The Production Function for Votes

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The Vote Production Function (VPF) has a party's vote depending on (a) its potential vote and (b) the party organization which actualizes it – 'political capital.' Empirical work suggests that moving to the centre would increase your vote if only you could hold political capital constant. The relative weights of the factors in the VPF will determine whether parties converge or polarize ideologically and politicians' rent seeking behavior. In most cases, the more important political capital is, the greater the extent of rent seeking. There is thus a welfare case for sidelining party organizations. Compulsory voting might help.

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The Production Function for Votes

If political parties aim to win elections why don't they converge in the ideological centre, as location theory would suggest? One reason is that their 'core' voters, i.e. those a long way from the centre, are especially valuable to them. They furnish the bulk of the enthusiasts and activists, so much so that, if you lose them, you can't take proper advantage of your new, middle-of-the-road, supporters. Envelopes remain unaddressed and no one is offering lifts to the poll. Party membership falls and with it party income.

A party's vote can thus be seen as the outcome of a production function, where potential voters (l) are one factor and 'political capital' (k) – activists and money – the other.

$$v = k^{\alpha} l^{1-\alpha}$$

The function has two main properties. First, whether or not voters turn out depends on the political capital of the parties. (In the standard Downsian model, potential voters are actual voters – and only ideological location matters.) Martin P. Wattenberg (2002) writes, "Political Parties organize for campaigns just like generals organize for battle. Commanders raise an army for their campaigns; the functional equivalent for parties is its mass membership. Parties have traditionally relied upon their members to stand on the political front line, carrying their message out to the electorate at large. Party members put up signs and pass out leaflets during the campaign. On Election Day, they work the phone banks and knock on doors to get out the vote. Taken together, these membership activities undoubtedly serve to stimulate turnout." Second, ideology drives voting

through more than one channel. A party that moves to the centre may gain territory from its opponents but possibly at the cost of membership or income or both. For this reason parties don't necessarily converge in the middle.

Section 1 of the paper looks at the vote production function (hereafter VPF) in more detail and examines some empirical evidence. A feature of the VPF is that the bivariate relationship between actual votes and ideological territory is ambiguous, but when membership and campaign expenditure are controlled for there should be a clear link and the data support these hypotheses. In Section 2 we see how the VPF implies two possible ideological equilibria within a standard model of political competition. Section 3 considers the implications of the VPF for the *quality* of government by affecting the incentive for politicians seek rents. We find that the quality of government depends on the relative importance of political capital and potential voters and that a smaller role for capital may be desirable. Compulsory voting, which must reduce the importance of the party machine in delivering the vote, is a case in point.

I. The Vote Production Function

In our vote production function ($v = k^{\alpha} l^{1-\alpha}$), α gives the relative weights of potential voters and political capital. This is a generalization of a standard Downsian model in which potential voters are actual voters and only policy location matters. (In the Downsian model α is equal to zero and parties compete for territory such that in equilibrium both parties' policy platforms coincide with the ideal of the median voter.)

The VPF has diminishing marginal returns to capital and to potential voters and constant returns to scale. The Cobb-Douglas form proposed here does of course imply strong (and testable) assumptions but we follow precedent and defend the function on grounds of simplicity.

Suppose there are two parties, *X* and *Y*. Let a random variable d^*, uniformly distributed between $-d/2$ and $+d/2$, reflect exogenous factors affecting the popularity of the two parties. Without loss of generality assume $d^*(Y) = -d^*(X)$ so that a positive shock for party *X* is also a negative shock, of equal magnitude, for *Y*, and only one shock term is required. For each party let $k/K = l/L = 1 + d^*/S$, where *S* is share of the vote, and upper-case letters denote the values of all variables when $d^* = 0$ with lower-case letters denoting post-shock realizations. Thus when a party experiences a positive (negative) shock, it gains (loses) both potential voters and political capital equiproportionately.

Therefore, actual votes can be expressed as a function of actual political capital, *ex ante* (i.e. pre-shock) potential voters and the shock term:

$$v = k^{\alpha} l^{1-\alpha} = k^{\alpha} L^{1-\alpha} \left(1 + \frac{d^*}{S}\right)^{1-\alpha}$$

Our empirical work proxies actual political capital with membership and campaign expenditure. Because we have actual data on these variables discussion of the determination of political capital itself is deferred until later. Potential voters, however, are not directly observable and we must discuss their determination now.

Suppose the ideological scale runs from 0 (left) to 1 (right). Let *y* and *x* be the ideological positions chosen by the two parties. Assume that $y < x$ i.e. party *Y* is left of party *X*. Now suppose the electorate are uniformly distributed across the ideological spectrum with the size of the electorate normalized to 1. The uniform distribution is common to the literature (see for example Torsten Persson and Guido Tabellini (2000), chapter 3) and captures the concept of an ideologically diverse electorate. When $d^* = 0$, each elector is a potential voter for the party to which she is closest ideologically. Thus voters whose θ (ideological score) is less than (greater than) $(x+y)/2$ will vote, if they vote at all, for party *Y* (party *X*.) Figure 1 depicts potential voters.

