

# Is Private Campaign Finance a Good Thing?

## Appendix 1: A Model of Voter Inference from Campaign Finance

Here we present an extremely simple model of how rational voters can draw inferences from campaign finance information, along the lines of Gerber (1996) and Potters *et al.* (1997). Consider one politician, two groups, and a voter. The politician sells a favor to Group 1 and a favor to Group 2. Favors are not observable by the voter. Suppose the amounts that Group 1 and Group 2 are willing to pay for favors are:  $t_1 = \bar{t}_1 + \varepsilon_1$  and  $t_2 = \bar{t}_2 + \theta + \varepsilon_2$ , where  $t_1$  and  $t_2$  are the campaign contributions from the groups to the politician;  $\bar{t}_1$  and  $\bar{t}_2$  are variables that depend on observable characteristics of the politicians and the groups (e.g. how much they value the favor and how much money they have);  $\varepsilon_1$  and  $\varepsilon_2$  are idiosyncratic noise elements; and  $\theta$  is the ability of the politician. We assume  $\varepsilon_1$ ,  $\varepsilon_2$  and  $\theta$  are independent, normal random variables with mean zero and variances  $\sigma_{\varepsilon_1}^2$ ,  $\sigma_{\varepsilon_2}^2$ , and  $\sigma_{\theta}^2$ , respectively.

The groups are asymmetric. Group 1 does not care about the ability of the politician, perhaps because the favor it wants is simple. Group 2 values the politician more if he is of high quality – perhaps this group cares about “good government,” which can only be provided by an able politician. The politician knows  $\theta$  and realizes how much the groups are willing to pay. So she sets the contribution levels at the maximum levels the groups will pay.

The voter does not know  $\theta$ . His goal is to infer as much information as possible about  $\theta$ , given what he observes regarding campaign contributions. There are two informational scenarios: (I) the voter observes  $t = t_1 + t_2$ , but not the individual contributions; and (II) the voter observes  $t_1$  and  $t_2$  separately. In our simple set-up, scenario II is equivalent to a situation where contributions from Group 1 are prohibited.

Given our assumptions on probability distributions, this is a standard inference problem. Suppose the voter computes the best unbiased estimator of  $\theta$  given historical data on politicians’ abilities and campaign contributions (these will be equivalent to running “regressions” in which the left-hand side variable contains politician’s abilities and the right-hand side variable contains the campaign contributions received). These estimators of  $\theta$  for the

voter in scenarios I and II are, respectively:

$$\hat{\theta}_I = \frac{\frac{1}{\text{Var}(\varepsilon_1 + \varepsilon_2)}}{\frac{1}{\text{Var}(\varepsilon_1 + \varepsilon_2)} + \frac{1}{\text{Var}(\theta)}} (t_1 + t_2 - \bar{t}_1 - \bar{t}_2) = \frac{\sigma_\theta^2}{\sigma_\theta^2 + 2\sigma_\varepsilon^2} (t_1 + t_2 - \bar{t}_1 - \bar{t}_2)$$

$$\hat{\theta}_{II} = \frac{\frac{1}{\text{Var}(\varepsilon_2)}}{\frac{1}{\text{Var}(\varepsilon_2)} + \frac{1}{\text{Var}(\theta)}} (t_2 - \bar{t}_2) = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2} (t_2 - \bar{t}_2)$$

Note that in scenario II the voter places a zero coefficient on money coming from Group 1.

The variances of the two estimators are:

$$\text{Var}(\hat{\theta}_I) = \frac{2 \cdot \sigma_\theta^2 \cdot \sigma_\varepsilon^2}{\sigma_\theta^2 + 2\sigma_\varepsilon^2}$$

$$\text{Var}(\hat{\theta}_{II}) = \frac{\sigma_\theta^2 \cdot \sigma_\varepsilon^2}{\sigma_\theta^2 + \sigma_\varepsilon^2}$$

The expressions above have the following immediate implications:

**Proposition:** (1) In scenario I, the effect of an additional dollar in campaign contributions on perceived ability is  $\frac{\sigma_\theta^2}{\sigma_\theta^2 + 2\sigma_\varepsilon^2}$ . (2) In scenario II, the effect of an additional dollar in contributions on perceived ability is: (i) 0 if the money comes from Group 1 (hence smaller than in scenario I); and (ii)  $\frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2}$  if it comes from Group 2 (greater than in scenario I). (3) The voter's estimate of ability is more precise in scenario II than in scenario I. (4) In scenario I, prohibiting contributions from Group 1 has two effects: (i) an increase in the marginal effect of a dollar of contribution on perceived ability; and (ii) an increase in voter information.

