior of the opposing party.

Table 1: The effect of a broker's control over her group on her resources and her party's vote share

Parameters Varied	Mean $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	Max $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	Min $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	Mean $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	Max $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	Min $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$
Party 1	-0.5051	-0.0002	-8.3799	0.0116	0.1316	0.0000
Party 1 & 2	-0.5772	1.8488	-10.33	0.0133	0.1464	-0.0122

The table shows the average, maximum and minimum percentage change of $\overline{\gamma}_{11}$ and $\overline{\pi}$ when the value of α_1 is increased by 1%.

Table 2: The effect of a broker's exit options on her resources and party's vote share

Parameters Varied	Mean $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta V_1}{\overline{V}_1}$	Max $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta V_1}{\overline{V}_1}$	Min $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta V_1}{\overline{V}_1}$	Mean $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta V_1}{\overline{V}_1}$	Max $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta V_1}{\overline{V}_1}$	Min $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta V_1}{\overline{V}_1}$
Party 1	0.3017	2.2609	0.0001	-0.0124	0.0000	-0.2417
Party 1 & 2	0.1639	1.5174	0.0000	-0.0079	0.0004	-0.1595

The table shows the average, maximum and minimum percentage change of $\overline{\gamma}_{11}$ and $\overline{\pi}$ when the value of V_1 is increased by 1%.

share is relatively small but is still meaningful for large shifts in α_1 or V_1.[24]

Finally note that when V_g exceeds the maximum amount of resources the party leader can give to her broker, the party leader and broker cannot reach an agreement. If V_g exceeds the maximum amount of resources that a party leader can give to her broker, then the broker has nothing to gain from an agreement with the party leader. Accepting less than the default amount of resources violates the Pareto

[24]This size of this effect may also be attributed to the values of other parameters in the model that are not altered in these simulations.

Optimal condition of Nash bargaining because any bargain with the party leader would make the broker worse off. Although this point is somewhat trivial in the formal framework, it provides an important substantive insight: a broker will leave his party, if an opposing party offers him more resources than his party can offer. When several competing party leaders have access to substantial amounts of resources political machines will become less stable.

While result (1) is quite intuitive within the logic of the model that I have developed, it is at odds with much of the literature on political parties and clientelism and yields important insight into the vulnerabilities of political machines. Much of the literature on political competition and clientelism assumes all party members share a single objective, which often consists of maximizing vote share. With this assumption, these theories trivialize intra-party cooperation and fail to anticipate organizational challenges that might arise from relying upon a large number of party intermediaries. By anticipating these challenges, this model is able to identify conditions that make political machines less efficient as vote-maximizing organizations. The model predicts that party intermediaries can decrease their party's vote share and even cause their party to lose elections in the rational pursuit of their own goals.

Some may respond to result (1) by arguing that if brokers are rational actors, they will refrain from exploiting increases in their bargaining power when doing so decreases their party's vote share because each broker's power is ultimately contingent upon her party winning elections. However, this response overlooks two important considerations. First, if a broker has valuable exit options, his power is not entirely contingent upon his party winning elections because he may be able to work for a different party when his party can longer allocate resources to him or his group. Second, even if a broker's power is contingent upon his party winning elections, brokers can still rationally exploit their bargaining power, in a similar way that shepherds can allow their sheep to overgraze a common pasture in the tragedy of the commons.

Consider this latter argument in more detail. When brokers have valuable exit options and can withdraw a large portion of their group of voters, a political machine may fall prey the tragedy of the commons: knowing that she cannot affect the electoral outcome each broker bargains for too many resources and collectively brokers cause their party's loss. Because organizing voters is so time intensive, scholars have often argued, and evidence in the following chapters supports, that political machines are comprised of many brokers who organize groups that are small relative to the size polity. Since broker's organize small groups relative to the size of the polity, each broker is unlikely to affect their party's electoral outcome by bargaining for too many resources. However, collectively brokers who bargain for too many resources may cause their party's electoral loss. The model allows me to evaluate how changes in bargaining power affect a broker's access to per-capita resources and the vote share of the broker's party when the broker organizes a small group of voters relative to the size of the polity.

Result 2. *As a broker's group size decreases relative to the size of the polity, the elasticity of a party's vote share with respect to changes in the broker's control over her group or changes in the value of a broker's exit options increases and then decreases.*

- *For party 1, a decrease in F_1 causes $\frac{\Delta\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}/\frac{\Delta\alpha_1}{\overline{\alpha}_1}$ and $\frac{\Delta\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}/\frac{\Delta V_1}{\overline{V}_1}$ to increase and then decrease.*

As a broker's group size decreases relative to the size of the polity, the elasticity of the per-capita resources that the group receives with respect to changes in the broker's control over her group or changes in the value of a broker's exit options increases.

- *For party 1, a decrease in* F_1 *causes* $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}}/\frac{\Delta\alpha_1}{\overline{\alpha}_1}$ *and* $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}}/\frac{\Delta V_1}{\overline{V}_1}$ *to increase.*

Together the statements in result (2) mean that for brokers who organize small groups relative the size of their polity, changes in their bargaining strength do not have substantial effects over their party's electoral outcome, but these changes do have substantial effects over the per-capita resources that the broker receives. The problem facing party leaders is that they depend on many brokers, who are making a similar calculations. Collectively, these bargaining dynamics could have a detrimental effect on the party's vote share.

Table (3) shows this effect by showing how a broker's group size affects the elasticities of $\pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22})$ with respect to α_1 and V_1. As the broker's group size decreases the effect of α_1 and V_1 on the party's vote share first increase and then decrease. However, the effect of α_1 and V_1 on the $\overline{\gamma}_{11}$ increases as a broker's group size decreases. For example, the first line in table one shows that when a broker's group makes up 90% of the population a 1% increase in α_1, will decrease the per-capita amount of resources that this group receives by about 0.1466%. A 1% increase in α_1 will increase party 1's vote share by 0.0060%. When a broker's group makes up 10% of the population, a 1% increase in α_1 will decrease the amount of resources that this group receives by about 0.7892%. A 1% increase in α_1 will decrease party 1's vote share by .0036%.

For table (3), I allow the population share of the broker's group in party 1, F_1,

Table 3: Decreasing group size and the effect of bargaining

F_1	$\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	$\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\alpha_1}{\overline{\alpha}_1}$	$\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta V_1}{\overline{V}_1}$	$\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta V_1}{\overline{V}_1}$
.9	-0.1466	0.0060	0.0478	-0.0020
.8	-0.2670	0.0097	0.0858	-0.0031
.7	-0.3692	0.0118	0.1171	-0.0037
.6	-0.4581	0.0125	0.1437	-0.0039
.5	-0.5371	0.0122	0.1667	-0.0038
.4	-0.6083	0.0110	0.1870	-0.0028
.3	-0.6734	0.0091	0.2052	-0.0020
.2	-0.7333	0.0066	0.2217	-0.0153
.1	-0.7892	0.0036	0.2367	-0.0010

The table shows the percentage change of $\overline{\gamma}_{11}$ and $\overline{\pi}$ when the value of α_1 or V_1 is increased by 1%.

to decrease from .9 to .1 at increments of .1. The other parameters of the model are fixed at the following values: $\eta_{11} = .75$, $\eta_{12} = 1$, $\eta_{21} = 1$, $\eta_{22} = 1$, $\mu_1 = 0$, $\mu_2 = 0$,$\sigma_1 = 2$, $\sigma_2 = 2$, $r = .2$, $\alpha_1 = .75$ and $\alpha_2 = .99$. While this parameter specification is relatively narrow, the results hold over a larger parameter space.[25]

1.4 Dynamics of intra-party competition and voter responsiveness

Although brokers contribute to an political machines vulnerabilities by creating organizational problems, brokers can also empower political machines because they undertake substantial effort that makes voters responsive to targeted goods and helps

[25] There might be some exceptions to the results presented here under particular specifications of parameter space, which could be developed in future research.

their party win elections. To win elections with targeted and contingent resources parties need brokers who build relationships with thousands, if not millions of voters. The scale of activity that is necessary to win elections is too large to be directly controlled by party leadership. Instead of directing all of the activity, party leaders can establish relatively simple party structures that give brokers intrinsic incentives to make targeted resources more efficient. As argued, in the previous chapter inducing competition among brokers gives them an incentive to maximize the "vote-getting capacity" that they can derive from "everyday, strong, face-to-face relationships."

In this section, I argue that although a broker does not care about her party's vote share, she still has an incentive to make the voters in her group more responsive to the targeted resources that the party distributes. By increasing her group's responsiveness, a broker increases her party's vote share. Further, I identify the role that intra-party competition plays in this result. To develop these insights, I first present comparative statics from the framework, in which each party has one broker. I then present comparative statics from a model, in which party 1 has 2 competing brokers.

Result (3) summarizes the effect that a change in η_{pg} has on party p's vote share and on γ_{pg} under most parameter specifications for the comparative statics below.