Given the uniform distribution, $L(Y) = (x+y)/2$. The actual number of potential voters also depends on the shock term, i.e. $l(Y) = \frac{x+y}{2}\left(1+\frac{d_Y^*}{S_Y}\right)$ and for the right-wing party, $l(X) = \left(1-\frac{x+y}{2}\right)\left(1-\frac{d_Y^*}{S_X}\right)$. The log difference in actual votes, or 'majority' of the left wing party over the right wing party is therefore

$$(1) \qquad \log\left[\frac{v_Y}{v_X}\right] = b_1 \log\left[\frac{k_Y}{k_X}\right] + (1-b_1)\log\left[\frac{x+y}{2-x-y}\right] + (1-b_1)\log\left(\frac{1+d_Y^*/S_Y}{1-d_Y^*/(1-S_Y)}\right).$$

Equation (1) is the basis for our empirical work. We focus on relative vote share to avoid problems associated with changing electorates and turnout. The dependent variable is the actual relative vote of the left and this depends on two observable arguments as well as the residual. The first of these is the relative political capital of the left, as captured by the first term on the right hand side, which we proxy with members and campaign

expenditure. The second term captures the conventional median voter location argument as depicted in Figure 1. For example an increase in *y* represents a move to the centre by the left-wing party, which adds to its own territory by invading that of the right-wing party. The final term is a residual term, which theoretically has expectation zero.

To examine the relationship between votes cast, ideology and our measures of political capital we use general election data for 15 OECD democracies. The general election results data come from Keesing's Contemporary archives. There is a substantial political science literature concerned with the construction of quantitative ideology data and we use the preferred measures of Matthew J. Gabel and John D. Huber (2000) covering elections from 1950-1992. The membership data of Susan Scarrow (2000) are the most comprehensive available with 116 observations across different countries between 1960 and 1992. Party finance data on campaign expenditure comes from Richard S. Katz and Peter Mair (1992) and unfortunately is quite patchy; there are only 41 observations covering 7 countries (one of which is Ireland – for which there is only one observation) for which both membership and campaign expenditure data are available. The data set is described in more detail in the Data Appendix.

It is instructive to contrast the VPF with a conventional median voter model where potential voters are actual voters and membership/political capital is irrelevant. The conventional model predicts that in equilibrium the political parties will be ideologically indistinguishable. Figure 2 plots the time series of ideology data for the two main parties in the UK and France, and shows a persistent ideological gap in both cases. Similar

findings hold in other countries. This gap suggests that there is some centrifugal force opposing the centralizing pull in the median voter theorem. Our interpretation is that this force is political capital.

The conventional median voter model predicts that the greater the political territory occupied by the left-wing party the greater its majority, regardless of the impact of political capital. Figure 3 plots the left-wing majority against our location variable. Consistent with the simple median voter model there is a positive slope, but the fit is not good. There is at best a very weak bivariate relationship between the majority of the left-wing and ideology, as captured by the relative political territory occupied by left-wing parties. However, the VPF (1) suggests that once political capital is controlled for, then a systematic relationship between votes and ideology should emerge.

The data essentially consist of an uneven pool of general elections in 15 countries spread over about 40 years. Political systems and voting behavior differ considerably across the countries, and any inference made must be treated with caution. However, it is only between general elections that ideology varies meaningfully and so pooling is the only way to get anything like a reasonable sample with which to conduct regression analysis. To control partially for country specific effects we include fixed effects and country specific heterogeneous time trends as explanatory variables.[1] Heteroscedasticity is a potential problem as the vote share $S_{i,}$ will be correlated with the explanatory variables, and also determines the effect on votes of the shock term d^*. Another possible source of heteroscedasticity is any country specific noise not captured by the simple VPF. Breusch-

Pagan tests on the squared residual were conducted for all the explanatory variables and on country dummies and in most cases heteroscedasticity could be rejected, but where it pertained to specific countries these were omitted from the pool. Having eliminated country specific heteroscedasticity, we used the White correction to deal with any remaining heteroscedasticity.

Initially we measure political capital purely by party membership. Estimation of equation (1) using the dataset detailed in the appendix gives the results in Table 1. Here ideology is significant with the correct sign. This is evidence that ideology does determine voting behavior, once membership has been controlled for. Membership is also correctly signed and highly significant. The sizes of the residuals for Canada and Ireland were found to be significantly different from the other countries and so these were omitted from estimation.[2] The Ramsey RESET test does not indicate any misspecification, providing some support for the Cobb-Douglas function form. Membership and relative ideological location explain 41% of the total variation in the left-wing majority in this sample. These are encouraging results for the model and represent an improvement over the standard median voter model in Figure 2.