Money from Group 1 is pure noise. If the voter only observes the total contribution amount, money from Group 1 reduces the information conveyed by the other group. In that scenario, the voter would make a more precise prediction if Group 1's contribution was prohibited.<sup>23</sup> While the example we have examined is highly stylized, the logic behind it carries over to more complicated situations, as the key intuition has to do with the signal extraction properties of normal distributions. In particular, the results are still valid if the contribution from Group 1 is positively (but very weakly) correlated with politician's ability.

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<sup>23</sup>One must be careful in drawing policy conclusions about the informational benefit of prohibiting certain types of contributions. Excluding certain groups may change the game between the politician and the remaining groups.

**Table A1: Explaining legislator effectiveness, uninformed voters, OLS regressions, accounting for challengers' spending**

	House			Senate		
	[1]	[2]	[3]	[4]	[5]	[6]
	Total contributions	Large and small money	4 categories of donors	Total contributions	Large and small money	4 categories of donors
Total contributions (thousands of \$)	0.099 [0.020]	-	-	0.056 [0.011]	-	-
Total contributions <b>below</b> 2000\$	-	0.317 [0.049]	-	-	0.208 [0.041]	-
Total contributions <b>above</b> 2000\$	-	-0.054 [0.030]	-	-	-0.093 [0.040]	-
Own funds	-	-	0.219 [0.347]	-	-	0.206 [0.252]
Party funds	-	-	-0.401 [0.090]	-	-	-0.116 [0.040]
Contributions from organizations	-	-	0.518 [0.094]	-	-	0.382 [0.064]
Contributions from individuals	-	-	-0.043 [0.024]	-	-	-0.004 [0.014]
Spending by challenger(s), per seat	-0.079 [0.028]	-0.103 [0.027]	-0.044 [0.028]	-0.043 [0.026]	-0.03 [0.028]	-0.012 [0.025]
Woman dummy	1.804 [4.664]	2.615 [4.481]	2.665 [4.445]	-2.317 [8.475]	-4.25 [9.124]	-2.108 [8.638]
Democratic party dummy	12.911 [3.482]	14.421 [3.290]	15.462 [3.280]	30.05 [4.768]	30.304 [4.882]	31.697 [4.748]
Observations	553	553	553	240	240	240
Number of individuals	206	206	206	95	95	95

*Notes:* OLS regressions, with normalised legislator effectiveness as dependent variable. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.

**Table A2: Explaining legislator effectiveness, informed voters, OLS regressions, accounting for challengers' spending**

	[1]	[2]	[3]	[4]	[5]	[6]
	Total contributions	Large and small money	4 categories of donors	Total contributions	Large and small money	4 categories of donors
Total contributions (thousands of \$)	0.042 [0.017]	-	-	0.029 [0.016]	-	-
Total contributions <b>below</b> 2000\$	-	0.21 [0.039]	-	-	0.136 [0.041]	-
Total contributions <b>above</b> 2000\$	-	-0.071 [0.022]	-	-	-0.07 [0.038]	-
Own funds	-	-	0.128 [0.277]	-	-	0.014 [0.187]
Party funds	-	-	-0.228 [0.071]	-	-	-0.072 [0.035]
Contributions from organizations	-	-	0.276 [0.065]	-	-	0.262 [0.068]
Contributions from individuals	-	-	-0.024 [0.019]	-	-	-0.016 [0.020]
Spending by challenger(s), per seat	-0.055 [0.021]	-0.073 [0.020]	-0.042 [0.021]	-0.003 [0.026]	0.004 [0.028]	0.013 [0.026]
Woman dummy	4.93 [3.246]	5.177 [3.106]	5.422 [3.228]	5.809 [7.898]	4.434 [8.450]	5.217 [7.947]
Democratic party dummy	5.416 [3.067]	6.115 [2.907]	7.172 [2.957]	31.143 [4.843]	30.7 [4.695]	32.078 [4.811]
Black dummy	-14.45 [4.376]	-12.773 [4.451]	-14.197 [4.408]	-11.333 [5.885]	-8.936 [5.894]	-10.687 [5.806]
Age at time of elections	-0.458 [0.131]	-0.358 [0.131]	-0.379 [0.130]	-0.034 [0.222]	-0.052 [0.210]	-0.038 [0.217]
Lawyer dummy	15.488 [4.138]	14.598 [4.091]	16.522 [4.216]	10.193 [4.796]	9.579 [4.512]	9.731 [4.656]
Number of previous terms in office	4.353 [0.483]	4.23 [0.464]	3.872 [0.484]	3.269 [0.702]	3.324 [0.677]	2.922 [0.703]
Majority party dummy	17.177 [1.696]	17.19 [1.664]	16.518 [1.752]	-	-	-
Post held by candidate during legislature	5.644 [1.302]	5.434 [1.355]	4.041 [1.346]	5.579 [1.329]	4.825 [1.380]	5.092 [1.421]
Observations	553	553	553	240	240	240
Number of individuals	206	206	206	95	95	95

*Notes:* OLS regressions, with normalised legislator effectiveness as dependent variable. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.