Result 3. *An increase in the responsiveness of a broker's group (a decrease in η_{11}) increases the vote share of the broker's party and increases the per-capita resources the broker's group receives (an increase in γ_{11}).*[26]

- *For party 1,* $\frac{\Delta\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22}})/\frac{\Delta\eta_{11}}{\overline{\eta}_{11}} \leq 0$ *and* $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}}/\frac{\Delta\eta_{11}}{\overline{\eta}_{11}} \leq 0$.

[26] $\overline{\eta}_{11}$ *is the value of this parameter for a particular equilibrium.*

Table 4: The effect of voters' responsiveness on resource distribution and party1's vote share

Parameters Varied	Mean $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Max $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Min $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Mean $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Max $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Min $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$
Party 1	-0.3894	-0.0008	-1.1082	-0.0218	0.0000	-0.0640
Party 1 & 2	-0.3384	-0.0001	-0.9962	-0.0262	0.0000	-0.0656

The table shows the average, maximum and minimum percentage change of $\overline{\gamma}_{11}$ and $\overline{\pi}$ when the value of η_{11} is increased by 1%.

A party leader and a broker benefit from increases in the responsiveness of a broker's group, despite having different objectives. Using the equilibria that provide the results for tables (1) and (2), table (4) contains the descriptive statistics for the elasticities of $\overline{\gamma}_{11}$ and $\pi(\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22})$ with respect to η_{11}. The table shows that making voters more responsive to targeted goods, a decrease in η_{11}, *increases* both the amount of resources that the broker receives and his party's vote share. While a broker only prioritizes his own access to resources and power, he has an incentive to make his voters more responsive to targeted goods and thereby increase his party's vote share.

Although the coincidence of a party leader's and broker's interests seem intuitive within the logic of the model, the dynamics underlying this coincidence of interest are somewhat complicated and generate more subtle insights. Broadly, a party leader benefits from an increase in a group's responsiveness because this effectively creates a surplus of resources for the party to distribute. If a group is willing to vote for a party at a lower price or the group derives more utility from the same amount of resources, a party will be able to buy more voters with the resources that has to distribute. A party leader may also benefit if a broker loses bargaining strength as a result of an increase in the responsiveness of a broker. By making her group more responsive a broker can benefit by receiving some of the surplus that she has created and she may also receive resources that would have been distributed to other groups. Both her bargaining strength and her marginal efficiency of transforming resources into votes relative to other brokers in the party determine if she will receive additional resources and the magnitude of these additional resources.

When a broker makes his group more responsive to targeted resources he increases his party's vote share by effectively generating additional resources for his party to distribute. From equation (8) it is easy to see how a broker effectively generates more resources for his party. Say that party 1's policy proposals are $\overline{\gamma}_{11}$ and $\overline{\gamma}_{12}$ when $\eta_{p'g'} = \overline{\eta}_{p'g'}$ for party p' and group g'. Then say that the broker from group g' decreases $\eta_{p'g'}$ by ϵ. For party p', the budget constraint of the policy proposals $\overline{\gamma}_{p'g}$ for all $g \in G$ is:

$$R_{p'} - \sum_{g \in G} F_g(\overline{\gamma}_{p'g} + \overline{\eta}_{p'g}\overline{\gamma}_{p'g}) \tag{39}$$

Given the policy proposals $\overline{\gamma}_{p'g}$ for all $g \in G$, an increase in efficiency of ϵ for group g' will make budget constraint will be equal to:

$$R_{p'} - F'_g(\gamma_{p'g'} - (\overline{\eta}_{p'g'} - \epsilon)\overline{\gamma}_{p'g'}) - \sum_{g \in G/g'} F_g(\gamma_{p'g} + \overline{\eta}_{p'g}\overline{\gamma}_{p'g}) \tag{40}$$

$$= R_{p'} + F'_g \epsilon \overline{\gamma}_{p'g'} - \sum_{g \in G} F_g(\gamma_{p'g} + \overline{\eta}_{p'g}\overline{\gamma}_{p'g})$$

By increasing the efficiency of his group, a broker would generates a budget surplus of $F_{g'}\epsilon\overline{\gamma}_{p'g'}$, given the equilibrium policy proposals when $\eta_{p'g'} = \overline{\eta}_{p'g'}$. $F_{g'}\epsilon\overline{\gamma}_{p'g'}$ is simply the magnitude of the change in efficiency, ϵ multiplied by the total amount of resources that the party allocated to the broker's group when his group's efficiency was $\overline{\eta}_{p'g'}$. Substantively, this means that if a group of voters is willing to accept a lower price for their vote or this group derives more utility from fewer resources, the party may have more resources to distribute, which increases the party's vote share.

Although a broker generates a surplus of $F_{g'}\epsilon\overline{\gamma}_{p'g'}$ given the equilibrium policies that the party proposed when $\eta_{p'g'} = \overline{\eta}_{p'g'}$ the surplus generated in the new equilibrium when $\eta_{p'g'} = \overline{\eta}_{p'g'} - \epsilon$ may be greater or less than $F_{g'}\epsilon\overline{\gamma}_{p'g'}$. The value of the surplus is determined by the new allocation of resources between the groups. The surplus will be greater than $F_{g'}\epsilon\overline{\gamma}_{p'g'}$ when two conditions hold. When $\eta_{p'g'} = \overline{\eta}_{p'g'} - \epsilon$ denote the policy proposals as $\tilde{\gamma}_{p'g}$ and each group's responsiveness as $\tilde{\eta}_{p'g}$ $\forall g \in G$. First, there exists at least two group $g'' \in G$ and $g''' \in G$ such that $g'' \neq g'''$, $\tilde{\gamma}_{p'g''} > \overline{\gamma}_{p'g''}$ and $\tilde{\gamma}_{p'g'''} < \overline{\gamma}_{p'g'''}$ when $\tilde{\eta}_{p'g''} < \tilde{\eta}_{p'g'''}$. Second there does not exist any two groups $g'' \in G$ and $g''' \in G$ such that $g'' \neq g'''$, $\tilde{\gamma}_{p'g''} < \overline{\gamma}_{p'g''}$ and $\tilde{\gamma}_{p'g'''} > \overline{\gamma}_{p'g'''}$ when $\tilde{\eta}_{p'g''} < \tilde{\eta}_{p'g'''}$. One can easily derive the conditions when the surplus will be less. Finally, note that a larger surplus does not necessarily result in a large vote share for the party because the marginal return of votes from a particular group to a unit of resources distributed to this group depend on other factors such as the the mean and variance of the group's distribution of partisan preferences and the amount of the per-capita resources that the group was receiving when $\eta_{p'g'} = \overline{\eta}_{p'g'}$.

An increase in a group's responsiveness will increase a party's vote share when party leaders have sufficient bargaining power to part of the surplus that is generated in a way that increases votes for the party. An increase in a group's responsiveness can decrease a party's vote share it increases a broker's bargaining power to such an extent that a party is forced to invest an amount greater than $\overline{\gamma}_{p'g'} + F_{g'}\epsilon\overline{\gamma}_{p'g'}$ and doing so results in a net loss of votes across groups. Since a decreases in η_{11} very rarely decreases vote share in the simulated results for this chapter and never decreases the results for table (4), the results indicate that a decrease in η_{11} increases a party's vote share under most parameter specifications. In the few results, that a decrease in η_{11} decreases party 1's vote share, the broker from party 1 has a large amount of bargaining power because α_1 is small.

When a broker increases his group's responsiveness, the broker's group can procure additional resources from the surplus that he generates and/or from resources that would have been allocated to other groups when his group was less responsive. The increases in the amount of resources that his party distributes to his group is due either to his bargaining power or the marginal rate of return of votes for the resources that are given to his group relative to that of other groups. Put simply, a broker only earns resources by competing with other groups for the resources through her relative bargaining strength or relative marginal efficiency in transforming resources into votes. A broker does not receive a portion of a surplus simply because the broker generated the surplus.

First consider how a broker can earn resources from his bargaining strength. When a broker already has a sufficient amount of bargaining strength, she will be able to force the party to allocate at least a portion of the surplus that she generates by making her group more responsive to targeted resources. However, changes in a group's responsiveness is likely to have a direct effect on a broker's bargaining power because it will change the portion of voters that the party leader will retain if the party leader and the broker cannot reach an agreement. Surprisingly, under a large set of parameter specifications an increase the responsiveness of a broker's group can decrease the broker's bargaining power.

