Varieties of Clientelism: Machine Politics During Elections

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Abstract

Why do political machines use different strategies of clientelism? Our study is the first to explain why machines never optimally engage in just one clientelist strategy. We argue that political machines are most effective when they combine at least four strategies: vote buying, turnout buying, abstention buying, and double persuasion. Our study also advances the literature by identifying why political machines often engage in fundamentally different portfolios of clientelism. When choosing their particular mix of strategies, machines are influenced by two attributes of individuals: political preferences and voting costs. Machines also adapt their mix to at least five contextual factors: compulsory voting, ballot secrecy, political polarization, machine support, and political salience. Our analysis yields novel insights, such as why the introduction of compulsory voting may have the unexpected consequence of increasing vote buying.

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Introduction

During elections in many countries, clientelist parties (or political machines) distribute benefits to citizens in direct exchange for political support. Such parties compete not only on the basis of policy platforms, but also with material inducements given to individuals. These inducements often include food, medicine, and other forms of sustenance. In contexts where citizens are highly dependent on such handouts, including countries where the state fails to provide a social safety net, this pattern of machine politics can have particularly important consequences for democratic accountability and responsiveness.

In the past, prominent scholars viewed clientelism as a pre-industrial political phenomenon that would wane as societies modernized. But the evolution of machine politics is often remarkably different than in the U.S., where powerful machines such as Tammany Hall in New York and the Dawson machine in Chicago lost considerable influence over time. In many advanced democracies, such as Greece, Italy and Spain, clientelist parties continue to attract substantial numbers of votes using direct material inducements (Piattoni 2001; Kitschelt & Wilkinson 2007). Clientelism is even more pronounced in many developing countries, where a growing body of evidence reveals the various ways in which parties engage in machine politics. In Brazil, the prevalence of inducements during campaigns motivated over one million citizens to sign a petition in 1999 for stricter legislation, leading to the recent prosecution of nearly 700 politicians (Movimento de Combate à Corrupção Eleitoral 2010).

It is generally accepted that patterns of clientelism vary across time and space. However, the reasons for this heterogeneity remain unclear. Scholars traditionally argued that the prevalence of clientelism depends on structural characteristics such as level of development (e.g., Weingrod 1968; Scott 1969; Powell 1970). By contrast, more recent studies tend to view clientelism as a political strategy, and therefore investigate reasons why some parties rely more heavily on particularistic than programmatic appeals (e.g., Shefter 1994; Kitschelt 2000; Levitsky 2003). Although this recent literature provides valuable insights about the relative prevalence of machine politics, it rarely investigates the reasons why parties often adopt fundamentally *different* strategies of clientelism. The rare exceptions tend to focus rather narrowly on how one specific electoral institution affects the choice between just two clientelist strategies. For example, Cox & Kousser (1981) suggest that the introduction of the secret ballot leads machines to rely more heavily on abstention buying than vote buying. But machines are influenced by many other factors, and often adopt alternative strategies such as mobilizing supporters through turnout buying (Cox 2006; Nichter 2008). The present paper advances research on clientelism by analyzing how a wide range of factors influence four distinct strategies.

We develop a formal model that sheds light on the logic of machine politics during campaigns. Our study is the first to explain why machines never optimally engage in just one clientelist strategy. We argue that machines are most effective when they combine at least four clientelist strategies: vote buying, turnout buying, abstention buying, and double persuasion. The particular mix of strategies adopted is shaped by both *individual* and *contextual* factors. Political machines focus on two key attributes of individuals, political preferences and voting costs, when allocating resources across strategies. Furthermore, the comparative statics of our formal model predict how contextual factors shape patterns of clientelism. Findings suggest that machines tailor their mix of clientelist strategies to at least five characteristics of political environments: (1) compulsory voting, (2) strength of ballot secrecy, (3) salience of political preferences, (4) political polarization, and (5) level of machine support. Our analysis yields novel insights, such as why the introduction of compulsory voting may have the unexpected consequence of increasing vote buying.

Understanding how such factors influence the mix of clientelism is also important because strategies may entail different normative implications. For example, vote buying may be seen as unambiguously pernicious for democracy, as the strategy interferes with free and fair elections, and undermines political equality by allowing those who have resources to buy the votes of the poor (Stokes 2005, 316; see also Schaffer & Schedler 2007). By contrast, Hasen (2000, 1357–58, 1370) contends that the normative implications of turnout buying are more ambiguous because it may increase equality of political participation by inducing the poor to vote. Such normative questions challenge scholars to deepen their understanding of how political machines choose amongst different strategies.

The present study does not claim to provide an exhaustive analysis of all varieties of clientelism. We restrict our analysis to *electoral* clientelism; that is, strategies that exclusively involve the distribution of benefits during electoral campaigns. We acknowledge that clientelism often involves a broader set of strategies than just elite payoffs to citizens before elections. For example, studies such as Scott (1969), Levitsky (2003), and Lawson (2009) discuss patterns of *relational* clientelism that involve ongoing relationships of mutual support and dependence.[1] Nevertheless, our explicit focus on electoral clientelism facilitates analysis of numerous strategies that remain poorly understood.

The findings of this study also contribute to the broader literature on distributive politics. Vigorous scholarly debate continues over how parties distribute targetable goods, such as infrastructure projects and particularistic benefits. Two seminal formal studies offer conflicting predictions: whereas Cox & McCubbins (1986) argue that parties will distribute targetable goods to core supporters, Lindbeck & Weibull (1987) contend they will target swing voters. A more recent conceptual paper by Gary Cox (2006) argues that these and other studies focus too narrowly on persuasion (changing voters' preferences); when strategies such as mobilization (affecting whether citizens vote) are considered, the core-supporter hypothesis is substantially strengthened. The present study contributes to this literature by exploring the mechanisms by which clientelist parties *combine* strategies of persuasion and mobilization.

Our analysis also advances formal studies of clientelism. Previous models rely on a one-dimensional voter space, in which citizens are arrayed along a spectrum of political preferences as in the classic Downsian spatial model of political competition. We introduce a second dimension, such that citizen types are defined both by political preferences and

[1] Whereas "electoral" clientelism delivers all benefits during electoral campaigns, "relational" clientelism provides ongoing benefits (Nichter 2010).

voting costs. This innovation facilitates the integration of nonvoters into our analyses. As a result, the present study addresses a major limitation in almost all existing models of clientelism — they examine only *one* strategy. For example, Stokes (2005) provides a model of vote buying, and Nichter (2008) develops a model of turnout buying. By contrast, we analyze the tradeoffs that parties face when combining strategies. A study by Morgan & Vardy (2008) also begins to tackle the key issue of how parties combine strategies, but focuses narrowly on the impact of introducing the secret ballot. The present paper offers a more exhaustive analysis of the range of strategies employed by machines and, through the model's comparative statics, a fuller assessment of factors that influence variation of clientelist strategies.[2]

Strategies of Electoral Clientelism

Political machines engage in several distinct strategies of clientelism during campaigns. Figure 1 presents five clientelist strategies, which target different types of individuals and induce distinct actions (Nichter 2008: 20). This section discusses each strategy and provides a stylized example about how political machines combine strategies. We then build on these insights to develop a model of electoral clientelism.

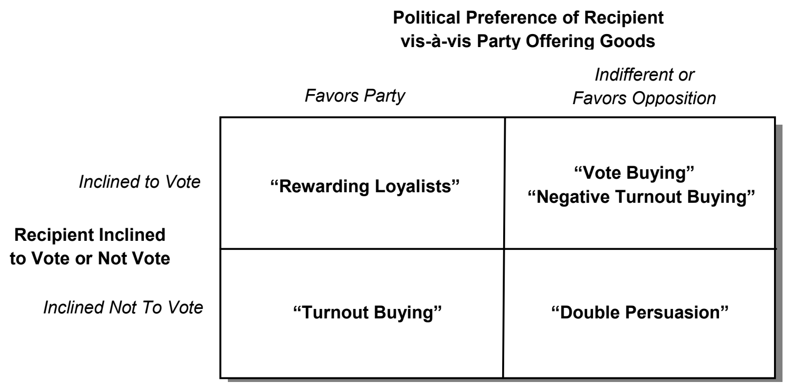
Vote buying rewards opposing (or indifferent) voters for switching their vote choices. Studies on vote buying suggest that machines engage in this strategy in many parts of the world.[3] One recent survey in Nigeria found that 70 percent of respondents believed that vote buying occurs "all of the time" or "most of the time" during elections, with nearly 40 percent reporting that a close friend or relative was offered benefits to vote for a particular candidate.[4] Studies on vote buying typically assume — either implicitly or explicitly — that political machines distribute benefits to voters in exchange for voting against their

[2] Dunning & Stokes (2009), an unpublished paper on the topic, examines only two strategies.

[3] To mention just a few examples, recent publications on vote buying focus on countries including Argentina (Stokes 2005), Benin and São Tome (Vicente & Wantchekon 2009), Japan (Nyblade & Reed 2008), Mexico (Diaz-Cayeros, Estevez & Magaloni forthcoming), and Thailand (Bowie 2008).

[4] Survey of 2,410 Nigerians in all 36 states and the federal capital territory in February 2007. See "Nigerians: Vote Buying a Common Occurrence," International Foundation for Electoral Systems, 2007.

Figure 1: Strategies for Distributing Targetable Goods



Source: Adapted from Nichter (2008).

preferences. A key point of this paper is that while scholars often focus exclusively on such vote buying, machines are most effective when they *combine* several distinct strategies of electoral clientelism.

Turnout buying rewards unmobilized supporters for showing up at the polls. During the 2004 US election, five Democratic Party operatives in East St. Louis were convicted in federal court for offering cigarettes, beer, medicine, and $5 to $10 rewards to increase turnout of the poor (Nichter 2008). One party official pleaded guilty and testified that operatives offered individuals rewards “because if you didn’t give them anything, then they wouldn’t come out” (cf Nichter 2008, 19). In the case of Argentina, Nichter argues that although both strategies coexist, survey data in Stokes (2005) are more consistent with turnout buying than vote buying. Evidence of turnout buying has also been found in the case of Venezuela (Rosas & Hawkins 2008), as well as Argentina and Mexico (Dunning & Stokes 2009).

Abstention buying rewards indifferent or opposing individuals for *not* voting (Cox & Kousser 1981; Schaffer 2002; Cornelius 2004).[5] This demobilizational strategy reduces the number of votes received by opposition candidates. For example, Cox & Kousser (1981)

[5]Abstention buying is often termed “negative vote buying” in the literature. However, “negative turnout buying” would be a more precise alternative term because the strategy influences turnout, not vote choices.

examine newspaper articles from 1870 to 1916 in New York state, and show that political operatives paid many rural voters to stay home on Election Day. Similarly, politicians use rewards to demobilize opposition voters when busing them away from electoral districts in the Philippines and buying their identification cards in Guyana (Schaffer 2002).

Double persuasion provides benefits to citizens in order to induce their electoral participation *and* influence their vote choices. The broader literature on clientelism suggests that many individuals have little in the way of ideological preferences or reasons to vote, other than material rewards offered by clientelist parties (e.g., Chubb 1982, 171). With double persuasion, machines distribute benefits to such nonvoters who do not inherently prefer the machine on ideological or programmatic grounds. Although studies typically ignore double persuasion, we find that machines optimally devote some resources to this strategy whenever they distribute selective benefits during campaigns.

Rewarding loyalists provides particularistic benefits to supporters who would vote for them anyway. By definition, such rewards do not influence vote choices or induce turnout during a contemporaneous election. Scholars typically understand such benefits as part of ongoing, long-term relationships between politicians and citizens (e.g., Auyero 2000; Kitschelt & Wilkinson 2007). In one explanation of rewarding loyalists, Diaz-Cayeros, Estevez & Magaloni (forthcoming, ch. 4) argue that parties offer selective benefits to core supporters during elections in order to "prevent the erosion of partisan loyalties" over time. Given that we focus on short-term electoral clientelism, such ongoing relationships are outside of the scope of our analysis, and we do not incorporate rewarding loyalists in the present paper.