**Table A3: Explaining legislator effectiveness, uninformed voters, candidate fixed effects**

	House				Senate			
	[1] No contributions	[2] Total contributions	[3] Large and small money	[4] 4 categories of donors	[5] No contributions	[6] Total contributions	[7] Large and small money	[8] 4 categories of donors
Total contributions (thousands of \$)	-	0.056 [0.018]	-	-	-	0.025 [0.019]	-	-
Total contributions <b>below</b> 2000\$	-	-	0.131 [0.051]	-	-	-	0.127 [0.061]	-
Total contributions <b>above</b> 2000\$	-	-	0.014 [0.025]	-	-	-	-0.06 [0.036]	-
Own funds	-	-	-	0.28 [0.348]	-	-	-	0.086 [1.094]
Party funds	-	-	-	-0.228 [0.158]	-	-	-	-0.012 [0.026]
Contributions from organizations	-	-	-	0.378 [0.102]	-	-	-	0.263 [0.078]
Contributions from individuals	-	-	-	-0.055 [0.022]	-	-	-	-0.035 [0.021]
Democratic party dummy	20.694 [16.027]	16.271 [12.237]	17.724 [15.379]	18.444 [20.623]	-	-	-	-
Observations	553	553	553	553	240	240	240	240
Number of individuals	206	206	206	206	95	95	95	95

*Notes:* Normalised legislator effectiveness is the dependent variable. Candidate fixed effects are included. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.

**Table A4: Explaining legislator effectiveness, informed voters, candidate fixed effects**

	House				Senate			
	[1] No contributions	[2] Total contributions	[3] Large and small money	[4] 4 categories of donors	[5] No contributions	[6] Total contributions	[7] Large and small money	[8] 4 categories of donors
Total contributions (thousands of \$)	-	0.002 [0.011]	-	-	-	-0.018 [0.013]	-	-
Total contributions <b>below</b> 2000\$	-	-	0.047 [0.033]	-	-	-	0.062 [0.055]	-
Total contributions <b>above</b> 2000\$	-	-	-0.022 [0.015]	-	-	-	-0.081 [0.033]	-
Own funds	-	-	-	0.035 [0.195]	-	-	-	0.117 [0.825]
Party funds	-	-	-	-0.118 [0.104]	-	-	-	-0.054 [0.031]
Contributions from organizations	-	-	-	0.075 [0.070]	-	-	-	0.029 [0.073]
Contributions from individuals	-	-	-	-0.013 [0.018]	-	-	-	-0.021 [0.022]
Democratic party dummy	2.877 [5.755]	2.805 [5.803]	3.762 [7.308]	6.315 [9.836]	-	-	-	-
Age at time of elections	-0.102 [1.684]	-0.128 [1.691]	0.016 [1.755]	0.313 [1.989]	3.569 [4.218]	4.068 [3.783]	5.026 [2.947]	4.456 [3.381]
Lawyer dummy	59.746 [28.085]	72.587 [34.769]	77.575 [36.366]	68.049 [33.432]	-67.372 [84.362]	-78.036 [75.651]	-100.819 [58.632]	-87.124 [67.520]
Number of previous terms in office	5.871 [3.523]	5.908 [3.525]	5.484 [3.672]	4.635 [4.145]	-1.521 [8.966]	-2.089 [8.085]	-4.11 [6.532]	-3.121 [7.434]
Majority party dummy	22.995 [1.830]	22.967 [1.853]	23.035 [1.812]	22.526 [1.845]	-	-	-	-
Post held by candidate during legislature	1.921 [1.144]	1.851 [1.384]	1.735 [1.291]	1.277 [1.503]	1.605 [1.311]	1.975 [1.195]	1.531 [1.229]	1.795 [1.212]
Observations	553	553	553	553	240	240	240	240
Number of individuals	206	206	206	206	95	95	95	95

*Notes:* Normalised legislator effectiveness is the dependent variable. Candidate fixed effects are included. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.