For party 1, when $\eta_{11} = \overline{\eta}_{11} - \epsilon$ the threat point for the party leader will be equal to:

$$\begin{aligned} \hat{\pi}_1 = F_2 * (\Phi_2(X_2^*(\overline{\gamma}_{12}, \overline{\gamma}_{22})) + \Delta\Phi_2(X_2^*(\gamma_{12}, \gamma_{22}))) \\ + \alpha_1 F_1 * (\Phi_1(X_1^*(\overline{\gamma}_{11}, \overline{\gamma}_{21})) + \Delta\Phi_1(X_1^*(\gamma_{11}, \gamma_{21}))) \end{aligned} \tag{41}$$

Where $\Phi_2(X_2^*(\overline{\gamma}_{12}, \overline{\gamma}_{22})) + \Delta\Phi_2(X_2^*(\gamma_{12}, \gamma_{22})) = \Phi_2(X_2^*(\tilde{\gamma}_{12}, \tilde{\gamma}_{22}))$, $\Phi_1(X_1^*(\overline{\gamma}_{11}, \overline{\gamma}_{21})) + \Delta\Phi_1(X_1^*(\gamma_{11}, \gamma_{21})) = \Phi_1(X_1^*(\tilde{\gamma}_{11}, \tilde{\gamma}_{21}))$ and $\{\tilde{\gamma}_{11}, \tilde{\gamma}_{12}, \tilde{\gamma}_{21}, \tilde{\gamma}_{22}\}$ are the equilibrium policies when $\eta_{11} = \overline{\eta}_{11} - \epsilon$. By rearranging the terms in equation (41), we can see that the broker from group 1 loses bargaining strength when:

$$F_2 * (\Delta\Phi_2(X_2^*(\gamma_{12}, \gamma_{22}))) + \alpha_1 F_1 * (\Delta\Phi_1(X_1^*(\gamma_{11}, \gamma_{21}))) > 0 \tag{42}$$

Equation (42) generates several insights into how a change in the responsiveness of a broker's group can decrease his bargaining strength even while it increases the proprotion of voters that support his party. First, if a change in a group's responsiveness increases the vote share that the party derives from both groups, the broker from group 1 loses bargaining power. Second if $\Delta\Phi_2(X_2^*(\gamma_{12}, \gamma_{22})) < 0$ or $\Delta\Phi_1(X_1^*(\gamma_{11}, \gamma_{21})) < 0$, then a broker will lose bargaining strength when the increase in responsiveness generates a net increase in the amount of voters that a party leader will retain, if the party leader and broker fail to reach an agreement over the distribution of resources.

Now consider how a broker can earn resources by making his group more efficient at transforming resources into votes relative to other groups in the polity. This mechanism is independent from a broker's bargaining strength. Even if a broker loses bargaining power, a party leader simply wants to invest resources in the groups that produce the most votes for the amount of resources that are invested in the group. As I noted above, a party can generate a larger effective surplus in resources when it distributes resources to group that are more responsive. A decrease in $\eta_{p'g'}$ may increase the resources that a party allocates to group g' because a decrease in $\eta_{p'g'}$ makes the group more efficient at transforming resources into votes relative to other groups. All else equal a decrease in $\eta_{p'g'}$ makes this group a better investment relative to other groups from the perspective of the party leader.[27]

[27] This finding is robust for different assumptions about the broker and different theoretical frameworks when brokers do not have any bargaining strength. Camp and Szwarcberg (2010) find that even if one assumes that brokers want to consume all of the resources that they receive and they have no bargaining power, brokers still have an incentive to make voters responsive to targeted distribution as long as the brokers must compete for resources. Thus, a broker's narrow self-interest, rather than concern for the greater good of the party, can theoretically provide the basis for an

Before, moving onto the next result, consider the discussion developed in this section. A decrease in $\eta_{p'g'}$ increases a party's vote share when this decrease effectively increases the amount of resources that the party can distribute. It is possible that a decrease in $\eta_{p'g'}$ will not increase a party's vote share because it may increase the bargaining strength of the broker from group g' to such a degree that the party effectively has fewer resources to distribute. However, this occurs in small area of the parameter space for the simulations that were run. A decrease in $\eta_{p'g'}$ will bring greater benefit to the party when broker's have less bargaining power because the party leader will be better able to allocate the surplus that is generated in a way that maximizes the vote share for the party.

A decrease in $\eta_{p'g'}$ causes a party to allocate more resources to group g' from two sources and through two mechanisms. A decreases in $\eta_{p'g'}$ generates a surplus of resources for the party to distribute, which can be a source of additional resources for the broker from group g'. The broker from group g' may also earn additional resources if a decrease in $\eta_{p'g'}$ causes the party to allocate resources to group g' that it would have allocated to other groups when $\eta_{p'g'}$ was a higher value. The additional resources that a party allocates to group g' from either source can be attributed to the bargaining strength of the broker or it can be attributed to the marginal return of these resources on votes generated with group g' relative to other groups.

Result 4. *If intra-party competition is defined as competition between brokers over the resources that a party can distribute, intra-party competition provides brokers with incentives to both benefit and harm their party. Generally, intra-party competition*

efficient machine.

will encourage brokers to make their groups more responsive to targeted resources. An increase in the responsiveness in a broker's group (a decrease in $\eta_{p'g'}$) will increase the amount of per-captia resources that the party allocates to this group (an increase in $\gamma_{p'g'}$), while it can decrease the amount of resources distributed to the groups of competing brokers (a decrease in $\gamma_{p'g''}$ where $g'' \neq g'$, $g'' \in \dot{G}$ if $g' \in \dot{G}$ and $g'' \in \ddot{G}$ if $g' \in \ddot{G}$).

Result (4) is a powerful insight that may explain why political machines are pervasive within democracies. This result shows a party can still win elections when its strategy is "the result of an internal power struggle rather than any rational decisions-making" (Downs 1957: 25). Surprisingly, a political machine can win elections precisely *because* its strategy in the result of an internal power struggle. Moreover, the result shows how a party can win elections when it members are pursuing the intrinsic goal of maximizing their individual power. The result does not rely on any centralized institution that forces actors to act in a particular way. Quite to the contrary, party leaders are simply investing resources where they produce the greatest return in votes and brokers are bargaining for resources to maximize their power. Intra-party competition does not come without its costs, but the model specifies these costs and identifies conditions, under which they will be exacerbated. Finally, as I show below, the results are robust even when brokers organize relatively small groups of voters. From this result, the model predicts that intra-party competition should be observed within political machines, which is a risky prediction that is at odds with much of the literature on clientelism and political parties.

To clarify the pressure that intra-party competition places upon brokers to make their groups more responsive, I now turn to comparative statics, in which party 1 has two brokers and each party divides its resources among three groups. Table (5) shows the results of two rounds of simulations. Again, the first round has a more restrictive parameter specification to facilitate interpretation, while the second round has a more general parameter specification to evaluate the model's behavior over a larger parameter space.

In the first round I hold the many parameters that define party 2 and group 2 constant. In the first round of simulations, I hold the following parameters constant: $\eta_{13} = 1$,[28] $\eta_{21} = 1$, $\eta_{22} = 1$, $\eta_{23} = 1$, $\mu_1 = 0$, $\mu_2 = 0$, $\mu_3 = 0$, $\sigma_1 = 2$, $\sigma_2 = 2$, $\sigma_3 = 2$, $r = .2$, $\alpha_3 = .99$, $V_3 = 0$. I allow the rest of the parameters to be selected from to the following distributions: $F_1 \in U[0,1]$. $F_2 \in U[0, 1-F_1]$, $F_3 = 1 - F_1 - F_2$, $\eta_{11} \in U[0,1]$. $\eta_{12} \in U[0,1]$. $\alpha_1 \in U[0,1]$. $\alpha_2 \in U[0,1]$. $V_1 \in [0, U_1(\frac{R}{F_1(1+\eta_{11})})]$. $V_2 \in [0, U_2(\frac{R}{F_2(1+\eta_{12})})]$. I ran the simulation 20,000 times which generated 679 equilibria.

In the second round, I relax the assumptions regarding party 2. I hold the following parameters constant: $\mu_1 = 0$, $\mu_2 = 0$, $\mu_3 = 0$, $\sigma_1 = 2$, $\sigma_2 = 2$, $\sigma_3 = 2$, $r = .2$. I allow the rest of the parameters to be selected from to the following distributions: $F_1 \in U[0,1]$. $F_2 \in U[0, 1-F_1]$, $F_3 = 1-F_1-F_2$, $\eta_{11} \in U[0, \eta_{13}]$. $\eta_{12} \in U[0, \eta_{13}]$. $\eta_{13} \in U[\eta_{23}, 1]$. $\eta_{21} \in U[\eta_{11}, 1]$. $\eta_{22} \in U[\eta_{12}, 1]$. $\eta_{23} \in U[0, Min[\eta_{21}, \eta_{22}]]$.[29] $\alpha_1 \in U[0,1]$. $\alpha_2 \in U[0,1]$. $\alpha_3 \in U[0,1]$. $V_1 \in [0, U_1(\frac{R}{F_1(1+\eta_{11})})]$. $V_2 \in [0, U_2(\frac{R}{F_2(1+\eta_{12})})]$. $V_3 \in$

[28] I set $\eta_{13} = 1$, because I am assuming that a party cannot distribute resources to an opposing group more efficiently than to their own group.