Combining Strategies

When distributing benefits during campaigns, political machines frequently combine several of the strategies in Figure 1. To provide intuition and motivate formal analysis of how political machines combine strategies, we first present a stylized example.

Assume that a political machine has \$100 to distribute to citizens during a campaign. The machine seeks to maximize its electoral prospects by influencing vote choices and/or turnout. There are 12 citizens whom the machine can target using different strategies:

- **Vote Buying**: Veronica ($10), Victor ($40), Virginia ($50)
- **Turnout Buying**: Tomas ($10), Teresa ($20), Tonia ($35)
- **Abstention Buying**: Alejandro ($10), Ana ($30), Alberto ($35)
- **Double Persuasion**: Debora ($10), David ($25), Diego ($40)

Observe that different payments (in parentheses) are required to buy each citizen using the given strategy. Required payments vary because citizens differ with respect to two key attributes — political preferences and voting costs. For example, vote buying is costlier when a citizen strongly opposes the machine on ideological grounds. Likewise, turnout buying is costlier when a citizen faces high voting costs such as transportation or lost wages.

Given the different required payments, how does the machine allocate its budget? The first crucial consideration is that vote buying benefits the machine more than other strategies. Vote buying provides two net votes — it adds a vote to the machine's tally, and subtracts one from the opposition. By contrast, turnout buying and double persuasion provide only one net vote because they target nonvoters. Abstention buying also provides just one net vote by subtracting one from the opposition. To allocate its budget efficiently, the machine should target citizens who offer the most net votes per dollar spent.

Using this metric, the machine should start by vote buying Veronica. For $10, it earns two net votes (i.e., $5 per net vote). To vote buy an additional citizen, the machine would need to pay Victor $40 ($20 per net vote). Thus, the machine would be better off turnout buying Tomas, abstention buying Alejandro, and double persuading Debora as each provides one net vote for $10. The machine now has $60 remaining, and considers costlier citizens. It should vote buy Victor for $40 and turnout buy Teresa for $20. Both options are equally cost-effective ($20 per net vote), and preferable to using the other strategies to target David ($25 per net vote) or Ana ($30 per net vote).

This stylized example provides several insights for further investigation: (1) machines optimally combine clientelist strategies; (2) their mix depends on citizens' political preferences and voting costs; and (3) machines are willing to pay more for vote buying relative to other strategies. Observe that the machine's decision process is actually more complicated, because all opposition voters (e.g., Veronica and Alejandro) are potential targets for *both* vote buying and abstention buying. We now develop a model that builds on intuition from this stylized example, and suggests how machines tailor their mix of clientelist strategies to specific political environments.

Model

Setup

Consider two political parties, an incumbent machine party (M) and an opposition party (O). Each party offers a platform, x^M and x^O, respectively, on a one-dimensional ideological spectrum ranging from $\underline{X}$ to $\overline{X}$. Without loss of generality, let $x^O < x^M$, and for simplicity, assume that the parties' platforms are symmetric around zero (that is, $x^O = -x^M$).[6]

Both parties' platforms are fixed for the duration of our analysis. This simplifying assumption is consistent with our focus on electoral clientelism, and accurately reflects reality during many electoral campaigns: parties may have attributes that cannot be credibly transformed in the short run, such as the personal or ideological characteristics of their leaders.

Each citizen i is defined by her political preferences x_i and net voting costs c_i, where x_i and c_i are independent.[7] The citizens' ideal points x_i are distributed over $[\underline{X}, \overline{X}]$ according to $F(x)$, where F has a strictly positive and continuously differentiable density f over $(\underline{X}, \overline{X})$. Net voting costs c_i are distributed over $[\underline{C}, \overline{C}]$ according to $G(c)$, where G has a strictly positive and continuously differentiable density g over $(\underline{C}, \overline{C})$. For ease of explication, we focus on the case where the parties' platforms are the endpoints of the citizens' ideological spectrum (i.e., $\underline{X} = x^O$ and $\overline{X} = x^M$), but results are not affected if some citizens have more extreme political preferences (i.e., $\underline{X} < x^O$ and $\overline{X} > x^M$).[8]

[6] This assumption simplifies the analysis but qualitatively does not affect our results.

[7] This assumption suggests that net voting costs (voting costs minus abstention costs) are not inherently less for machine supporters (or opposers). As we explore below, this assumption does not imply that strong and weak partisans are equally willing to *incur* voting costs.

[8] A proof is available upon request.

A citizen's utility equals the difference between her expressive value from voting and her net voting costs.[9] Formally, a citizen of type (x_i, c_i) who votes for party $P \in \{M, O\}$ receives utility:

$$U^P(x_i, c_i) = -|x^P - x_i| - c_i \tag{1}$$

The first term, $-|x^P - x_i|$, captures the notion that the closer the citizen's ideal point to the platform of the party for which she votes, the more utility she receives from casting a ballot. The second term, c_i, represents the citizen's net voting cost. This cost includes material costs of reaching the polls (such as transportation, lost wages or child care) less any costs incurred from abstention. Such abstention costs range from social disapprobation to fines and penalties in countries with compulsory voting laws.[10] If a citizen abstains, she is assumed to receive a reservation utility of 0.[11]

We assume that a machine has a given budget B to allocate across citizens using different strategies of electoral clientelism.[12] In order to allocate this budget most effectively, the machine's objective is to maximize the net votes received from payments to citizens (i.e., additional votes for the machine plus votes taken away from the opposition). We assume the machine cannot afford to buy all citizens, given its limited resources (B).[13]

[9] Many studies focus on expressive utility (i.e., utility from the act of voting itself) as a way of overcoming the supposed "paradox of voter turnout." Feddersen et al. (2009) provide an extended discussion of the role of expressive utility in models of voter turnout. Morgan & Vardy (2008) provide an excellent formal defense of exclusively using expressive utility in models of electoral clientelism.

[10] We make two realistic assumptions that ensure an interior solution to the machine's optimization problem and monotonicity of comparative statics: (1) some indifferent citizens vote (formally, this requires $\underline{C} < -x^M$); and (2) even with electoral clientelism, there exist strong supporters who do not vote (formally, this requires $\overline{C} > b^*$, where b^* is defined below as the most-expensive payment to nonvoters).

[11] Note that disutility of abstaining, which may vary across individuals, is already captured by the use of *net* voting costs (c_i). An equivalent way of representing this setup is to unpack net voting costs such that $c_i = k_i - a_i$, where $k_i \geq 0$ represents an individual's voting costs and $a_i \geq 0$ represents an individual's abstention costs. The citizen turns out if $-|x^P - x_i| - k_i \geq -a_i$, or equivalently, if $-|x^P - x_i| - c_i \geq 0$. Thus, with the use of net voting costs, the reservation utility is 0.

[12] The present paper examines how a machine optimally allocates a given budget B across strategies of electoral clientelism shown in Figure 1. As we discuss more extensively below, analyzing how a machine chooses B — i.e., how it allocates funds between electoral clientelism and other campaign activities (e.g., advertising or fraud) — would require a more complicated model.

[13] Formally, the machine's problem is to maximize its net votes by assigning a reward $b_i \geq 0$ to every citizen, such that total expenditures, $N \int \int b_i g(c) f(x) dc\, dx$, are less than or equal to budget B, where N is the total number of citizens.

Following models of clientelism such as Stokes (2005) and Nichter (2008), we assume that only the machine — and not the opposition party — has the infrastructure, social networks, and resources required to deliver clientelist rewards to citizens. This assumption accurately reflects countries such as those where Kitschelt (2011: 9) argues clientelism is a "unilateral, monopolistic affair concentrated in the hands of a single party." Based on extensive cross-national survey data, Kitschelt provides numerous examples of such countries, including Japan, Malaysia, Russia, Senegal, South Africa, Thailand, and Turkey.[14] Our analysis also extends to countries in which multiple machines operate, but where each machine controls distinct geographic territories.[15] Stokes (2009, 12, 20) offers two explanations for the single-machine assumption: (1) the incumbent party has exclusive access to public coffers, from which clientelist payments are made; and (2) only one party has invested in the "dense organizational structure" and "social proximity" that define a machine. We assume that this high level of social embeddedness enables the machine to observe citizens' political preferences and voting costs. We also initially assume that the machine is able to enforce clientelist exchanges, but later relax this assumption to examine how ballot secrecy affects the mix of strategies due to the threat of opportunistic defection by citizens.

Classifying Citizens

Given its knowledge of preferences and voting costs, the machine can classify citizens. If a citizen shows up at the polls, she will vote for the machine if doing so provides (weakly) greater utility than voting for the opposition. That is, a citizen votes for the machine if $U_i^M \geq U_i^O$, or equivalently, if $x_i \geq 0$.[16] Thus, citizens with political preferences $x_i \geq 0$ are supporters of the machine, while those with political preferences $x_i < 0$ are opposers. But a

[14] This survey of over 1,400 country experts explores the usage of clientelism by 506 parties in 88 countries. The data are not yet publicly available for analysis.

[15] Analyzing other contexts, where several machines compete in the same geographic districts, would require a more complicated game-theoretic model. Although we do not consider such contexts here, our results can be interpreted as the best response strategy of one machine in a multiple machine framework (i.e., how one machine should respond to the given strategies of another machine).

[16] To ensure that the party's optimization problem is well-defined, we assume that citizens who are indifferent between the two parties vote for the machine and that citizens who are indifferent between abstaining and voting come to the polls.

citizen will only vote for her preferred party if doing so provides (weakly) greater utility than abstaining, which yields a reservation utility of 0. That is, she votes if $\max\,[U_i^M, U_i^O] \geq 0$, or equivalently, if $\max\,[-|x^M - x_i| - c_i, -|x^O - x_i| - c_i] \geq 0$. Overall, the machine can classify the population into four groups of citizens:

- **Supporting Voters**: Citizens with $x_i \geq 0$ and $-|x^M - x_i| - c_i \geq 0$
- **Supporting Nonvoters**: Citizens with $x_i \geq 0$ and $-|x^M - x_i| - c_i < 0$
- **Opposing Voters**: Citizens with $x_i < 0$ and $-|x^O - x_i| - c_i \geq 0$
- **Opposing Nonvoters**: Citizens with $x_i < 0$ and $-|x^O - x_i| - c_i < 0$

Figure 2a presents a graphical depiction of these four groups of citizens (from the perspective of the machine). Political preferences are represented on the horizontal axis, while net voting costs are represented on the vertical axis.[17] The vertex lines represent citizens who are indifferent between voting and not voting, because they receive the same utility from voting as they do from abstaining.[18] All citizen types on or below line l_1 vote for the machine; those on or below line l_2 vote for the opposition. All citizen types above l_1 and l_2 are nonvoters.