**Table A5: Explaining legislator effectiveness, uninformed voters, OLS regressions, different thresholds for large and small contributions**

	House					Senate				
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Threshold between big and small contributions	\$ 500	\$ 1,000	\$ 1,500	\$ 2,000	\$ 2,500	\$ 500	\$ 1,000	\$ 1,500	\$ 2,000	\$ 2,500
Total contributions <b>below</b> the threshold	0.231	0.267	0.307	0.286	0.319	0.009	0.165	0.21	0.212	0.186
	[0.075]	[0.057]	[0.052]	[0.047]	[0.044]	[0.103]	[0.076]	[0.051]	[0.041]	[0.031]
Total contributions <b>above</b> the threshold	0.064	0.023	-0.037	-0.049	-0.194	0.058	-0.004	-0.066	-0.105	-0.107
	[0.017]	[0.021]	[0.028]	[0.032]	[0.049]	[0.021]	[0.034]	[0.034]	[0.035]	[0.030]
Woman dummy	1.206	1.49	1.825	1.876	2.163	-2.082	-4.403	-4.8	-4.584	-4.142
	[4.655]	[4.596]	[4.548]	[4.528]	[4.477]	[8.932]	[9.447]	[9.553]	[9.523]	[9.367]
Democratic party dummy	13.095	13.387	14.39	14.372	15.853	31.52	31.03	30.891	31.248	31.52
	[3.465]	[3.408]	[3.343]	[3.355]	[3.272]	[4.714]	[4.762]	[4.778]	[4.777]	[4.767]
Observations	553	553	553	553	553	240	240	240	240	240
Number of individuals	206	206	206	206	206	95	95	95	95	95

*Notes:* OLS regressions, with normalised legislator effectiveness as dependent variable. Each column refers to a different threshold between large and small campaign contributions. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.

**Table A6: Explaining legislator effectiveness, informed voters, OLS regressions, different thresholds for large and small contributions**

	House					Senate				
	[1] \$ 500	[2] \$ 1,000	[3] \$ 1,500	[4] \$ 2,000	[5] \$ 2,500	[6] \$ 500	[7] \$ 1,000	[8] \$ 1,500	[9] \$ 2,000	[10] \$ 2,500
Threshold between big and small contributions										
Total contributions <b>below</b> the threshold	0.195 [0.062]	0.189 [0.045]	0.202 [0.043]	0.187 [0.037]	0.197 [0.040]	0.022 [0.104]	0.116 [0.065]	0.142 [0.048]	0.136 [0.041]	0.122 [0.035]
Total contributions <b>above</b> the threshold	0.002 [0.014]	-0.025 [0.016]	-0.062 [0.021]	-0.071 [0.022]	-0.161 [0.046]	0.029 [0.026]	-0.011 [0.029]	-0.048 [0.028]	-0.069 [0.033]	-0.072 [0.028]
Woman dummy	4.05 [3.244]	4.285 [3.207]	4.471 [3.179]	4.543 [3.168]	4.619 [3.141]	5.881 [7.781]	4.65 [8.215]	4.379 [8.381]	4.436 [8.389]	4.625 [8.324]
Democratic party dummy	4.499 [3.091]	4.7 [3.040]	5.535 [2.993]	5.499 [2.981]	6.883 [2.992]	31.267 [4.624]	30.679 [4.601]	30.215 [4.521]	30.58 [4.556]	30.769 [4.576]
Black dummy	-11.265 [4.327]	-11.035 [4.322]	-10.942 [4.321]	-11.055 [4.317]	-11.708 [4.312]	-11.452 [6.078]	-9.728 [5.955]	-8.555 [5.927]	-8.904 [5.941]	-9.223 [6.016]
Age at time of elections	-0.409 [0.133]	-0.389 [0.132]	-0.364 [0.132]	-0.36 [0.132]	-0.35 [0.131]	-0.034 [0.223]	-0.05 [0.221]	-0.046 [0.212]	-0.051 [0.211]	-0.046 [0.209]
Lawyer dummy	14.396 [4.033]	14.331 [4.061]	14.218 [4.083]	14.545 [4.069]	13.691 [3.976]	10.23 [4.807]	9.291 [4.777]	9.592 [4.580]	9.598 [4.542]	9.99 [4.510]
Number of previous terms in office	4.42 [0.471]	4.38 [0.469]	4.33 [0.468]	4.3 [0.466]	4.214 [0.470]	3.27 [0.732]	3.395 [0.707]	3.396 [0.689]	3.308 [0.687]	3.264 [0.683]
Majority party dummy	17.812 [1.735]	17.788 [1.728]	17.298 [1.713]	17.384 [1.706]	17.087 [1.715]	-	-	-	-	-
Post held by candidate during legislature	6.785 [1.331]	6.482 [1.335]	6.258 [1.381]	6.179 [1.373]	5.943 [1.371]	5.602 [1.342]	5.536 [1.358]	4.939 [1.420]	4.792 [1.428]	4.692 [1.418]
Observations	553	553	553	553	553	240	240	240	240	240
Number of individuals	206	206	206	206	206	95	95	95	95	95

*Notes:* OLS regressions, with normalised legislator effectiveness as dependent variable. Each column refers to a different threshold between large and small campaign contributions. Standard errors are clustered at the candidate level and are reported in brackets below each coefficient.