[29] I set the η_{pg} parameters so that a party cannot distribute to an opposing group more efficiently than their own group and a party cannot distribute to an opposing group more efficiently than the opposing party can distribute to this group. To ensure both of these conditions hold, I set the parameter values so that: $\eta_{11} \leq \eta_{13}$. $\eta_{12} \leq \eta_{13}$. $\eta_{11} \leq \eta_{21}$. $\eta_{12} \leq \eta_{22}$. $\eta_{23} \leq \eta_{21}$. $\eta_{23} \leq \eta_{22}$. $\eta_{23} \leq \eta_{13}$.

$[0, U_3(\frac{R}{F_3(1+\eta_{23})})]$. I ran the simulation 20,000 times which generated 298 equilibria.

Table(5) shows that a decrease in η_{11} increases the vote share of the broker's party in all of the simulated results. This result underscores the observation that a political machine will be more efficient as a broker decreases η_{11} and will benefit by designing incentives for a broker to undertake the necessary work to make his group more responsive.[30]

Table (5) clarifies how intra-party competition gives brokers an incentive to make their brokers more responsive to targeted resources. A decrease in η_{11} *always* increases the amount of resources that the party gives to the broker of group 1. However, on average a decrease in η_{11} decreases the amount of resources that the broker from group 2 receives. On average, the relative change in marginal responsiveness makes party 1 take resources from group 2 and give them to group 1.[31]

However, the results also show that intra-party competition does not always harm

[30]Under different parameter specifications not reported here, In 5.02% of the equilbria a decrease in η_{11} decreases the broker's party's vote share. In these equilibria, the broker from group 1 has a large amount of bargaining power because α_1 is very low. In these equilibria the maximum value of α_1 is 0.0033. In these equilibria, an increase in the amount of resources increases the number of voters that support party 1 in group 1. Since the broker controls a very large portion of these voters, his bargaining strength increases. The increase in his bargaining strength, force party leaders to over-invest in his group which outweighs the benefits that the party derives from the increased responsiveness of this broker's voters. This result may partially capture the idea, that party leaders what to limit the success of their most powerful brokers. However, it occurs under a small amount of parameter space and needs to be better developed.

[31]In a a very small amount of the equilibria, the broker from group 2 benefits more than the broker group 1 from a decrease in η_{11}. This effect only occurs in respectively .7364% and .3356% of the equilibria in first and second rounds of simulations. This result could be driven by many factors. However, in most of these equilbria η_{12} is much smaller than η_{11}, which means that group 2 is much more responsive to resources than group 1. In other equilibria, group 1 is receiving a much larger share of the resources. In both cases the marginal return on giving resources to group 2 is much higher than the marginal return for giving resources to group 1. In these equilibria much of the surplus that the broker creates is distributed to group 2 because this group is much more responsive to resources relative to group 1.

Table 5: The effect of voters' responsiveness on resource distribution and party1's vote share

Parameters Varied	Mean $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Max $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Min $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Mean $\frac{\Delta\gamma_{12}}{\overline{\gamma_{12}}} / \frac{\Delta\eta_{11}}{\overline{\eta_{11}}}$	Max $\frac{\Delta\gamma_{12}}{\overline{\gamma_{12}}} / \frac{\Delta\eta_{11}}{\overline{\eta_{11}}}$	Min $\frac{\Delta\gamma_{12}}{\overline{\gamma_{12}}} / \frac{\Delta\eta_{11}}{\overline{\eta_{11}}}$	Mean $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Max $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$	Min $\frac{\Delta\pi}{\overline{\pi}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$
Party 1	-0.2712	-0.0023	-0.4247	0.0039	0.1337	-1.4076	-0.0458	-0.0003	-0.1118
Party 1 & 2	-0.2700	-0.0137	-0.4399	0.0192	0.1271	-0.2304	-0.0512	-0.0023	-0.1111

The table shows the average, maximum and minimum percentage change of $\overline{\gamma_{11}}$ and $\overline{\pi}$ when the value of η_{11} is increased by 1%.

brokers who do not make their group's more responsive. In 28.13% of the equilibria, a decrease in η_{11} can increase the resources that are distributed to group 2. This result occurs because a decrease in η_{11} effectively gives party 1 more resources to distribute and some of this surplus can be distributed to group 2. When the broker from group 2 has more bargaining strength than the broker from group 1, the broker from group 2 may receive a portion of the surplus that broker 1 has created. Similarly when the broker η_{12} is low relative to η_{11}, the broker from group 2 might receive a portion of the surplus that broker 1 has created. Note that in either case, intra-party competition is still relevant because the broker from group 2 only receives additional resources from a decrease in η_{11} when she has a large amount of bargaining power relative to broker 1 or is already more efficient than broker 1 at transforming resources into to votes.[32]

The results show that the benefits that a broker receives from an increase in the responsiveness of any particular group depends on the bargaining strength and efficiency of the broker relative to other brokers in the party. Intra-party competition

[32]Some may criticize the importance placed upon intra-party competition because a broker can benefit from increasing their voter's responsiveness without receiving any resources that would have been allocated to other groups. However, the results show that the portion of the surplus that a broker receives depends upon the broker's relative bargaining strength and efficiency compared to other brokers in the party. Moreover, substantively a broker might value the resources that would have been allocated to other groups more than the resources that she receives from the surplus that she generates. In terms of the parameters of the model, this benefit is an increase in γ_{11} but not in $\gamma_{11} + \eta_{11}\gamma_{11}$. However, in many of the equilibria the group also benefits from pulling resources from other groups. This benefit requires intra-party competition. This benefit is an increase in both γ_{11} and $\gamma_{11} + \eta_{11}\gamma_{11}$. In the model, the voters do not respond to $\eta_{11}\gamma_{11}$ with their votes. However, substantively $\eta_{11}\gamma_{11}$ could be a source of power for the broker and valuable to voters. For example, a voter who does not support a party because he receives a monthly subsidy from the party's broker will likely still value the subsidy. Moreover, the broker may be able to extract favors from this individual that do not result in the individual supporting the party. Insomuch, as $\eta_{11}\gamma_{11}$ is important to brokers and voters, intra-party competition matters.

increases the pressure on brokers to make their voters responsive. In many of the equilibria, the broker from group 2 *loses* resources when the broker from group 1 makes her voters more responsive. Moreover, the broker from group 2 only benefits when he has sufficient bargaining strength or is already sufficiently efficient at transforming resources into votes. If a broker fails to improve the responsiveness of her group or improve her bargaining strength within the party she risks losing resources and power. Without intra-party competition, a broker could maintain her current level of power with status quo behavior. With intra-party competition, a broker must consistently work to improve the responsiveness of her voters and control over her voters or risk of becoming obsolete.

While creating pressure for brokers to increase their bargaining strength might be harmful for the party, empirically brokers will not have a large amount of control over the value of their exit options. Moreover, when brokers do not have valuable exit options their control over voters might be limited because they will not be able to offer the voters much if the brokers abandon their party leader. If brokers cannot substantially affect their exit options, intra-party competition will place pressure on brokers to increase their voter's responsiveness.

To further illustrate the pressure that intra-party competition places on brokers, I present several graphs that show how increases in the difference between η_{11} and η_{12} affect the amount of resources that groups 1 and 2 receive from their party. The graph's illustrate the pressure that intra-party competition places on brokers. A broker can lose resources if he does not increase his voters' responsiveness to targeted goods at the same rate as a competing broker. Moreover, just to maintain his current access to resources, a broker must constantly try to improve his voters' responsiveness.

For the following comparative statics I hold following parameters constant at: $F_1 = .3$. $F_2 = .3$. $F_3 = .4$. $\eta_{13} = 1$, $\eta_{21} = 1$, $\eta_{22} = 1$, $\eta_{23} = 1$, $\mu_1 = 0$, $\mu_2 = 0$, $\mu_3 = 0$, $\sigma_1 = 2$, $\sigma_2 = 2$, $\sigma_3 = 2$, $r = .2$, $\alpha_1 = .5$, $\alpha_2 = .5$, $\alpha_3 = .99$, $V_1 = 0$, $V_2 = 0$ and $V_3 = 0$. The parameter specifications are quite restrictive, however, the follow graphs serve only to illustrate the pressure that intra-party competition can place on brokers rather than identifying general properties of the model.

Figures (1) and (2) show that as the difference between the responsiveness of groups 1 and 2 increases, the broker from group 1 benefits by receiving more resources, while the broker from group 2 loses resources. For these figures, I set $\eta_{12} = 1$ and allow η_{11} to vary from 0 to 1. As group 1 becomes more responsive than group 2, the broker from group 1 benefits by pulling resources from group 2. The broker from group 2 his harmed as his group loses resources.