The vertex shape of the cutoff line between voters and nonvoters reflects the fact that citizens with intense political preferences (i.e., voters for whom x_i approaches either x^M or x^O) receive greater expressive utility from voting, as can be observed in the utility function (Equation 1). They are thus more inclined to incur voting costs and turn out to support their favored party. By contrast, citizens who have weak political preferences (i.e., citizens for whom x_i approaches 0) receive lower expressive utility from voting, and thus are less inclined to incur voting costs.[19]

Payments

In order to determine the machine's optimal mix of clientelist strategies, we first identify how much the machine would need to pay to buy each citizen type. For each strategy, the

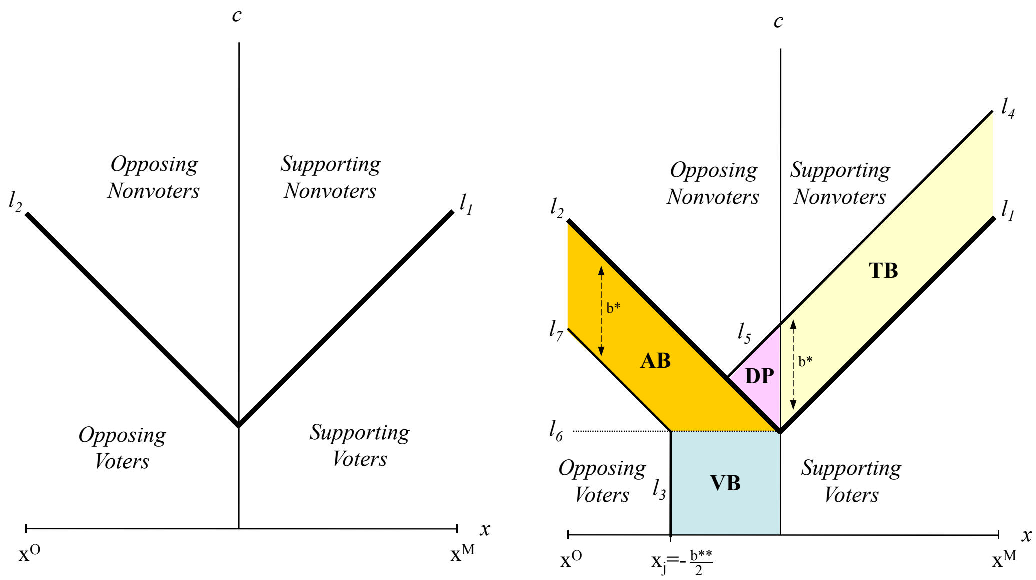
[17] The horizontal axis in Figure 2a represents $\underline{C}$. Since c_i represents net voting costs, $\underline{C}$ can be less than 0.

[18] Formally, these are supporters for whom $-|x^M - x_i| - c_i = 0$ and opponents for whom $-|x^O - x_i| - c_i = 0$. It thus follows that $l_1 = x - x^M$ and $l_2 = -x + x^O = -x - x^M$, where the second equation follows from the assumption of symmetric party platforms, $x^M = -x^O$.

[19] Given the assumption that some indifferent citizens vote, the vertex tip is above the horizontal axis.

Figure 2: Map of Citizens by Political Preferences and Net Voting Costs

(a) Without Electoral Clientelism (b) With Electoral Clientelism



Note: VB = Vote Buying; TB = Turnout Buying; AB = Abstention Buying; DP = Double Persuasion.

required payments ($\bar{b}_i$) are as follows:

Vote Buying targets opposing voters, who have a reservation utility of U_i^O. To induce an opposing voter of type $t_i = (x_i, c_i)$ to switch her vote, the machine must therefore pay $\bar{b}_i^{VB}$ such that $U_i^M + \bar{b}_i^{VB} \geq U_i^O$. In an optimal allocation, the machine sets payments equal to a citizen's reservation value, because it will not "overpay" (pay a citizen more than her reservation value) or "underpay" (pay a citizen less than her reservation value).[20] Thus, the inequality binds. Substituting the identities of U_i^M and U_i^O from Equation 1 yields: $-|x^M - x_i| - c_i + \bar{b}_i^{VB} = -|x^O - x_i| - c_i$. Then, solving for $\bar{b}_i^{VB}$:[21]

$$\bar{b}_i^{VB} = -2x_i \tag{2}$$

As shown in Equation 2, the machine can vote buy all opposing voters with a given ideal point for the same price, even if they have different costs of voting. Because they already show up at the polls, opposing voters only need to be compensated for voting against their

[20] A proof is available upon request.

[21] For the derivation of equations in this section, recall the assumption of symmetric party platforms, $x^M = -x^O$.

political preferences.

Turnout Buying targets supporting nonvoters, who have a reservation utility of 0. To induce turnout of a supporting nonvoter of type $t_i = (x_i, c_i)$, the machine must pay $\bar{b}_i^{TB}$ such that $U_i^M + \bar{b}_i^{TB} \geq 0$. Substituting the identity of U_i^M from Equation 1 yields: $-|x^M - x_i| - c_i + \bar{b}_i^{TB} \geq 0$. Then, given that the inequality binds and solving for $\bar{b}_i^{TB}$:

$$\bar{b}_i^{TB} = c_i - x_i + x^M \tag{3}$$

Supporting nonvoters receive more utility from abstaining than from voting. Thus, with turnout buying, the machine must compensate such citizens for the difference between the utility received from staying home and the utility received from voting for the machine.

Abstention Buying targets opposing voters, who have a reservation utility of U^O. In order to convince an opposing voter of type $t_i = (x_i, c_i)$ to stay home, the machine must offer a reward $\bar{b}_i^{AB}$ such that: $\bar{b}_i^{AB} \geq U_i^O$. Substituting U_i^O from Equation 1 yields: $\bar{b}_i^{AB} \geq -|x^O - x_i| - c_i$. Then, given that the inequality binds and solving for $\bar{b}_i^{AB}$:

$$\bar{b}_i^{AB} \;\; = -x_i - x^M - c_i \tag{4}$$

With abstention buying, the machine must compensate opposing voters for: (1) the forgone utility of voting for their preferred party; and (2) the cost they incur by abstaining.

Double Persuasion targets opposing nonvoters, who neither participate in elections nor support the machine. Their reservation utility is 0. To induce an opposing nonvoter of type $t_i = (x_i, c_i)$ to turn out *and* vote for the machine, the party must therefore pay $\bar{b}_i^{DP}$ such that $U_i^M + \bar{b}_i^{DP} \geq 0$. Substituting the identity of U_i^M from Equation 1 yields: $-|x^M - x_i| - c_i + \bar{b}_i^{DP} \geq 0$. Then, given that the inequality binds and solving for $\bar{b}_i^{DP}$:

$$\bar{b}_i^{DP} = c_i - x_i + x^M \tag{5}$$

Observe that Equations 3 and 5 are identical, except that double persuasion targets opposing nonvoters ($x_i < 0$), while turnout buying targets supporting nonvoters ($x_i \geq 0$). With double persuasion, the machine must compensate opposing nonvoters for: (1) voting against their political preferences; and (2) their disutility from voting relative to abstaining.

Optimal Mix of Clientelist Strategies

Given this information about required payments, we now determine the optimal mix of clientelist strategies. This section provides intuition about how a machine optimally allocates resources across vote buying, turnout buying, abstention buying, and double persuasion in order to maximize its electoral prospects. The appendix provides proofs of each proposition.

The machine conditions the size of rewards on citizens' ideal points and voting costs (in accordance with Equations 2–5), and targets citizens who deliver net votes most cheaply. Otherwise, the machine would be better off shifting resources to obtain additional electoral support. The machine is willing to pay twice as much to the most-expensive vote-buying recipient (a payment of b^*_{VB}) as it is willing to pay to the most-expensive turnout-buying, abstention-buying, and double-persuasion recipients (payments of b^*_{TB}, b^*_{AB} and b^*_{DP}, respectively). After all, vote buying delivers twice as many net votes as the other three strategies. By the same logic, the machine is willing to pay the most expensive turnout-buying recipient exactly as much as it pays the most expensive abstention-buying or double-persuasion recipient, because they both yield one net vote. In sum, as shown formally in the appendix:

Proposition 1: The machine optimally sets $b^*_{VB} = 2b^*_{TB} = 2b^*_{AB} = 2b^*_{DP}$.

For notational simplicity, analysis below drops the subscripts, letting $b^*_{VB} = b^{**}$ and $b^*_{TB} = b^*_{AB} = b^*_{DP} = b^*$. An important finding follows. Observe in Proposition 1 that if b^*_{VB}, b^*_{TB}, b^*_{AB}, or b^*_{DP} is greater than 0, then all four terms must be greater than 0. Thus:

Proposition 2: If a machine engages in electoral clientelism, then it optimally engages in *all* four strategies of vote buying, turnout buying, abstention buying, and double persuasion.

Whereas most studies focus exclusively on vote buying, Proposition 2 suggests that machines *never* optimally expend all their resources on just one strategy. Mobilization and demobilization are also fundamental to the logic of electoral clientelism.

Another important implication pertains to double persuasion. This strategy might not seem intuitive — why distribute benefits to citizens who neither vote nor support the machine? Indeed, Dunning & Stokes (2009) even call double persuasion a "perverse strategy."

Yet our model suggests that machines optimally engage in double persuasion. When operatives distribute rewards, they find that targeting weakly opposing nonvoters through double persuasion is often more cost-effective than buying votes of strongly opposed voters, or buying turnout of supporting nonvoters with high voting costs.

Who Gets Bought?

Given that the machine optimally combines all four strategies, how does it determine *which* citizens to buy? Formal proofs in the appendix provide insight into this key question. This section offers graphical intuition of these findings, employing Figure 2b.

To determine the machine's optimal targets, a first step is to identify the most-expensive payments for each strategy. First, consider who receives the most-expensive turnout-buying payment (b^*). Given that the machine neither overpays nor underpays, it delivers b^* to supporting nonvoters who require exactly that level of benefits to come to the polls. In accordance with Equation 3, these are supporting nonvoters of type $t_k = (x_k, c_k)$ for whom $b^* = c_k - x_k + x^M$. Such supporting nonvoters are on line segment l_4, right of the vertical axis.[22] Observe that l_4 is parallel to l_1, and the vertical distance between the two line segments is b^*. In other words, all voters along l_4 receive the same payment, because the higher voting costs of some citizens on this line segment are balanced by their stronger preferences for the machine's platform.

For double persuasion, the machine delivers the most-expensive double-persuasion payment (b^*) to opposing nonvoters who require exactly that level of benefits to turn out and vote for the machine. In accordance with Equation 5, these are opposing nonvoters of type $t_l = (x_l, c_l)$ for whom $b^* = c_l - x_l + x^M$. Such opposing nonvoters are on line segment l_5, left of the vertical axis.[23] Observe that l_4 and l_5 intercept the vertical axis at the same point, because the most-expensive payments for double persuasion and turnout buying are the same.

[22] Line segment l_4 is given by the equation $c = x - x^M + b^*$, on the domain from the vertical axis to X^M.

[23] Line segment l_5 is given by the equation $c = x - x^M + b^*$, on the domain from the point where l_5 intersects with l_2 to the vertical axis.

Next, consider who receives the most-expensive vote-buying payment (b^{**}). Given that the machine neither overpays nor underpays, it delivers b^{**} only to opposing voters who require exactly that level of benefits to switch their vote choices. In accordance with Equation 2, these are opposing voters of type $t_j = (x_j, c_j)$ for whom $b^{**} = -2x_j$. However, a crucial point is that the machine only provides this most-expensive vote-buying payment to a *subset* of opposing voters of type $t_j = (x_j, c_j)$; more specifically, those located on the vertical line segment l_3 in Figure 2b.

To see why, note that the machine faces a dual choice when rewarding opposing voters — it can deliver benefits in exchange for vote-switching (vote buying) or for staying home (abstention buying). Intuitively, vote buying yields double the net votes, so it is more attractive to pay a citizen to switch her vote, unless doing so is more than twice as expensive as paying her to stay at home. Therefore, given the required payments for each strategy (Equations 2 and 4), the machine chooses vote buying under the following condition:[24]

$$\begin{aligned} b^*_{VB} &\leq 2b^*_{AB} \\ -2x_j &\leq 2[-x_j - x^M - c_j] \\ c_j &\leq x^O \end{aligned} \tag{6}$$

This condition is shown in Figure 2b as horizontal line segment l_6.[25] If the machine rewards an opposing voter located on or below l_6, vote buying is more cost-effective. If the machine rewards an opposing voter located above l_6, abstention buying is more cost-effective.