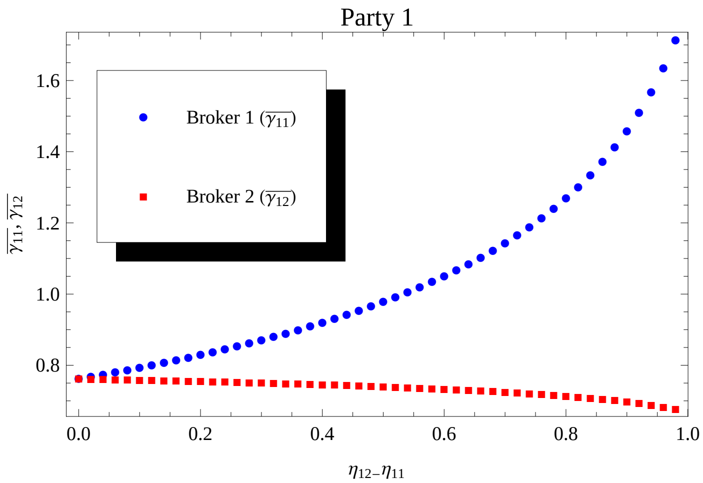

Figure 1: Party 1's distribution to group 1 and 2 as a function of the difference in the groups' responsiveness to targeted resources

These figures illustrate the pressure that intra-party competition creates for brokers. If a broker is not actively trying to make his group more responsive, he risks losing resources, which can diminish his power. In these figures, group 2 is losing resources while group 1 is gaining resources. Empirically, such a result may have a substantial impact for the broker's empowerment in his community and party. Voters in his group would certainly notice that they are receiving fewer resources. Moreover, they may also notice that voters who align themselves with a competing broker are receiving more resources. Since broker 2 is receiving fewer resources, he is also earning a lower vote share for the party. In contrast, broker 1 is earning a larger vote share for the party both because she is receiving more resources and is making voters more responsive to these resources.

For figure (3), I vary η_{11} and η_{12} from 0 to 1 at the same rate. Figure (3) shows

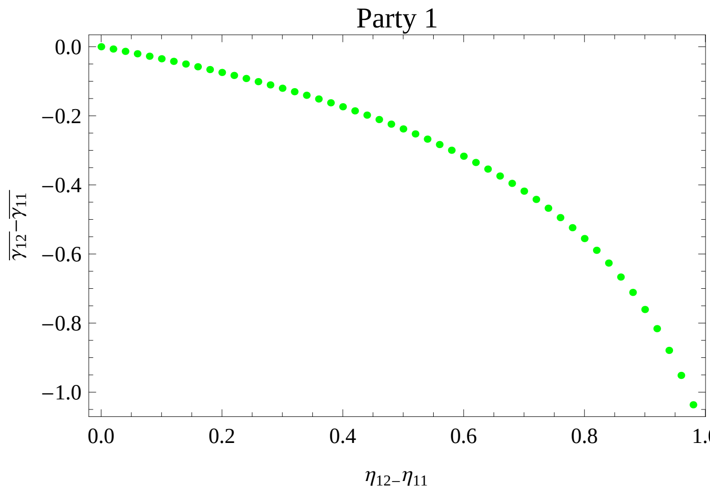

Figure 2: The difference in party 1's distribution to group 1 and 2 as a function of the difference in the groups' responsiveness to targeted resources

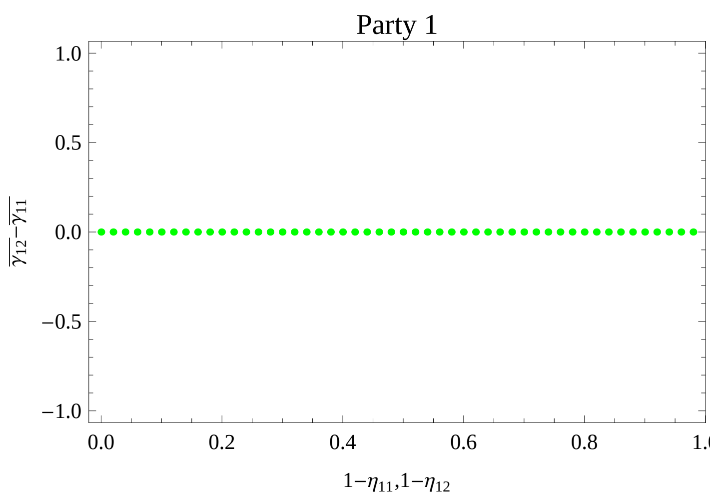

Figure 3: The difference in party 1's distribution to group 1 and 2 as a function of each group's responsiveness to targeted resources

that all brokers in party 1 receive the same amount of resources if they improve their groups' responsiveness at the same rate. The implication of this figure is that if either broker falls short of this rate then she will receive relatively fewer resources while the more successful broker will receive relatively more resources.

1.4.1 Motivating broker's that organize small groups

As I have noted in this chapter and previous chapters, many brokers organize groups of voters that are small relative to the size of the polity because organizing each voter requires substantial investments in time. This observation has caused Auyero (1999) to doubt the" vote-getting capacity" of "clientelist domination" and similar observations have caused Schlesinger (1984) to argue that parties will suffer from a collective action problem that limits the participation of party members and activists. In the previous subsection, I discussed the role of intra-party competition in the model and the pressure that it places upon brokers to make their voters more responsive to targeted resources. This result is robust when brokers organize small groups because brokers are maximizing the per-capta amount of resources that they can procure from a party. The result below shows how political machines benefit from brokers who are engaged in the local power dynamics of their communities.

The model shows that even when a broker's group is small relative to the size of the polity, a broker can substantially affect the amount of per-capita resources that her party distributes to her group by increasing her group's responsiveness. However, as a broker's group size declines the effect of increasing her group's responsiveness on her party's vote share and the total amount of resources that her group receives decreases.[33] This result provides a key insight into the effectiveness of political machines. If a broker was motivated by maximizing their party's vote share or maximizing the total amount of resources that she could procure from their party, the broker may lack motivation to increase her group's responsiveness when this group is small relative to the polity. The following summarizes this result.

Result 5. *As a broker's group size decreases relative to the size of the polity, the elasticity of a party's vote share or the total amount of resources distributed to a group with respect to changes in the responsiveness of the broker's group decreases.*

- *For party 1, a decrease in* F_1 *causes* $\frac{\Delta\pi(\gamma_{11},\gamma_{12},\gamma_{21},\gamma_{22})}{\pi(\overline{\gamma}_{11},\overline{\gamma}_{12},\overline{\gamma}_{21},\overline{\gamma}_{22}}) / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$ *and* $F_1 * \frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_{11}}{\overline{\eta}_{11}}$ *to decrease.*

As a broker's group size decreases relative to the size of the polity, the elasticity of the per-capita resources that the group receives with respect to changes in the responsiveness of the broker's group increases.

- *For party 1, a decrease in* F_1 *causes* $\frac{\Delta\gamma_{11}}{\overline{\gamma}_{11}} / \frac{\Delta\eta_1}{\overline{\eta}_1}$ *to increase.*

Result (5) shows how a political machine can become more effective as a vote-getting organization by relying on brokers who are maximizing the per-capita amount of resources that they can procure from their party. When a broker organizes a small group of voters, her marginal efforts for the party cannot substantially affect the electoral outcome of their party and cannot substantially affect the total amount of resources that the party leaders allocate to her group. This indicates that a broker

[33] The total amount of resources refers to the sum of all the resources that every voter in a broker's group receives. The total amount of resources that group g' receives from party p' is denoted as $F_{g'} * \gamma_{p'g'}$.

may lack the motivation to undertake these efforts, if the broker participates in her party only to help her party leader win elections or to win control over a large share of the resources that are distributed in the polity.

Conversely, maximizing per-capita resources can provide a powerful motivation for a broker to undertake marginal efforts to help his party win an election. Through his marginal efforts, a broker can reasonably expect to affect the amount of per-capita resources that he receives. In turn, the amount of resources that he receives has substantial implications for the power that he wields within his community. For example, the ability to enroll two or three more individuals in a public employment program will significantly increase the power of a broker in a small neighborhood precisely because the broker is organizing a small neighborhood and distributing these positions has the potential of significantly changing the percentage of individuals in his neighborhood that are dependent upon the broker. In this sense, political machines are effective in part because party intermediaries are maximizing their power over the group that they organize rather than their power or their party's power within the polity as a whole.

Substantively, this result shows that the efficiency of a machine depends in part on local power dynamics. The power of this result became apparent to me when I was conducting surveys in Misiones. Through random selection, we selected a city council member who lived on ranch that was located about 5 miles from his municipality and accessible by only dirt roads. Without any contact information, I simply asked people in town where he lived and (with several unintended detours) drove to his house. On my first visit, he was not home, but his wife told me that he would be happy to talk to me the following day. When I returned, the city council member politely told me he wanted to do the interview, but he would need to ask permission from the mayor. My promises of anonymity and the clear seclusion of his house did not persuade him. He told me to call him at the city council the following day. When I called, I asked to speak to the city council member, but the secretary connected me directly to the mayor. The mayor told me that the city council member could not do the interview because he was "a simple man" and that I should be interviewing "college professors" and "politicians" in the larger neighboring city. While a mayor of a town that has around 3000 inhabitants is generally not considered a very powerful politician, this mayor clearly had substantial power over those who resided in his city. His power is in part a function of the size of his city compared to the resources that he controls. This relative sense of power plays a crucial role in motivating individuals, which I show in greater detail in the next chapter.

Table (6) shows the elasticities of the amount of resources that the broker from party 1 receives, $\overline{\gamma_{11}}$, and party 1's vote share, $\overline{\pi}$, with respect to $\overline{\eta_{11}}$ for each value of group 1's population share, F_1. The table shows that as group 1's population decreases, the effect on their per-capita resources increases, while the effect on their party 1's vote share decreases. For example, the first line in table one shows that when a broker's group makes up 90% of the population a 1% increase in η_{11}, will decrease the amount of resources that this group receives by about 0.4730%. A 1% increase in η_{11} will decrease party 1's vote share by 0.0564%. When a broker's group makes up 10% of the population, a 1% increase in η_{11} will decrease the amount of resources that this group receives by about 0.6685%. A 1% increase in η_{11} will

Table 6: Decreasing group size and the effects of a group's responsiveness

F_1	$\frac{\delta\gamma_{11}}{\delta\eta_{11}}\frac{\overline{\gamma_{11}}}{\overline{\eta_{11}}}$	$\frac{\delta\pi}{\delta\eta_{11}}\frac{\overline{\pi}}{\overline{\eta_{11}}}$
.9	-0.473017	-0.0563913
.8	-0.510823	-0.0514089
.7	-0.543433	-0.0460785
.6	-0.571808	-0.0404097
.5	-0.596623	-0.0344151
.4	-0.618368	-0.0281077
.3	-0.637416	-0.0215006
.2	-0.654052	-0.014606
.1	-0.668504	-0.00743563

The table shows the percentage change of $\overline{\gamma_{11}}$ and $\overline{\pi}$ when the value of η_{11} is increased by 1%.

decrease party 1's vote share by .0074%. This effect is particularly striking because controlling even 10% of the vote share is a very large portion of voters to control.

Table (6) shows that as the size of a broker's group decreases, the responsiveness of the voters in a broker's group has less of an effect on their party's vote share but has a larger effect over the per-capita amount of resources that the broker can procure. If the broker can affect his group's responsiveness to targeted goods he will lose the incentive to do so, if he is only motivated by helping his party win elections, simply because he loses the ability to substantially affect the outcome of the election. However, even when a broker's group becomes insignificant relative to the size of the electorate, he can still affect the amount of per-capita resources that he receives by making his group more responsive to targeted resources. Brokers who pursue their own power have incentives to make marginal contributions, which do not significantly affect an election in isolation but can be the difference between winning and losing in the aggregate.

Finally, table (6) reveals one more crucial insight into the internal workings of a political machine. Note that as a broker's group size decreases, marginal increases in the responsiveness of a broker's group have a lower positive effect on the total amount of resources that the broker's group receives. For example, when the broker's group comprises 90% of the population, a 1% decrease in η_{11} decreases the total amount of resources by about .4257%. However, when the broker's group comprises 10% of the population, a 1% decrease in η_{11} decreases the total amount of resources by about .0669%. If a broker, cared about the total rather than per-capita amount of resources that she could obtain, she may lose motivation to undertake marginal effort to make her group more responsive to targeted goods as her group size decreased. However, as I argued above brokers are maximizing power within their communities, which makes per-capita resources a more appropriate objective for them.

1.5 Conditions that affect the efficiency of a political machine

The preceding results show that large numbers of brokers can confer both advantages and disadvantage to party leaders who are trying to win elections. A broker harms his party's electoral chances by forcing his party to over-invest in his group. Moreover, a broker may even leave his party with the voters that he controls if he finds a better deal elsewhere. When valuable exit options or substantial control over their group gives brokers a large amount of bargaining strength, political machines become less efficient and can even fall apart. Since no single broker can rectify the fate of the party through her own actions, each broker lacks incentives to try to hold her party together by refraining from using her bargaining power. Finally, a broker's bargaining power even limits the benefits that party leaders derive from increases in voter responsiveness to the targeted goods that the party distributes.

Conversely, when party leaders can induce high levels of intra-party competition between brokers and limit their autonomy, they can give large numbers of individuals intrinsic incentives to undertake the necessary activity that makes political machine efficient. By establishing relatively simply mechanisms of intra-party competition, party leaders allow brokers to increase their own power by increasing the vote share for their party. This allows party leaders to extract substantial effort from brokers. It also encourages brokers to act entrepreneurially and leverage local institutions on behalf of the party without needing their day-to-day activities directed by a party leader. Since brokers are maximizing power over the group that they are organizing, brokers who organize small groups can be motivated with small changes in the amount of resources that they receive. Political machines work well because they allow party leaders to use targeted resources to inspire the efforts of a large number of brokers who are maximizing their power over small groups of voters.

Together the results indicate that as the bargaining strength of brokers increases, targeted resources become less efficient in generating vote share. If a party leader can limit her brokers' bargaining strength, while inducing intra-party competition, then targeted resources will be more efficient. Figure (4) summarizes these predictions.

	High Intra-Party Competition	Low Intra-Party Competition
High Broker Bargaining Strength	Less Efficient	Least Efficient
Low Broker Bargaining Strength	Most Efficient	Less Efficient

Figure 4: The efficiency of targeted resources as a function of broker's autonomy and intra-party competition

The lower-left and upper-right hand quadrants are of particular interest for the argument that I advance and test in later chapters. A party leader's monopoly control over resources and low levels of inter-party competition, will limit the brokers' autonomy and will enable a party leader to induce high levels of intra-party competition. By limiting brokers' bargaining strength and allowing a party leader to induce intra-party competition, monopoly control over resources and low levels of inter-party competition will make targeted resources more efficient. All else equal, compared to urban areas, rural areas limit brokers' bargaining strength and enable greater intra-party competition because brokers in these areas mobilize smaller groups. Therefore, rural areas will making targeted resources more efficient. Admittedly, these predictions require greater abstraction from the model than the predictions outlined in the previous paragraph. However, with this abstraction the model identifies how external conditions in a polity can affect the efficiency of a machine by contributing to its organizational strengths or exacerbating its organizational weaknesses.[34]

[34]At a final level of abstraction, the argument suggests that inter-party competition makes party ideology more valuable for party leaders. If brokers have valuable exit options and party leaders cannot induce high levels of intra-party competition, then party ideology should be more valuable for party leaders for the following reasons.In a similar sense, ethnic identity could function in a similar way. If political competition is organized with ethnic identities then brokers will not have exit options and will need to compete within their party for resources. As targeted resources become less efficient in a polity with high levels political competition, alternative vote-getting strategies become more valuable. Also ideological attachment might limit the percentage of voters that a

At this point, some may question if the predictions regarding the conditions that affect the efficiency of a political machine are tautological or suffer from reverse causation by interpreting the results as follows. If a political machine is effective it will win elections and dominate a party system. This, in turn, gives party leaders the ability to induce intra-party competition and limit their brokers' bargaining power, thereby making their political machine efficient. Conversely if a political machine is not effective, it will fail to consistently win elections and it will not dominate a party system. This, in turn, prevents leaders from inducing intra-party competition and limiting their brokers' bargaining power, thereby limiting the party leader's ability to make their political machine more efficient.

While reverse causation is a concern that needs to be addressed in the empirical section, the argument is not tautological and the predictions are falsifiable. The value of exit options available to a broker and a broker's ability to withdraw voters from a political machine is in part a function of the value of resources that competing parties and party leaders control relative to the value of the resources that the broker's party controls. This ratio is contingent upon many factors that are not all directly

---

broker can withhold from a party leader. Brusco (2010) makes an argument along these lines. She observes the cost of voters increases when a voter's ideological cost for leaving a party declines. If voters have strong ideological attachments to a party, they should be less likely to abandon it because their broker had a dispute over resource distribution.

Conversely, party leaders who monopolize resources in a polity do not need to create a strong party ideology to win elections. Instead they can win elections by using targeted resources and inducing intra-party competition. While these leaders might still try to create a strong party ideology, party ideology does not confer the same advantage that it does in more competitive settings. Strong party ideology could help party leaders in non-competitive settings whereas competitive settings make it increasingly necessary to win elections. Since inter-party competition creates a premium for ideology, increasing inter-party competition will make parties more ideologically motivated. Finally, if party leaders are less able to discipline brokers through intra-party competition, they may have to inspire activists with party ideology.

related to a party's electoral dominance. For example, a variable that will be used in the succeeding empirical analysis is the value of resources that municipal and provincial governments receive from the federal government. The model predicts that a shift in the value of these resources that are exogenous to electoral results will have implications for the effectiveness of a political machine. These predictions are falsifiable and will be tested.