Given this condition, we can also determine who receives the most-expensive abstention-buying payment (b^*). The machine delivers b^* to opposing voters who require exactly that level of benefits to stay home. In accordance with Equation 4, these are opposing voters of type $t_h = (x_h, c_h)$ for whom $b^* = -x_h - x^M - c_h$. Such opposing voters are located on line segment l_7, which extends from X^O to the point where l_7 intercepts with l_6.[26]

[24] We assume that if both strategies are equally cost-effective, the machine engages in vote buying.

[25] Line segment l_6 is given by the equation $c = x^O$, on the domain from X^O to the vertical intercept.

[26] Line segment l_7 is given by the equation $c = -x - x^M - b^*$, on the domain from X^O to the point where l_7 intercepts with l_6.

Thus far, graphical analysis suggests whom the machine buys with its most-expensive payments (b^* and b^{**}): citizens on l_4 receive turnout-buying payments of b^*, citizens on l_5 receive double-persuasion payments of b^*, citizens on l_3 receive vote-buying payments of b^{**}, and citizens on l_7 receive abstention-buying payments of b^*. Another key insight is that the machine optimally buys *all* citizens whose required payments are less than or equal to the most-expensive payments for each respective strategy. That is, the machine buys all citizens in the shaded areas in Figure 2b. For further intuition, assume that a voter X weakly opposes the machine and requires a vote-buying payment b', which is smaller than b^{**}. If the machine vote buys an opposing voter Y for b^{**}, then it must also vote buy X, because she provides the same number of net votes for a smaller payment. Otherwise, the machine would be better off buying X instead of Y, and reallocating the savings. Note that the machine optimally pays X exactly her required payment, as it does not "overpay" in equilibrium. Such logic also applies for turnout buying, abstention buying, and double persuasion.

The model also provides insight about whom the machine does *not* buy. The machine optimally distributes *no* benefits to opposing voters who require payments greater than b^{**}, or to nonvoters who require payments greater than b^*. Formal analysis suggests that the machine buys no citizens outside the shaded areas in Figure 2b. For further intuition, assume that a voter Z strongly opposes the machine and requires a vote-buying payment b'', which is greater than b^{**}. Observe that even the most-expensive vote-buying payment b^{**} "underpays" Z and is not enough to persuade her to switch her vote. Thus, it cannot be optimal for the machine to expend resources on citizens requiring vote-buying payments larger than b^{**}, for such a payment would not alter these citizens' behavior and would constitute wasted expenditures. The logic is analogous for turnout buying, abstention buying, and double persuasion.

Taken together, these findings suggest the optimal mix of clientelist strategies:

Proposition 3: Optimal Mix of Strategies

- **Vote Buying**: If $\bar{b}_i^{VB} \leq b^{**}$ and $c_i \leq x^O$, pay an opposing voter $\bar{b}_i^{VB}$

- **Turnout Buying**: If $\bar{b}_i^{TB} \leq b^*$, pay a supporting nonvoter $\bar{b}_i^{TB}$
- **Abstention Buying**: If $\bar{b}_i^{AB} \leq b^*$ and $c_i > x^O$, pay an opposing voter $\bar{b}_i^{AB}$
- **Double Persuasion**: If $\bar{b}_i^{DP} \leq b^*$, pay an opposing nonvoter $\bar{b}_i^{DP}$
- **No Payment**: Make no payment to all other citizens

The appendix provides a formal derivation of these equilibrium conditions, and shows how the machine determines b^* and b^{**}. In order to explore why this optimal mix differs across electoral contexts, we now examine comparative statics.

Comparative Statics

The model offers insights into how the political environment in which a machine operates shapes its portfolio of clientelism. Machines optimally tailor their mix of clientelist strategies to at least five characteristics of political environments: (1) compulsory voting, (2) strength of ballot secrecy, (3) salience of political preferences, (4) political polarization, and (5) level of machine support. This section provides intuition about how each factor influences the optimal mix, based on analytical solutions derived in the appendix.

More specifically, the formal analysis indicates how a machine optimally changes the quantity of citizens bought with each strategy in response to parameter shifts in the model. In response to such changes, machines alter which citizens they buy by reallocating resources *across* and *within* strategies of electoral clientelism. Changes in the political environment affect the number of cheap targets that the machine can buy with each strategy. Thus, machines reallocate resources towards strategies that now offer additional cheap targets. In addition, machines reallocate resources within a given strategy to ensure that they continue to buy the cheapest citizens. For tractability, comparative statics examine the case where x_i and c_i are distributed uniformly.

Where possible, we discuss empirical evidence related to the predictions of each comparative static. At the outset, it should be emphasized that the paucity of data on distinct strategies of electoral clientelism (especially across time or space) impedes rigorous testing of comparative statics. Nevertheless, our formal findings yield important insights and lay the groundwork for future empirical research.

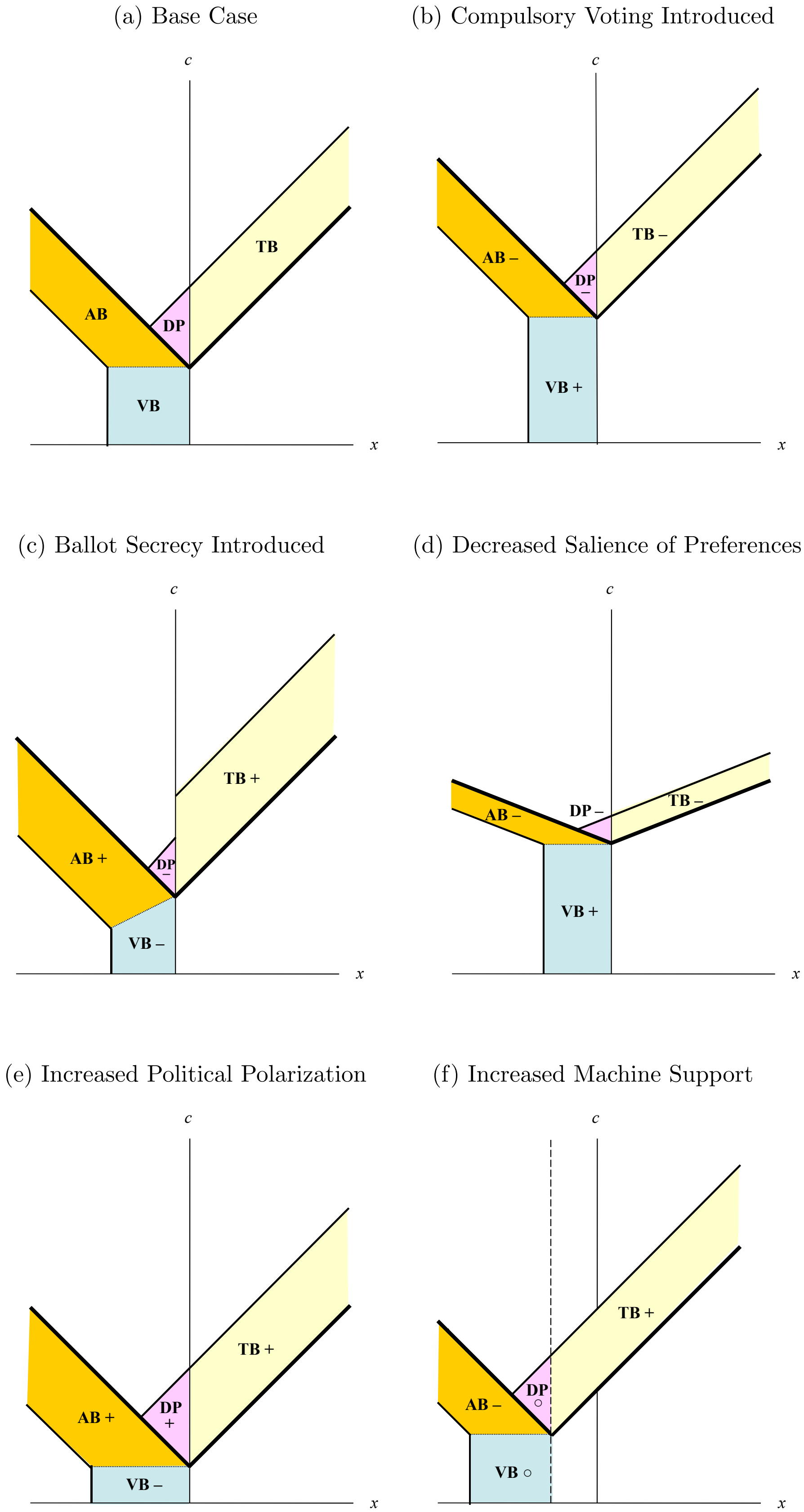
(1) *Compulsory Voting*. Few institutional changes affect voting behavior as dramatically as the introduction of compulsory voting. Over 30 countries have introduced compulsory voting for a variety of reasons (IDEA 2009). While some scholars such as Lijphart (1997) suggest that compulsory voting may reduce political inequality by encouraging electoral participation, our analysis predicts that introducing this rule has unintended consequences with respect to clientelism. Several analysts purport that compulsory voting reduces vote buying, because it increases how many purchased voters are needed to influence an election (e.g., Donaldson 1915; Uwanno & Burns 1998; Dressel 2005). For example, Schaffer (2008: 124) argues that compulsory voting "provides an institutional disincentive for vote buying: by expanding the electorate it makes vote buying more expensive." But as the case of Thailand suggests, reformers who explicitly try to curb vote buying through compulsory voting have been disappointed to find that this predicted effect does not necessarily materialize.[27] And contrary to what such analysts might predict, countries with compulsory voting often have relatively *higher* rates of vote buying. While the prevalence of vote buying depends on various factors (some explored below), it deserves mention that a recent survey of over 37,000 citizens across the Americas reveals that vote buying is twice as prevalent in countries where voting is mandatory.[28]

Our model examines specific mechanisms by which compulsory voting affects clientelist strategies, and predicts that — holding other factors equal — the introduction of compulsory voting actually *increases* the prevalence of vote buying. To analyze the effects of compulsory voting, we unpack citizens' net voting costs such that $c_i = n_i - a$, where $a \geq 0$ represents

[27] For example, see the discussion in Schaffer (2008). Note that curbing vote buying was one of several goals of introducing compulsory voting, and Thailand simultaneously engaged in multiple reforms. While we cannot isolate whether compulsory voting increased vote buying in Thailand (as predicted by our model), the point here is simply that compulsory voting did not have the negative effect expected by reformers.

[28] Survey conducted by the Latin American Public Opinion Project of Vanderbilt University. In the 13 countries with compulsory voting, 10.9 percent of citizens reported receiving offers of material benefits in exchange for their votes "sometimes" or "often," versus only 5.3 percent in the 11 countries with optional voting. Removing Canada and the U.S. from the sample increases the prevalence of vote buying in countries with optional voting to 6.1 percent (N=9). In either case, the difference is statistically significant in a two-tailed t-test (at the 99 percent level).

Figure 3: Comparative Statics



Note: VB = Vote Buying; TB = Turnout Buying; AB = Abstention Buying; DP = Double Persuasion.

The symbols +, - and 0 reflect how the prevalence of each strategy changes for each parameter shift.

the fines or other penalties formally imposed on nonvoters through a compulsory voting law.[29] Higher abstention costs boost turnout and shift the vertex upwards (compare Figures 3a and 3b). This upward shift increases the number of cheap vote-buying targets, who are weak opposing voters clustered along the vertical axis under the vertex. In order to buy these newly introduced cheap targets for vote buying, the machine: (1) reallocates resources from turnout buying, double persuasion, and abstention buying towards vote buying, and (2) reallocates resources within vote buying from the most-expensive recipients towards the newly introduced cheap targets. Consequently, the prevalence of vote buying increases ($\frac{\partial VB}{\partial a} > 0$) while turnout buying, abstention buying, and double persuasion all decrease ($\frac{\partial TB}{\partial a} < 0$, $\frac{\partial AB}{\partial a} < 0$, $\frac{\partial DP}{\partial a} < 0$).