2 Intra-Party competition within a party hierarchy

The complexity of party structures necessitates the inclusion of brokers into a model on clientelism but accounting for this complexity is challenging. When describing her party's structure, a city council member said that it is a "pyramid that contains many pyramids."[35] With the inclusion of a broker, the party structure model approximates the party structure that the city council member described. Yet, while the model essentially has three tiers of a party structure, a real party structure would likely be more complex. For example, this city council member's party structure consisted of seven tiers that linked voters to the president.

Although the model only accounts for three tiers in a party's hierarchy, at a more abstract level much of the model's logic holds for party hierarchies that extend beyond three tiers. While voters have a clear empirical counterpart, the empirical counterparts of party leaders, brokers and groups depends upon context and relations

[35] Interview on May 20, 2010. In subsequent chapters, I will provide detailed descriptions of actual party structures in municipalities.

between the actors. A broker is distinguished from a party leader because the broker is trying to maximize the amount of resources that he can procure from a party in order to maximize the vote share from a *particular group*. In contrast, the party leader is trying to maximize the vote share from the *entire polity*.[36] In the model, a polity is the entire set of voters that is of interest and a group is a subset of this polity. The groups' intersection is empty and their union comprises the entire polity.[37] Empirically, a group is an association of voters that a broker organizes and might be very roughly conceptualized as their constituents.

For example, consider figure (5). In this figure, the polity is defined as two groups, each of which is a continuum of voters. Empirically each group could be a distinct neighborhood. In this case, the local intermediaries 1 and 2 would be the brokers in the model, who could be brokers in a neighborhood. If the polity, as in this example, is defined as two neighborhoods, then a city council member responsible for organizing these neighborhoods would be the party leader. In this figure, local intermediary 1 would maximize the amount of resources that he could distribute to voters in group 1. In doing so, he would maximize his support among these voters. Conversely the city council member seeks to distribute resources to maximize support from both groups.

To demonstrate how the empirical definitions of brokers, party leaders, and groups

[36] These definitions depend upon contestable assumptions in the model. Brokers defined by other scholars, journalists or a folk understanding may have other priorities. Ultimately these assumptions are testable. In the empirical portion of this paper brokers were not selected on the criteria that they prioritize procuring resources from their party. Instead, part of the empirical portion is designed to test this assumption. If brokers are found to have different priorities then this framework is not appropriate to describe these brokers.

[37] Clearly this framework is simpler than any empirical counterpart, in which a polity will likely have many groups that have much more complex linkages to the party.

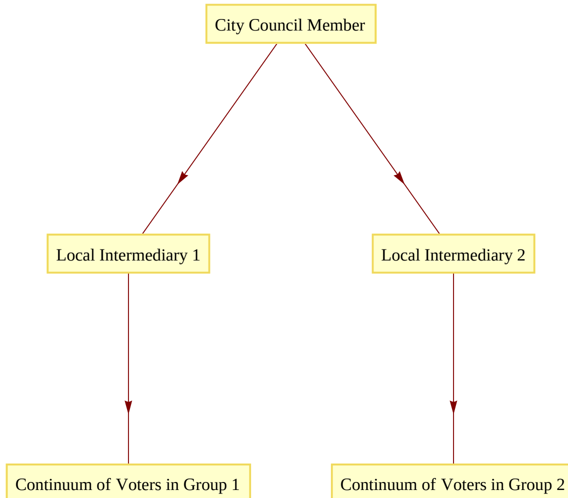

Figure 5: Polity defined as multiple neighborhoods

changes by changing the definition of a polity, consider figure (6). If the polity is defined as the municipality, then the mayor is the party leader and now the city council members are brokers. A group would consist of the voters that are respectively organized by intermediaries 1 and 2. A city council member would seek to maximize the resources that he could distribute to his structure and thus, maximize the support of the voters in his group. The mayor would seek to maximize the votes that he can derive from the entire municipality. In yet another context, the polity is defined as a province, which would make the governor be the party leader in the model and mayors the brokers. The empirical counterpart of groups becomes more well defined as they become more aggregated. While the territorial network of a local broker generally has amorphous boundaries and varies with local institutions, the group that the mayor organizes is defined by legal boundaries and electoral laws.

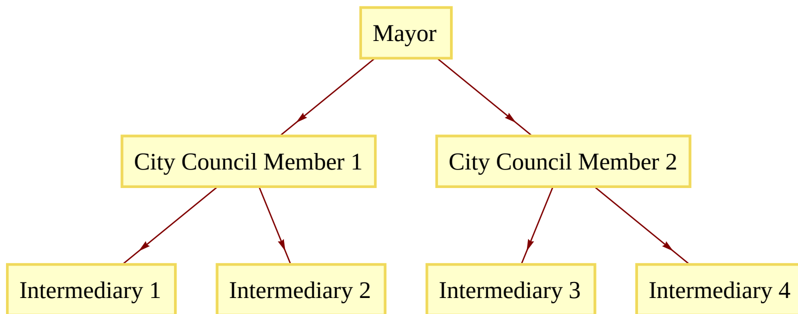

Figure 6: Polity defined as municipality

Although the model, cannot consider more than three levels of a party simultaneously, the insights from the comparative statics can describe strategies that exist throughout the party hierarchy. A mayor and a city council member are playing the same game that a city council member and broker are playing. The nested games are played in each pyramid of the party hierarchy. At each level, intermediaries are bargaining for as many resources as they can procure and are disciplined to increase the responsiveness of their structure through intra-party competition. If one accepts, this argument then it becomes easier to use the model to make more abstract predictions regarding the effect of political competition on the efficiency of clientelism and the linkage strategies that parties utilize.

Multiple tiers in a party's hierarchy may also provide further justification for assuming that brokers simply want to maximize their access to resources and will have an incentive to make voters and their structure as responsive to resources as possible. By making their voters more responsive to resources and thereby obtaining more resources , an intermediary will have more support from below. As they expand the organization beneath them, they become more powerful in the party. When a broker gets a certain number of voters he will need to train intermediaries to organize portions of these voters and he will gain more bargaining strength within the party. The scale of his activity forces him to raise himself in the party by building levels underneath him. For his work and due to his increased bargaining strength, it is more likely that he will be awarded more formal political power such as a political office or a government position.[38]

While conducting the surveys a city council member explained this method of advancement clearly. She explained, "I was organizing the neighborhood where I live. With 22 blocks, it is a small neighborhood. I left my neighborhood in the care of a friend, which opened the rest of the neighborhoods [of her city].... but it [her neighborhood] is not loyal because you say its under the goodwill of god. You leave people that replace the work that you were doing. You're not watching [her nieghborhood], but you have an organization that continues to accompany you."

We have seen that gaining more resources allows a broker to increase her power horizontally by increasing the breadth of support among her group. More resources allow a broker to increase her bargaining power, which in turn allows her to procure even more resources. Beyond the direct implications of the model, increasing access to resources might also allow her to increase her power vertically by helping her climb the party hierarchy. The desire to win a higher position in the party creates an additional incentive to use resources to efficiently build as large of a following as

[38]Szwarcberg (2009) interviews party actors who argue that they must use resources to maintain their position in the party.

possible. The scarcity of positions within a party's structure makes these positions another resources that the party leader can exploit to discipline intermediaries.

3 Moving Forward

In the following chapters, I test assumptions and predictions identified above. In the first two chapters I test the microfoundations and micro-level predictions of the model. These chapters will test the most direct predictions that the model makes. In the subsequent chapters, I test increasingly macro-level and abstract predictions.

In chapter 3, I use a case study to test both the microfoundations and micro-level predictions of the model. Using case study of a municipality, Florencio Varela, which has a well established political machine, I will describe the various political activities of a broker, the dominant party structure in the municipality and the technology that the mayor has developed to monitor brokers. The case study will establish that brokers can make voters more responsive to resources. To make voters more responsive to resources brokers must dedicate substantial effort, solve complex everyday problems that arise in the lives of voters and be entrepreneurial. The case study will also show that brokers prioritize access to resources and test predictions of the model. It will show that brokers compete with one another and that the mayor has developed sophisticated monitoring mechanisms that encourage brokers to become more efficient and increase their organizing capacity. By identifying the amount of voters that a broker organizes, I will show that brokers would likely suffer from a collective action problem if they only prioritize their party's victory.

In chapter 4, I turn to survey evidence which generalizes many of the results in the previous chapter and tests the micro-foundations of the the model. The analysis in this chapter will draw on data from the Latin America Public Opinion Project and a survey of local level political brokers. Throughout the preceding chapters, I have argued that parties rely on a large number of brokers who perform significant organizing activities and make targeted resources more efficient. In this chapter, I will provide estimates of the numbers of brokers that local politicians employ and the relative importance of various organizing activities. I then present evidence that shows local level actors can make targeted resources more efficient by giving voters access to state resources, making them more politically active and making them more responsive to targeted resources.