The findings of a recent field experiment in Peru are consistent with our model's prediction about the impact of compulsory voting on vote buying. Leon (2011) examines the impact of a steep reduction in the penalties imposed on nonvoters. In 2006, the Peruvian government decreased compulsory voting penalties from approximately \$50 to as low as \$6 in the poorest districts. Given that this institutional shift remained almost entirely unpublicized, Leon (2011) conducted an experiment by randomly providing information about the penalty reductions. Observe that our model predicts that this decrease in abstention costs (a) will reduce turnout, and as a consequence, lead to a decline in vote buying. These predictions match the findings in Leon (2011): Peru's reduction in penalties for abstention caused significant declines in both electoral participation and vote buying. Most important for this discussion, the study finds that "a decrease in the cost of abstention reduces the incidence of vote buying by 20%" (Leon 2011: 4).

Although the Peruvian study examines only vote buying, other studies also provide evidence about the impact of compulsory voting on different strategies of electoral clientelism. Evidence from both Australia and Belgium is consistent with the predictions of our model. In an analysis of the overall decline of clientelism in Australia, Orr (2003: 133) suggests

[29] Note that n_i captures all other net costs of voting (i.e., voting costs and other abstention costs such as social disapprobation).

that compulsory voting decreased turnout buying: "As a final nail in the coffin, compulsory enrolment and voting in Australia assisted, by guaranteeing high turnouts and thereby out-flanking bribery to 'get-out-the-vote.'" Furthermore, Malkopoulou (2009: 10) suggests Belgium introduced compulsory voting in 1893 in part to reduce abstention buying, and concludes that compulsory voting laws "may still be a useful mechanism to prevent electoral corruption and abstention-buying in countries that feature large economic divides and labour dependence." Overall, in line with these authors' findings, the model's comparative statics predict how compulsory voting affects each strategy of electoral clientelism.

(2) *Secret Ballot.* Especially since its 1856 adoption in Australia, the secret ballot has emerged as one of the most ubiquitous electoral institutions in the world. In theory, the secret ballot renders vote buying unenforceable because machines cannot verify whether reward recipients actually switch their vote choices. But in practice, machines employ a variety of tactics to violate ballot secrecy. For example, parties in the Philippines give out carbon paper so voters can copy their ballots, and Italian parties lend mobile phones with cameras so reward recipients can photograph how they vote (Schaffer & Schedler 2007, 30–31). Although such tactics continue to facilitate vote buying, it is generally accepted that the secret ballot reduces vote buying by making it costlier to monitor vote choices (e.g., Cox & Kousser 1981; Rusk 1974; Stokes 2005).

Evidence also suggests that ballot secrecy affects abstention buying (e.g., Cox & Kousser 1981; Heckelman 1998). Most prominently, a quantitative study of rural newspaper articles by Cox & Kousser (1981) finds that abstention buying (what they call "deflationary fraud") increased when ballot secrecy was introduced in New York state. They quote a Democratic state chairman: "Under the new ballot law you cannot tell how a man votes when he goes into the booth, but if he stays home you know you have got the worth of your money" (1981: 656). Whereas Cox & Kousser (1981) do not conduct formal analyses, our model illustrates the logic behind their findings. As an additional contribution, our model also helps to explain a counterintuitive result in their analysis (discussed below).

The model's comparative statics offer insights into the effects of ballot secrecy on each strategy. To analyze these effects, we relax the assumption that the machine can costlessly monitor vote choices and sanction reward recipients who vote against the machine. The machine incurs these costs, which are captured by a parameter $\beta \geq 1$, when rewarding citizens who prefer the opposition. Introducing β changes the payment equations for vote buying, $\bar{b}_i^{VB} = \beta(-2x_i)$, and double persuasion, $\bar{b}_i^{DP} = \beta(c_i - x_i + x^M)$, given that both strategies target opposers.[30] Recall from Proposition 1 that without the secret ballot, the most expensive price the machine optimally pays for vote buying is twice as much as for the other strategies: $b^*_{\text{VB}} = 2b^*_{\text{TB}} = 2b^*_{\text{DP}} = 2b^*_{\text{AB}}$. As shown in the appendix, a machine facing ballot secrecy takes into account the cost of monitoring and sanctioning opposers when setting the most expensive payments: $\beta(b^*_{\text{VB}}) = 2b^*_{\text{TB}} = \beta(2b^*_{\text{DP}}) = 2b^*_{\text{AB}}$. Given that ballot secrecy makes strategies targeting opposers more expensive, the machine engages in less vote buying and double persuasion ($\frac{\partial VB}{\partial \beta} < 0$, $\frac{\partial DP}{\partial \beta} < 0$), and more abstention buying and turnout buying ($\frac{\partial AB}{\partial \beta} > 0, \frac{\partial TB}{\partial \beta} > 0$). For a graphical representation of these effects, compare Figures 3a and 3c.

These predictions are consistent with Cox & Kousser's (1981) finding that ballot secrecy increases abstention buying and provide insights about mechanisms underlying this change. Our model also helps to explain a puzzling finding in Cox & Kousser's quantitative analysis with respect to "inflationary fraud" — their term for payments to voters that increase the machine's vote tally. The authors find that inflationary fraud remained relatively *constant* with the introduction of the secret ballot law (1981: 657). This finding ostensibly contradicts the observations of many scholars and journalists who posit that the introduction of ballot secrecy substantially decreased vote buying in the U.S.[31] Our model provides an explanation for this apparent discrepancy. When tallying inflationary fraud, Cox & Kousser lumped together vote buying and turnout buying because both strategies "inflate" the number of

[30] The original payment equations for these strategies (Equations 2 and 5) are a special case of this more general setup where $\beta = 1$.

[31] For example, see Rusk (1974); Heckelman (1998); "Election Corruption in New York State," *The Evening Post: New York*, January 8, 1917; and "Here and There," *The Niagara Falls Gazette*, October 10, 1936.

votes received by the machine.[32] But ballot secrecy has *opposite* effects on vote buying and turnout buying. The authors thus conflate two strategies with countervailing effects, which helps explain why they find no effect of the secret ballot. It should be noted that historical New York newspapers emphasized machines' use of turnout buying — not just abstention buying — after the introduction of the secret ballot. For example, the *New York Herald* observed in 1912 that some partisan supporters "refuse to vote at all unless they are paid for it ... Their plea is that they must have a few dollars to compensate them for their 'loss of time' in going to the polls."[33] Even a *New York Times* article cited by Cox & Kousser (1981) discusses turnout buying as well as abstention buying in 1894: "Ten times that amount, it is said by visitors of that county, is needed to properly get out such voters as desired and keep others at home."[34] Overall, our model predicts that ballot secrecy influences all strategies of electoral clientelism, not just vote buying and abstention buying as recognized by the existing literature.

(3) *Salience of Political Preferences.* In addition to institutional factors, the model suggests that characteristics of the electorate also affect machines' mix of clientelistic strategies. For various reasons, voters in some contexts place relatively more value on political preferences than material rewards. For example, many studies suggest that clientelism is more prevalent in poor or rural areas, where the electorate tends to be relatively less responsive to policy platforms than handouts (Kitschelt & Wilkinson 2007; Powell 1970).[35] What the overall literature fails to clarify is that political salience has differential effects *across* strategies of electoral clientelism.

To explore this point, we analyze the salience of political preferences by introducing a

[32] For a specific instance in which turnout buying and vote buying are explicitly conflated as "inflationary fraud," see the discussion of farmers in Cox & Kousser (1981: 661). It should be noted that the authors actually conflate vote buying, turnout buying, *and* double persuasion under the label "inflationary fraud."

[33] "How Radical Leaven Swells Campaign Dough," *New York Herald*, July 14, 1912.

[34] "Money Flowing In and Out," *New York Times*, November 2, 1894. To clarify, Cox & Kousser (1981) cite this article in reference to abstention buying, but do not mention the quotation regarding turnout buying.

[35] While the comparative statics focus on how contextual characteristics affect electoral clientelism, it should be noted that the relative salience of political preferences may also vary across citizens within a given context (e.g., see Dixit & Londregan 1996; Stokes 2005; Corstange 2010).

parameter $\kappa > 0$ to the utility function of citizens (Equation 1): $U_i^M = -\kappa|x^M - x_i| - c_i$.[36] The parameter κ represents the importance of expressing one's political preferences, relative to the cost of voting. As the salience of political preferences increases (i.e., κ increases), the vertex becomes more steep and shifts downward. This downward shift decreases the number of cheap vote-buying targets, who are weak opposing voters clustered along the vertical axis under the vertex. Given that the number of cheap vote-buying targets decreases, the machine decreases vote buying ($\frac{\partial VB}{\partial \kappa} < 0$) and increases turnout buying, abstention buying, and double persuasion ($\frac{\partial TB}{\partial \kappa} > 0$, $\frac{\partial AB}{\partial \kappa} > 0$, $\frac{\partial DP}{\partial \kappa} > 0$).

The model not only sheds light on how levels of political salience affects the mix of strategies, but also offers intriguing predictions about the effects of shocks to this factor. For example, consider the possibility that an economic shock during a campaign leads citizens to place greater value on clientelist handouts relative to political preferences (i.e., κ decreases). The model predicts that such shocks would increase vote buying, as well as decrease other strategies. As shown in Figure 3d, the vertex becomes less steep and shifts upward, which increases the number of cheap vote-buying targets. Although further evidence is required to test predictions fully, newspaper reports suggest that consistent with our model, vote buying increases during economic shocks caused by droughts. As one article in the Philippines quotes a senatorial candidate: "The drought will lead to hunger and desperation, thus making vote-buying a more viable option for candidates with resources."[37] Similarly, an article on the impact of El Niño droughts in Northeast Brazil quotes a Catholic bishop: "It's easier to buy votes when the people are starving and will agree to anything for food."[38]

Further research should explore how changes and levels of political salience affect machines' mix of electoral clientelism. The model also provides insights about two other characteristics of political environments. We mention these findings briefly to identify directions for future research, given that evidence about the following predictions remains available.

[36] Observe that Equation 1 is a special case of this setup, in which $\kappa = 1$.

[37] "Dry Spell May Encourage Vote-Buying," *Sun-Star Cebu*, March 1, 2000.

[38] "Drought Brings Misery to Brazil," *Associated Press*, May 1, 1998.

(4) *Political Polarization.* The model's comparative statics also suggest that characteristics of a party system influence the mix of electoral clientelism employed by a machine. We examine political polarization, which we conceptualize as the ideological distance between parties (formally, $|x^M - x^O|$). Increased political polarization is predicted to decrease vote buying ($\frac{\partial VB}{\partial(x^M - x^O)} < 0$), increase turnout buying ($\frac{\partial TB}{\partial(x^M - x^O)} > 0$), increase abstention buying ($\frac{\partial AB}{\partial(x^M - x^O)} > 0$), and increase double persuasion ($\frac{\partial DP}{\partial(x^M - x^O)} > 0$). Observe that as polarization increases, voters with moderate ideological preferences receive less expressive utility from voting, because the ideological distance from their preferred party grows. As a result, some voters no longer come to the polls, and the vertex shifts down (compare Figures 3a and 3e). This downward shift decreases the number of cheap vote-buying targets, who are weak opposing voters clustered along the vertical axis under the vertex. As the number of cheap vote-buying targets decreases, the machine: (1) reallocates resources from vote buying to turnout buying, abstention buying, and double persuasion, and (2) reallocates resources within vote buying from the lost cheap targets towards costlier opposing voters. Overall, the model suggests that machines rely relatively more on mobilizational strategies where political polarization is high, and rely relatively more on vote buying where it is low.

(5) *Machine Support.* A final comparative static examines the level of political support for the machine. We conceptualize machine support as the proportion of citizens who prefer the machine's platform over the opposition party's platform. Comparative statics suggest that an increase in *machine support* increases turnout buying ($\frac{\partial TB}{\partial \overline{x}} > 0$), decreases abstention buying ($\frac{\partial AB}{\partial \overline{x}} < 0$), and has no effect on vote buying or double persuasion ($\frac{\partial VB}{\partial \overline{x}} = 0$ and $\frac{\partial DP}{\partial \overline{x}} = 0$, respectively). To analyze this comparative static, we unpack citizens' political preferences such that $x_i = \overline{x} + \epsilon_i$, where $\overline{x}$ represents the political preferences of the median voter, and ϵ_i captures individual-specific deviation from the median voter.[39] A rise in support for the machine's platform increases $\overline{x}$ and shifts the vertex left (compare Figures 3a and

[39] The utility function for machine supporters (Equation 1) thus becomes: $U_i^M = -|x^M - (\overline{x} + \epsilon_i)| - c_i$. Observe that Equation 1 is a special case of this setup, in which $\overline{x} = 0$ (i.e., in the original setup, the machine party and opposition party have equal levels of political support).

3f). This leftward shift increases the number of cheap turnout-buying targets, who are supporting nonvoters clustered just above l_1. In order to buy these supporting nonvoters, the machine reallocates resources from abstention buying to turnout buying. Substantively, this comparative static suggests that a machine operating in several political districts will optimally tailor its clientelist mix according to political support. When distributing benefits in districts with many loyalists, the machine employs relatively more turnout buying. But in opposition bailiwicks, it employs relatively more abstention buying.

In summary, our model predicts that characteristics of political environments affect clientelist strategies as follows:[40]

	Vote Buying	Turnout Buying	Abstention Buying	Double Persuasion
Compulsory Voting Introduced	+	−	−	−
Ballot Secrecy Introduced	−	+	+	−
Decreased Political Salience	+	−	−	−
Increased Political Polarization	−	+	+	+
Increased Machine Support	0	+	−	0

Further empirical research is needed to understand more thoroughly the effects of the five factors discussed above, as well as to test rigorously the predictions of each comparative static. More broadly, the findings reveal and lay the groundwork for potentially fruitful research agendas that have thus far largely remained unexplored.

Discussion

This article provides important insights about the logic of electoral clientelism. Although most studies focus exclusively on vote buying, our analysis suggests that political machines maximize their electoral prospects by using rewards for both persuasion and mobilization. Our analysis is the first to explain why political machines never optimally engage in only one

[40]The symbols +, - and 0 reflect how the prevalence of each strategy changes for each parameter shift.

clientelist strategy. We argue that machines are most effective when they combine at least four strategies — vote buying, turnout buying, abstention buying, and double persuasion.

Our study also contributes to the literature by identifying numerous reasons why political machines often adopt different portfolios of clientelist strategies. Machines consider both individual and contextual factors when deciding how to distribute benefits during campaigns. Two attributes of individuals — political preferences and voting costs — determine the prevalence of cheap targets for each strategy. Machines also adapt their mix of clientelist strategies to contextual factors. For example, our model suggests that relatively more vote buying will be observed in contexts with compulsory voting, weak ballot secrecy, low political polarization, and low salience of political preferences. By contrast, relatively more turnout buying is predicted in contexts with optional voting, strong ballot secrecy, high political polarization, high salience of political preferences, and strong machine support.

An essential next step is testing our predictions rigorously. Empirical tests should rely on both quantitative and qualitative methods, employing enhanced data collection and identification strategies. To date, analysis of varieties of clientelism has been hampered by data collection efforts that focus exclusively on vote buying. To address this issue, survey and interview research should explicitly attempt to ascertain whether rewards are used to influence vote choices or induce electoral participation. For example, panel surveys could help identify the relative prevalence of strategies by capturing *ex ante* partisan preferences and inclination to vote (i.e., before receiving rewards). Another potentially fruitful approach to studying varieties of clientelism may involve more rigorous analysis of aggregate data.

In addition to rigorous empirical testing, another productive direction for future research involves additional formal analysis. For example, our analysis of comparative statics assumes that political preferences and voting costs (i.e., x_i and c_i) are distributed uniformly. This simplifying assumption facilitates analysis of whether changes in contextual factors increase or decrease the prevalence of each strategy. Varying the distribution of x_i and c_i to reflect specific political environments would provide further insights, such as the effect of contextual factors on the *overall* prevalence of electoral clientelism. Another important issue is how a machine adapts its mix of electoral clientelism when facing competition from another machine operating in the same geographic territory. Whereas our model focuses on the many contexts where such direct competition does not exist (Stokes 2005, 2009; Kitschelt 2011), a game theoretical model could be developed to examine other contexts. In addition, future research should examine the way in which regime type affects the mix of electoral clientelism. For example, although many authoritarian regimes distribute benefits during elections (e.g., Blaydes 2010; Magaloni 2006), they may be more likely to use coercive measures while engaging in clientelist exchanges. Formal examination of such factors, as well as potential interactions across factors, would further enhance our understanding of electoral clientelism.

Expanding formal and empirical analyses beyond elections is also crucial. The present paper focuses exclusively on electoral clientelism, which provides all benefits before voting. This focus provides valuable insights about strategies that remain poorly understood, but clientelism obviously involves a broader set of strategies than just elite payoffs to citizens at election time. An important avenue for further research is understanding the mechanisms that facilitate such relational clientelism, which involves ongoing relationships and promises of future benefits. A related issue is the link between electoral clientelism and relational clientelism. For example, do longer-term clientelist relationships typically represent substitutes for — or complements to — vote buying and turnout buying? And more broadly, given that clientelist strategies are part of a portfolio of tools for obtaining electoral support (Estévez, Magaloni & Diaz-Cayeros 2002; Calvo & Murillo 2010: 5–6), how do parties allocate resources between clientelist and programmatic strategies (e.g., campaign advertising)?

Such questions provide important directions for future research on clientelism, a topic with significant policy implications. With respect to the present study, our findings suggest that policy shifts may shape the mix of strategies employed by political machines, with potentially serious implications. Different strategies may entail distinct political and social consequences. For example, our model predicts that the introduction of compulsory voting decreases turnout buying and increases vote buying. Yet the normative implications of inducing turnout may well be less pernicious than paying citizens to vote against their preferences (Hasen 2000, 1375–8, 1370). Given such normative considerations, further research on how different policies affect patterns of clientelism could help inform policy debates.

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Appendix

We refer to opposing voters as OV; to supporting nonvoters as SNV; and to opposing nonvoters as ONV. Also, for notational simplicity, let $h = g(c)f(x)dc\,dx$, $r = x - x^M$, and $s = -x - x^M$. The proofs to Propositions 1 and 3 make use of the following lemma:

Lemma 1: For any allocation of budget B, a machine could buy more citizens if it had additional resources of any positive amount.

Proof. Let A be an allocation of budget B. Define $M(A)$ to be the set of citizens who vote for a machine given this allocation: $M(A) \equiv \{(x_i, c_i) : b_i \geq \bar{b}_i\}$, where b_i is the payment received by citizen i under allocation A and $\bar{b}_i$ is the payment required to buy this citizen. Limited resources means that for any allocation A, a machine cannot afford to buy all citizens: $\int\int \bar{b}_i h > B$. It follows that there exists a set $Q \notin M(A)$ of positive measure such that $\bar{b}_i > b_i$ for all $(x_i, c_i) \in Q$. Let $(\dot{x}_i, \dot{c}_i)$ be any point on the interior of Q and select η sufficiently small such that $\Delta(\eta) \equiv [\dot{x}_i, \dot{x}_i + \eta] \times [\dot{c}_i, \dot{c}_i + \eta] \subset Q$. Let $\theta > 0$ represent some nonzero amount of resources. Then by the continuity of $f(x)$ and $g(c)$, there exists a $\eta_0 < \eta$ such that for any θ, a machine can afford to buy all citizens in $\Delta(\eta_0)$: $\int_{\Delta(\eta_0)} \bar{b}_i h \leq \theta$. $\square$

Proposition 1: In an optimal allocation of resources, a machine sets $b^*_{VB} = 2b^*_{TB} = 2b^*_{DP} = 2b^*_{AB}$.

Proof. We will show (i) $b^*_{TB} = b^*_{DP}$ and (ii) $b^*_{VB} = 2b^*_{TB}$. (Note that the proof to $b^*_{TB} = b^*_{AB}$ follows identical logic).

(i) Let b^*_{TB} and b^*_{DP} be the upper bounds on a machine's payments to SNV and ONV, respectively. For contradiction, assume A is an optimal allocation in which $b^*_{TB} \neq b^*_{DP}$. Without loss of generality, say $b^*_{TB} > b^*_{DP}$. We will show there exists an allocation A' that is affordable and produces a strictly greater number of net votes. Thus, A cannot be optimal.

Let S be a set with positive measure of SNV such that all citizens in set S have a required payment $\bar{b}_i = b^*_{TB}$. Let $(\hat{x}, \hat{c})$ be any point on the interior of S and take δ small enough such that $\Delta(\delta) \equiv [\hat{x}, \hat{x} + \delta] \times [\hat{c}, \hat{c} + \delta] \subset S$. Recall from Lemma 1 that Q is a set of citizens who remain unbought under allocation A. Let $R \subset Q$ be a set with positive measure of ONV such that all citizens in set R have a required payment $b^*_{TB} > \bar{b}_i > b^*_{DP}$. Let $(\tilde{x}, \tilde{c})$ be any point on the interior of R. Take μ small enough such that $\Delta(\mu) \equiv [\tilde{x}, \tilde{x} + \mu] \times [\tilde{c}, \tilde{c} + \mu] \subset R$. By the continuity of $f(x)$ and $g(c)$, there exists a $\delta_0 < \delta$ and a $\mu_0 < \mu$ such that $\int_{\Delta(\delta_0)} h = \int_{\Delta(\mu_0)} h$ (call this Equation A1). Observe that $\Delta(\delta_0)$ and $\Delta(\mu_0)$ have the same number of citizens, so buying either set produces the same net votes. Let $\theta \equiv \int_{\Delta(\delta_0)} \bar{b}_i h - \int_{\Delta(\mu_0)} \bar{b}_i h$ and note $\theta > 0$ because citizens on $\Delta(\delta_0)$ are more expensive than those on $\Delta(\mu_0)$. Finally, let $\Delta(\eta_0)$ be a set of citizens who are mutually exclusive of set $\Delta(\mu_0)$ and who do not receive rewards under allocation A. Formally, $\Delta(\eta_0) \subset Q$ and $\Delta(\mu_0) \cap \Delta(\eta_0) = \emptyset$.

Consider an allocation A' in which a machine buys all citizens in $\Delta(\mu_0)$, reduces payments to citizens on $\Delta(\delta_0)$ to zero, and redistributes the savings to citizens in $\Delta(\eta_0)$. Recall from Lemma 1 that citizens on $\Delta(\eta_0)$ can be be bought with resources θ. Formally, define $\Omega \equiv [\underline{X}, \overline{X}] \times [0, \overline{C}] - (\Delta(\delta_0) \cup \Delta(\mu_0) \cup \Delta(\eta_0))$. Let $A' = A$ for all (x_i, c_i) on Ω, $A' = 0$ for all (x_i, c_i) on $\Delta(\delta_0)$, and $A' = \bar{b}_i$ for all (x_i, c_i) on $\Delta(\mu_0)$ and for all (x_i, c_i) on $\Delta(\eta_0)$. The cost of A' is $\leq$ the cost of allocation A, and A' buys $\int_{\Delta(\eta_0)} h$ more citizens. Thus A cannot be an optimal allocation.