In chapter 5, I test the three micro-level predictions regarding intra-party dynamics using fine-grained survey evidence. With the model I predict that relying on brokers generates two organizational problems for the party: a collective action problem and a bargaining problem between party leaders and brokers. After having established that parties do rely on large numbers of brokers I test these predictions by testing if parties experience these organizational problems in the previous chapter. The model predicts that party leaders will use intra-party competition to overcome these organizational problems. I test this prediction by providing measurements of the extent of intra-party competition between local level actors.

In chapter 6, I test the macro-level implications of the model, using an inter-provincial data set and the fine-grained survey data to test several predictions. I use the varying levels of political competition in the provinces to test if higher levels of political competition make targeted resources more effective in generating vote share. I use variation in access to external resources to test if clientelism is more efficient in municipalities and provinces that receive more resources. I also test if political parties are more likely to use brokers in provinces and municipalities that receive larger amounts of external resources. Finally, I test if targeted resources are more efficient in provinces that have larger rural populations.

4 Appendix

4.1 Solving the system of equations that define the equilibrium first order conditions

In this subsection, I explain how I solve the system of equations that define equilibrium first order conditions when there are two group in the polity. To solve this system of equations I use an algorithm in Mathematica. First, I solve for the Lagrangian multipliers, using equations (20) and (22). Solving for the Lagrangian multipliers leaves a system of four equations and four unknowns. The algorithm then assigns values to all of the parameters in the model and begin the loop that solves for the equilibrium values. The simulations below are produced by changing one of the parameter values. Inside the loop, a nested loop solves for $\{\gamma_{11}, \gamma_{12}, \gamma_{21}, \gamma_{22}\}$. The nested loop first assigns random values the four policies choices. It then changes the values using the FindRoot command, until equations (19), (21), (23) and (24) are satisfied. The nested loop then verifies if all of the other conditions for a unique local maximum are satisfied. Since the loop begins with arbitrary values for $\hat{\pi}_p$ I must run a second nested loop to get the fixed point equilibrium. The second nested loop is described below. If the first nested loop finds a fixed point for each party and the resulting values satisfy all of the conditions that satisfy a local maximum, the loop has found $\{\overline{\gamma}_{11}, \overline{\gamma}_{12}, \overline{\gamma}_{21}, \overline{\gamma}_{22}\}$ as the equilibrium policies and it stores the relevant values. The first nested loop runs until it finds an equilibrium or performs a maximum amount of iterations. The algorithm used to solve for the system of equations when there are three groups is very similar.

4.2 Solving for a party leader's threat point

$\hat{\pi}_p(\overline{\gamma}^1, \overline{\gamma}^2)$ is endogenous to the equilibrium policies proposals and is calculated using a loop in Mathematica. Given a set of exogenous parameter specifications, the loop begins assigning arbitrary values to this threat point for both parties and then solves the maximization problem defined in equations (11) and (13). The loop uses the resulting vote-shares to define $\hat{\pi}_p(\overline{\gamma}^1_{[2]}, \overline{\gamma}^2_{[2]})$ $\forall p \in \{1, 2\}$, where the number in brackets identifies the loop's iteration and solves the maximization problem again. The loop plugs in the new vote-shares to define $\pi_p(\overline{\gamma}^1_{[3]}, \overline{\gamma}^2_{[3]})$ and solve the maximization problem again. The loop repeats this process until it produces the same vote-shares for two consecutive iterations. Specifically, it repeats the process until $\overline{\gamma}^1_{[i]} = \overline{\gamma}^1_{[i-1]}$ and $\overline{\gamma}^2_{[i]} = \overline{\gamma}^2_{[i-1]}$. When this occurs, the equilibrium outcome will not change with additional iterations of the loop and is a fixed point. This fixed point equilibrium outcome is the solution to the maximization problem.

4.3 Approximating elasticities

After obtaining the equilibrium policy proposals and the resulting vote share for each set of parameter values, I use the implicit function theorem to calculate partial derivatives and elasticities for each equilibrium that the simulation generated. The partial derivatives and elasticities are approximated because taking partial derivatives of the equilibrium equations becomes intractable.

To illustrate the method of approximating the Jacobian matrix and the equilibrium equations with respect to a particular variable, the following is an example that shows how I take the partial derivative of the equation (19) with respect to γ_{11}. First I define equation (19) as a function of the parameter and policy variables that are of interest for the comparative statics and set this equation equal to zero so that the equation satisfies the equilibrium condition.

$$G^1(\gamma_{11}, \gamma_{12}, \gamma_{21}, \gamma_{22}, \lambda_1, \lambda_2) = \frac{dL}{d\gamma_{11}} = 0 \tag{43}$$

Next I calculate the value of this function with the equilibrium values of each variable in the function. I also calculate the value the function holding all of the variables at their equilibrium values except for $\overline{\gamma_{11}}$. I add one thousandth of the equilibrium value to $\overline{\gamma_{11}}$. Then I approximate the partial derivative using equation (44).

$$\frac{\partial G^1}{\partial \gamma_{11}} \approx \frac{G^1(\overline{\gamma_{11}}, \overline{\gamma_{12}}, \overline{\gamma_{21}}, \overline{\gamma_{22}}, \overline{\lambda_1}, \overline{\lambda_2}) - G^1(\overline{\gamma_{11}} + \frac{\overline{\gamma_{11}}}{1000}, \overline{\gamma_{12}}, \overline{\gamma_{21}}, \overline{\gamma_{22}}, \overline{\lambda_1}, \overline{\lambda_2})}{\frac{\overline{\gamma_{11}}}{1000}} \tag{44}$$

The arguments in the function $G^1(.)$ can be expanded to include additional variables of interest. Using the method specified above I am able to approximate the partial derivatives and elasticities that provide the basis for the comparative statics below.

References

[1] Javier Auyero, *The logic of clientelism in argentina : An ethnographic account*, Latin American Research Review **35** (2000), no. 3, 55–81.

[2] ———, *On domination and inequality: The case of patronage politics in contemporary argentina*, Iberoamericana. Nordic Journal of Latin American and Caribbean Studies **36** (2006), no. 2, 159–174.

[3] Valeria Brusco, *Los punteros de la política desnuda y la suba de precios en el mercado clientelar argentino* (fortcoming).

[4] Ernesto Calvo and Victoria Murillo, *Who delivers? partisan clients in the argentine electoral market*, American Journal of Political Science **48** (2004October), no. 4, 742–757.

[5] Eddie Camp and Mariela Szwarcberg, *Competitive clientelism*, 2010.

[6] Alberto Diaz-Cayeros, Beatriz Magaloni, and Barry R. Weingast, *Tragic brilliance: Equilibrium party hegemony in mexico*, 2006. Working Paper.

[7] Avinash Dixit and John Londregan, *The determinants of success of special interests in redistributive politics*, Journal of Politics **58** (1996), 1132–1155.

[8] Agustina Giraudy, *The distributive politics of emergency employment programs in argentina (1993-2002)*, Latin American Research Review **42** (2007June), no. 2, 33–55.

[9] Michael Johnston, *Patrons and clients, jobs and machines: A case study of the uses of patronage*, The American Political Science Review **73** (1979June), no. 2, 385–398.

[10] Herbert Kitschelt, Kirk Hawkins, Juan Pablo Luna, Guillermo Rosas, and Elizabeth Zechmeister, *Latin american party systems*, Cambridge University Press, 2010.

[11] Herbert Kitschelt and Steven Wilkinson, *Citizen-politician linkages: an introduction*, Patrons, clients, and policies: Patterns of democratic accountability and political competition, 2007.

[12] Beatriz Magaloni and Poire Alejandro, *The issues, the vote, and the mandate for change*, Mexico's pivotal democratic election: Campaign effects and the presidential race of 2000, 2004.

[13] Luis Medina, *A unified theory of collective action and social change*, The University of Michigan Press, Ann Arbor, 2007.

[14] David W. Nickerson, *Is voting contagious? evidence from two field experiments*, American Political Science Review **102** (2008February), no. 1, 49–57.

[15] John E. Roemer, *Political competition: Theory and applications*, Harvard University Press, Cambridge, 2001.

[16] James C. Scott, *Corruption, machine politics, and political change*, The American Political Science Review **63** (1969December), no. 4, 1142–1158.

[17] ———, *Patron-client politics and political change*, Friends, followers and factions, 1977.

[18] Susan C Stokes, *Perverse accountability: A formal model of machine politics with evidence from argentina*, American Political Science Review **99** (2005August), no. 3, 315–325.

[19] ———, *Political clientelism*, Oxford university press handbook of comparative politics, 2007.

[20] Mariela Szwarcberg, *Making local democarcy: Political machines, clientelism, and social networks in argentina*, Ph.D. Thesis, Chicago, 2009.

[21] Rebecca Weitz-Shapiro, *Partisanship and protest: The politics of workfare distribution in argentina*, Latin American Research Review **41** (2006), 123–147.