(ii) To show $b^*_{VB} = 2b^*_{TB}$ (or, equivalently, $b^*_{VB} = 2b^*_{DP}$ or $b^*_{VB} = 2b^*_{AB}$), we repeat the proof that $b^*_{TB} = b^*_{DP}$, replacing Equation (A1) with $\int_{\Delta(\delta_0)} h = 2 \int_{\Delta(\mu_0)} h$, where $\Delta(\delta_0)$ is a subset of OV for whom $\bar{b}_i = b^*_{VB} > 2b^*_{TB}$, and where $\Delta(\mu_0)$ is a subset of SNV for whom $\frac{1}{2} b^*_{VB} > \bar{b}_i > b^*_{TB}$. $\square$

Proposition 2: If a machine engages in electoral clientelism, then optimally it allocates resources across all three strategies of vote buying, turnout buying, and double persuasion.

Proof. Let $b^*_{VB} = b^{**}$ and $b^*_{TB} = b^*_{DP} = b^*_{AB} = b^*$. In an optimal allocation, the number of vote-buying recipients is $VB = N\int_{-\frac{b^{**}}{2}}^{0}\int_{\underline{C}}^{x^O} h$ (Equation A2), the number turnout-buying recipients is $TB = N\int_0^{\overline{X}}\int_r^{r+b^*} h$ (Equation A3), the number of double-persuasion recipients is $DP = N\int_{-\frac{b^*}{2}}^{0}\int_s^{r+b^*} h$ (Equation A4), and the number of abstention buying recipients is $AB = N\int_{\underline{X}}^{-\frac{b^{**}}{2}}\int_{s-b^*}^{s} h + N\int_{-\frac{b^{**}}{2}}^{0}\int_{x^O}^{s} h$ (Equation A5). By Proposition 1, $b^{**} = 2b^*$, so $b^* > 0 \iff b^{**} > 0$. It then follows from equations A2, A3, A4, and A5 that $VB > 0 \iff TB > 0 \iff DP > 0 \iff AB > 0$. □

Proposition 3 If $\bar{b}_i^{VB} \leq b^{**}$ and $c_i \leq x^O$, a machine pays $\bar{b}_i^{VB}$ to a OV. If $\bar{b}_i^{AB} \leq b^*$ and $c_i > x^O$, a machine pays $\bar{b}_i^{AB}$ to a OV. If $\bar{b}_i^{TB} \leq b^*$, a machine pays $\bar{b}_i^{TB}$ to a SNV. If $\bar{b}_i^{DP} \leq b^*$, a machine pays $\bar{b}_i^{DP}$ to a ONV . All other citizens receive no payment.

Proof. We prove the TB case; identical logic holds for other strategies. We show (i) if $\bar{b}_i^{TB} \leq b^{**}$, a machine pays $\bar{b}_i^{TB}$ to a SNV; (ii) if $\bar{b}_i^{TB} > b^*$, a machine offers $b_i = 0$ to a SNV.

(i) Let b^* be the upper bound on payments a machine makes to SNV. Define $M(A)$ to be the set of SNV who vote for the machine given the payment allocation A. For contradiction, assume A is an optimal allocation in which the machine does not buy all SNV who are cheaper than b^*. Formally, there exists a set Z with positive measure of SNV receiving $b_i < \bar{b}_i < b^*$. We will show there exists a A' that is affordable and produces a strictly greater number of net votes. Thus, A cannot be optimal.

Let $(\hat{x}, \hat{c})$ be any point on the interior of $M(A)$ and take δ small enough such that $\Delta(\delta) \equiv [\hat{x}, \hat{x}+\delta] \times [\hat{c}, \hat{c}+\delta] \subset M(A)$. Let $(\tilde{x}_i, \tilde{c}_i)$ be any point in Z and select μ sufficiently small such that $\Delta(\mu) \equiv [\tilde{x}_i, \tilde{x}_i+\mu] \times [\tilde{c}_i, \tilde{c}_i+\mu] \subset Z$. By the continuity of $f(x)$ and $g(c)$ there exists a $\delta_0 < \delta$ and $\mu_0 < \mu$ such that $\int_{\Delta(\delta_0)} h = \int_{\Delta(\mu_0)} h$. Observe that $\Delta(\delta_0)$ and $\Delta(\mu_0)$ have the same number of SNV, so buying either set produces the same net votes. Let $\theta \equiv \int_{\Delta(\delta_0)} b_i h - \int_{\Delta(\mu_0)} \bar{b}_i h$ and note that $\theta > 0$ because citizens in $\Delta(\mu_0)$ are cheaper than those in $\Delta(\delta_0)$. Consider an allocation A' in which a machine buys all citizens in $\Delta(\mu_0)$, reduces payments to citizens in $\Delta(\delta_0)$ to zero, and redistributes the savings to citizens in $\Delta(\eta_0)$. Recall from Lemma 1 that $\Delta(\eta_0)$ is a set of citizens who remain unbought under allocation A, and who could be bought with resources θ. Formally, define $\Omega \equiv [\underline{X}, \overline{X}] \times [0, \overline{C}] - (\Delta(\delta_0) \cup \Delta(\mu_0) \cup \Delta(\eta_0))$. Let $A' = A$ for all (x_i, c_i) on Ω, $A' = 0$ for all (x_i, c_i) on $\Delta(\delta_0)$, and $A' = \overline{b}_i$ for all (x_i, c_i) on $\Delta(\mu_0)$ and for all (x_i, c_i) on $\Delta(\eta_0)$. The cost of A' is less than or equal to the cost of allocation A and A' buys $\int_{\Delta(\eta_0)} h$ more citizens. Thus A cannot be an optimal allocation.

(ii) Recall that b^* is the upper bound on payments a machine makes to SNV. Offering b^* to a citizen for whom $\overline{b}_i^{TB} > b^*$ is insufficient to induce turnout (i.e., it is an underpayment). Formally, underpayment can be defined as a set of positive measure P of SNV receiving rewards b_i such that $\overline{b}_i > b_i > 0$. For contradiction, assume A is an optimal allocation in which a machine underpays some SNV. We show there exists an affordable allocation A'' that produces strictly more net votes than A. Thus, A cannot be optimal.

Define $\theta \equiv \int_P b_i h$ as the resources the machine devotes to citizens in set P. In allocation A, $\theta > 0$. Observe that since the machine underpays these citizens, it receives 0 net votes in return. Recall from Lemma 1 that a machine can purchase all citizens on set $\Delta(\eta_0)$ for resources θ, where $\Delta(\eta_0)$ are citizens who remain unbought under allocation A. Consider an allocation A'' in which a machine reduces payments to citizens on set P to 0 and uses the savings to purchase citizens on set $\Delta(\eta_0)$. Formally, define $\Omega \equiv [\underline{X}, \overline{X}] \times [0, \overline{C}] - (P \cup \Delta(\eta_0))$. Let $A'' = A$ for all (x_i, c_i) on Ω, $A'' = 0$ for all (x_i, c_i) on P, and $A'' = \overline{b}_i$ for all (x_i, c_i) on $\Delta(\eta_0)$. Then the costs of A'' are $\leq$ the costs of A, and A'' buys $\int_{\Delta(\eta_0)} h$ more citizens. Thus A cannot be an optimal allocation. $\square$

Comparative Statics

For analysis of comparative statics, we assume f and g are distributed uniformly. The machine's constrained optimization problem, where λ is the Lagrangian multiplier, is: $\underset{b_{\text{TB}},\, b_{\text{DP}},\, b_{\text{VB}},\, b_{\text{AB}}}{max} V^M - V^O - \lambda(E - B)$. The machine maximizes the difference between its votes (V^M) and opposition votes (V^O), given that total expenditures (E) must be less than or equal to its budget B. Note that $V^O = N \int_{\underline{X}}^{-\frac{b^{VB}}{2}} \int_{\underline{C}}^{s-b^{AB}} h$ and $V^M = VB + TB + DP + S$, where: Vote Buying (VB) $= N \int_{-\frac{b^{VB}}{2}}^{0} \int_{\underline{C}}^{x^O} h$, Turnout Buying (TB) $= N \int_0^{\overline{X}} \int_r^{r+b^{TB}} h$, Double Persuasion (DP) $= N \int_{-\frac{b^{DP}}{2}}^{0} \int_s^{r+b^{DP}} h$, and Supporters (S) $= N \int_0^{\overline{X}} \int_0^r h$. Total expenditures for the machine party are $E = E_{VB} + E_{TB} + E_{DP} + E_{AB}$, where: VB Expenditures (E_{VB}) $= N \int_{-\frac{b^{VB}}{2}}^{0} \int_{\underline{C}}^{x^O} \overline{b}_i^{VB} h$, TB

Expenditures (E_{TB}) $= N\int_0^{\overline{X}}\int_r^{r+b^{TB}} \overline{b}_i^{TB} h$, DP Expenditures ($E_{DP}$) $= N\int_{-\frac{b^{DP}}{2}}^{0}\int_s^{r+b^{DP}} \overline{b}_i^{DP} h$, and AB Expenditures ($E_{AB}$) $= N\int_{\underline{X}}^{-\frac{b^{VB}}{2}}\int_{s-b^{AB}}^{s} \overline{b}_i^{AB} h + N\int_{-\frac{b^{VB}}{2}}^{0}\int_{x^O}^{s} \overline{b}_i^{AB} h$. Solving the problem yields four first order conditions. Solving all first order conditions for λ yields the results from Proposition 1: $b^*_{\text{VB}} = 2b^*_{\text{TB}} = 2b^*_{\text{DP}} = 2b^*_{\text{AB}}$. For the following analyses, let $\Gamma = \frac{N}{(\overline{X}-\underline{X})(\overline{C}-\underline{C})}$. Recall that $\underline{C} < 0$, $\underline{X} < 0$, and $\underline{X} = -\overline{X}$.

Compulsory Voting

Substitute $b^* = \frac{1}{2}b^{**}$ from the FOCs into the budget constraint. Implicit differentiation yields: $\frac{\partial b^{**}}{\partial a} = \frac{-4b^{**}}{8(a+\overline{X}-x^M-\underline{C})-b^{**}} < 0$. Substitute $b^{**} = 2b^*$ into the budget constraint. Implicit differentiation yields: $\frac{\partial b^*}{\partial a} = \frac{-2b^*}{4(a+\overline{X}-x^M-\underline{C})-b^*} < 0$. Comparative statics follow: (1) $\frac{\partial VB}{\partial a} = \frac{\Gamma}{4}\left[2b^{**} + (2(a-x^M-\underline{C}) + b^{**})\frac{\partial b^{**}}{\partial a}\right] - b^*\frac{\partial b^{**}}{\partial a} - b^{**}\frac{\partial b^*}{\partial a} = \frac{\Gamma}{4}\left[2b^{**} - 2b^{**}\left(\frac{4(a-x^M-\underline{C})+2b^{**}}{8(a+\overline{X}-x^M-\underline{C})-b^{**}}\right)\right] - b^*\frac{\partial b^{**}}{\partial a} - b^{**}\frac{\partial b^*}{\partial a} > 0$. (2) $\frac{\partial TB}{\partial a} = \Gamma\overline{X}\frac{\partial b^*}{\partial a} < 0$. (3) $\frac{\partial DP}{\partial a} = \Gamma\frac{b^*}{2}\frac{\partial b^*}{\partial a} < 0$. (4) $\frac{\partial AB}{\partial a} = -\frac{\Gamma}{4}\left[b^*\frac{\partial b^{**}}{\partial a} + (4\underline{X} + b^{**})\frac{\partial b^*}{\partial a}\right] = -\frac{\Gamma}{4}\left[b^{**}\frac{\partial b^{**}}{\partial a} + 2\underline{X}\frac{\partial b^{**}}{\partial a}\right] < 0$ (recall that $\underline{X} < 0$ and that under an optimal allocation of resources, $b^* = \frac{1}{2}b^{**}$ and $\frac{\partial b^*}{\partial a} = \frac{1}{2}\frac{\partial b^{**}}{\partial a}$).

Ballot Secrecy

In the constrained optimization problem above, replace E_{VB} with βE_{VB} and E_{DP} with βE_{DP}. The FOCs become $\beta b^*_{\text{VB}} = 2\beta b^*_{\text{DP}} = 2b^*_{\text{TB}} = 2b^*_{\text{AB}}$. Substitute $b^*_{\text{DP}} = \frac{1}{2}b^*_{\text{VB}}$ and $b^*_{\text{TB}} = b^*_{\text{AB}} = \frac{\beta}{2}b^*_{\text{VB}}$ from the FOCs into the budget constraint. Implicit differentiation yields: $\frac{\partial b^*_{\text{VM}}}{\partial\beta} = \frac{b^*_{\text{VB}}((5-12\beta)2b^*_{\text{VB}}-12(\beta x^M+\underline{C}-2\beta\overline{X}))}{3\beta(4\beta\overline{X}(6\beta-5)b^*_{\text{VB}}+8(x^M+\underline{C}))} < 0$. Substitute $b^*_{\text{VB}} = 2b^*_{\text{DP}}$ and $b^*_{\text{TB}} = b^*_{\text{AB}} = \beta 2b^*_{\text{DP}}$ and implicit differentiation yields: $\frac{\partial b^*_{\text{DP}}}{\partial\beta} = \frac{b^*_{\text{VB}}((5-12\beta)b^*_{\text{VB}}-6(\beta x^M+\underline{C}-2\beta\overline{X}))}{3\beta(2\beta\overline{X}(6\beta-5)b^*_{\text{VB}}+4(x^M+\underline{C}))} < 0$. Let $b_{\text{TB}} = b_{\text{AB}}$ and substitute $b^*_{\text{VB}} = \frac{2}{\beta}b^*_{\text{TB}}$ and $b^*_{\text{DP}} = \frac{1}{\beta}b^*_{\text{TB}}$ and implicit differentiation yields: $\frac{\partial b^*_{\text{TB}}}{\partial\beta} = \frac{\partial b^*_{\text{AB}}}{\partial\beta} = \frac{2b^*_{\text{TB}}((3\beta-5)b^*_{\text{TB}}+3\beta(x^M+\underline{C}))}{3\beta((6\beta-5)b^*_{\text{TB}}+2\beta(2(x^M+\underline{C})-2\beta\overline{X}))} > 0$. Comparative statics follow: (1) $\frac{\partial VB}{\partial\beta} = \frac{\Gamma}{4}\left[(b^*_{\text{VB}} - 2(x^M+\underline{C}))\frac{\partial b^*_{\text{VB}}}{\partial\beta} - b^*_{\text{AB}}\frac{\partial b^*_{\text{VB}}}{\partial\beta} - b^*_{\text{VB}}\frac{b^*_{\text{AB}}}{\partial\beta}\right] = \frac{\Gamma}{4}\left[(b^*_{\text{VB}} - 2(x^M+\underline{C}))\frac{\partial b^*_{\text{VB}}}{\partial\beta} - \frac{\beta}{2}b^*_{\text{VB}}\frac{\partial b^*_{\text{VB}}}{\partial\beta} - b^*_{\text{VB}}(\frac{1}{2}(b^*_{\text{VB}} + \beta\frac{\partial b^*_{\text{VB}}}{\partial\beta})\right] < 0$ (using the fact that in an optimal allocation of resources, $b^*_{\text{AB}} = \frac{\beta}{2}b^*_{\text{VB}}$ and $\frac{\partial b^*_{\text{AB}}}{\partial\beta} = \frac{1}{2}(b^*_{\text{VB}} + \beta\frac{\partial b^*_{\text{VB}}}{\partial\beta})$). (2) $\frac{\partial TB}{\partial\beta} = \Gamma\overline{X}\frac{\partial b^*_{\text{TB}}}{\partial\beta} > 0$. (3) $\frac{\partial DP}{\partial\beta} = \frac{\Gamma b^*_{\text{DP}}}{2}\frac{\partial b^*_{\text{DP}}}{\partial\beta} < 0$. (4) $\frac{\partial AB}{\partial\beta} = -\frac{\Gamma}{4}\left[b^*_{\text{AB}}\frac{\partial b^*_{\text{VB}}}{\partial\beta} + (4\underline{X} + b^*_{\text{VB}})\frac{\partial b^*_{\text{AB}}}{\partial\beta}\right] = -\frac{\Gamma}{4}\left[\frac{\beta}{2}b^*_{\text{VB}}\frac{\partial b^*_{\text{VB}}}{\partial\beta} + \frac{1}{2}(4\underline{X} + b^*_{\text{VB}})(b^*_{\text{VB}} + \beta\frac{\partial b^*_{\text{VB}}}{\partial\beta})\right] > 0$ (again substituting $b^*_{\text{AB}} = \frac{\beta}{2}b^*_{\text{VB}}$ and $\frac{\partial b^*_{\text{AB}}}{\partial\beta} = \frac{1}{2}(b^*_{\text{VB}} + \beta\frac{\partial b^*_{\text{VB}}}{\partial\beta})$).

Salience of Political Preferences

Substituting FOCs into the budget constraint and implicitly differentiating yields: (1) $\frac{\partial b^{**}}{\partial \kappa} = \frac{b^{**}(b^{**}+12\underline{C})}{3\kappa(8(x^M+\kappa(\underline{C}-\overline{X}))+b^{**})} > 0$ and (2) $\frac{\partial b^{*}}{\partial \kappa} = \frac{b^{*}(b^{*}+6\underline{C})}{3\kappa(4(x^M+\kappa(\underline{C}-\overline{X}))+b^{*})} > 0$. Comparative statics follow: (1) $\frac{\partial VB}{\partial \kappa} = -\frac{\Gamma}{8\kappa^2}\left[2b^{**}(b^{**}+2\underline{C}) + 2\kappa(2(\kappa x^M + \underline{C}) + b^* - \kappa b^{**})\frac{\partial b^{**}}{\partial \kappa}\right] < 0$ (using the fact that in an optimal allocation of resources, $\frac{\partial b^{*}}{\partial \kappa} = \frac{1}{2}\frac{\partial b^{**}}{\partial \kappa}$). (2) $\frac{\partial TB}{\partial \kappa} = \Gamma\left[\overline{X}(\frac{\partial b^{*}}{\partial \kappa})\right] > 0$. (3) $\frac{\partial DP}{\partial \kappa} = \frac{\Gamma}{4\kappa^2}\left[2\kappa\frac{\partial b^{*}}{\partial \kappa} - b^*\right] = \frac{\Gamma}{4\kappa^2}\left[2\kappa b^*\frac{(b^*+6\underline{C})}{3\kappa(4(x^M+\kappa(\underline{C}-\overline{X}))+b^*)} - b^*\right] > 0$. (4) $\frac{\partial AB}{\partial \kappa} = \frac{\Gamma}{4\kappa^2}\left[b^*(b^{**} - \kappa\frac{\partial b^{**}}{\partial \kappa}) - \kappa(4\underline{X} + b^{**})\frac{\partial b^{*}}{\partial \kappa}\right] =$ $\frac{\Gamma}{4\kappa^2}\left[b^*(b^{**} - b^{**}\frac{\kappa(b^{**}+12\underline{C})}{3\kappa(8(x^M+\kappa(\underline{C}-\overline{X}))+b^{**})}) - \kappa(4\underline{X} + b^{**})\frac{\partial b^{*}}{\partial \kappa}\right] > 0$.

Political Polarization

Note that by the assumption of symmetric party platforms, $x^M - x^O = 2x^M$. Substitute $b^* = \frac{1}{2}b^{**}$ from the FOCs into the budget constraint. Implicit differentiation yields: $\frac{\partial b^{**}}{\partial x^M} = \frac{4b^{**}}{8(\overline{X}-x^M-\underline{C})-b^{**}} > 0$. Substitute $b^{**} = 2b^*$ into the budget constraint. Implicit differentiation yields: (2) $\frac{\partial b^{*}}{\partial x^M} = \frac{2b^{*}}{4(\overline{X}-x^M-\underline{C})-b^{*}} > 0$. Comparative statics then follow: (1). $\frac{\partial VB}{\partial x^M} = \frac{\Gamma}{4}\left[-(2b^{**} + (2(x^M+\underline{C}) + b^{**}))\frac{\partial b^{**}}{\partial x^M}\right] - b^*\frac{\partial b^{**}}{\partial x^M} + b^{**}\frac{\partial b^{*}}{\partial x^M} =$ $\frac{\Gamma}{4}\left[-(2b^{**} + (2(x^M+\underline{C}) + b^{**}))\frac{\partial b^{**}}{\partial x^M}\right] < 0$ (where the last two terms of the first equation cancel after substituting $b^* = \frac{1}{2}b^{**}$ and $\frac{\partial b^{*}}{\partial a} = \frac{1}{2}\frac{\partial b^{**}}{\partial a}$). (2) $\frac{\partial TB}{\partial x^M} = \Gamma\left[\overline{X}(\frac{\partial b^{*}}{\partial x^M})\right] > 0$. (3) $\frac{\partial DP}{\partial x^M} = \frac{\Gamma}{2}\left[b^*\frac{\partial b^{*}}{\partial x^M}\right] > 0$. (4) $\frac{\partial AB}{\partial x^M} = -\frac{\Gamma}{4}\left[b^*\frac{\partial b^{**}}{\partial x^M} + (4\underline{X} + b^{**})\frac{\partial b^{*}}{\partial x^M}\right] = -\frac{\Gamma}{4}\left[b^{**}\frac{\partial b^{**}}{\partial x^M} + 2\underline{X}\frac{\partial b^{**}}{\partial x^M}\right] > 0$ (recall that $\underline{X} < 0$ and that under an optimal allocation of resources, $b^* = \frac{1}{2}b^{**}$ and $\frac{\partial b^{*}}{\partial x^M} = \frac{1}{2}\frac{\partial b^{**}}{\partial x^M}$).

Machine Support

Substituting FOCs into the budget constraint and implicitly differentiating yields: $\frac{\partial b^{**}}{\partial \overline{x}} = \frac{\partial b^{*}}{\partial \overline{x}} = 0$. Comparative statics follow: (1) $\frac{\partial VB}{\partial \overline{x}} = -\frac{\Gamma}{4}\left[(2(x^M+\underline{C}) - b^{**} + b^*)\frac{\partial b^{**}}{\partial \overline{x}} + b^{**}\frac{\partial b^{*}}{\partial \overline{x}}\right] = 0$. (2) $\frac{\partial TB}{\partial \overline{x}} = \Gamma\left[b^* + (\overline{X} + \overline{x})\frac{\partial b^{*}}{\partial \overline{x}}\right] = \Gamma b^* > 0$. (3) $\frac{\partial DP}{\partial \overline{x}} = \frac{\Gamma}{2}\left[b^*(\frac{\partial b^{*}}{\partial \overline{x}})\right] = 0$. (4) $\frac{\partial AB}{\partial \overline{x}} = -\frac{\Gamma}{4}\left[b^*(4 + \frac{\partial b^{**}}{\partial \overline{x}}) + (4(\underline{X} + \underline{x}) + b^{**})\frac{\partial b^{*}}{\partial \overline{x}}\right] = -\Gamma b^* < 0$.