Interestingly, the hypothesis that the parameters sum to one is firmly rejected. This could signify decreasing returns to scale. A possible explanation of this is that members are heterogeneous in their effectiveness – core personnel and committee members who have invested decades of membership and have a stronger commitment may put more hours into banging on doors than lukewarm recent converts. Thus over and above diminishing

marginal returns (which relate to a homogenous input) the quality of the input may decline as it increases. Alternatively, measurement error in the explanatory variables would bias the parameter estimates downwards, and there is much evidence that parties exaggerate their membership to give favorable impressions of their strength (Scarrow, 2000). Re-estimating the voting equation using an errors-in-variables regression model for decreasing degrees of reliability in the membership data certainly increases the coefficient estimates. There is no way of knowing exactly how badly mis-measured the membership data may be, but political scientists agree that the mismeasurement may be considerable. Assuming, for example, a 30% reliability coefficient (i.e. attributing 70% of the total variation in the explanatory variable to measurement error) makes the errors-in-variable regression model yield the results in Table 2 where both parameters are correctly signed and highly significant. As expected, accounting for measurement error increases the sensitivity of voting to *true* membership numbers. Furthermore the constant-returns restriction is now not rejected. However the results are quite sensitive to the degree of reliability placed in the membership data. Those reported assume a large degree of this type of error, and give a flavor of the consequences of mismeasurement.

Another possibility is that membership by itself does not fully capture political capital. We now re-estimate equation (1), but with political capital represented as a weighted combination of membership and campaign expenditure (f_i), i.e.

$$\log\left(\frac{v_Y}{v_X}\right) = b_1 \log\left[\frac{k_Y}{k_X}\right] + b_2 \log\left[\frac{f_Y}{f_X}\right] + b_3 \log\left[\frac{x+y}{2-x-y}\right]$$

which allows a test of the hypothesis $b_3 = 1 - b_1 - b_2$ and;

$$\log\left(\frac{v_Y}{v_X}\right) = b_1\lambda\log\left[\frac{l_Y}{l_X}\right] + b_1(1-\lambda)\log\left[\frac{f_Y}{f_X}\right] + (1-b_1)\log\left[\frac{x+y}{2-x-y}\right]$$

where the second of these equations exhibits 'constant returns' as implied by the vote production function. The parameter λ weights the membership and campaign expenditure components of political capital.

The more general regression, reported in Table 3, unfortunately uses a smaller data set due to limited financial data but nonetheless generates interesting results. In the unrestricted regression all the parameter estimates exhibit the correct sign, and the model restriction is passed and so the restricted model is preferred. In this regression ideology is highly significant with the correct sign so again we find that ideology does determine voting behavior, once membership and finances have been controlled for. The membership and finance parameters are significant and correctly signed, and the estimated value of λ (0.283) suggests that finance counts for more than membership in winning elections, so that regressions using membership only will suffer from omitted variable bias. The null hypothesis of no heteroscedasticity cannot be rejected at the 5% level, although the RESET test does in this case indicate some misspecification. The true vote generation process is undoubtedly more complex than that implied by the vote production function, but, given the diversity of the countries and their electoral systems, it is a considerable result that 68% of the variation in the dependent variable is explained by the explanatory variables. Finally, the parameter magnitudes are similar to those in the errors-in-variables regression results in Table 2 and both types of estimation put the value of α at around 2/3. 10% more political capital will bring in about twice as many actual votes as 10% more potential voters would. How far this is a reason to avoid the centre

will depend on how political capital itself is related to ideology, a question we take up in the next section.

II. Political Competition

In this section we look at the decisions parties face within a standard model of political competition but subject to the VPF. In particular we show how ideological stance is determined.

A. *Objectives*

Suppose party *Y* is currently in power, and is trying to maximize a weighted combination of its rents from being in power and the probability of being re-elected. It can increase its vote by giving up rents and spending the money on public goods (or giving it back as tax cuts, which, for simplicity, we will treat as a perfect substitute for public spending in the eyes of the voters.) As in Persson and Tabellini (2000) the government itself therefore opportunistically seeks rents (dislikes spending money on public goods) but this is mitigated by the desire to win office.

Hence the party Y's utility function is written as

$$U(Y) = b(R - g) + (prob(s(Y) > 0.5))$$

where R is maximum possible rent, g is government spending, $s(Y)$ is Y's share of the vote, and b the weight it puts on rents rather than votes.[3] Any money not spent on public

goods is therefore kept as rent. An alternative interpretation of *g* is that the provision of public goods eats into government rents by requiring effort (a 'bad') to ensure tax receipts are not wasted.

On our existing assumptions that $d^*(Y) = -d^*(X)$, and that $(k/K) = (l/L) = 1 + d^*/S$, and recalling that upper case letter denote values when the shock term is zero, then from equation (1),

(2) $$v = k^{\alpha} l^{1-\alpha} = K^{\alpha} L^{1-\alpha}\left(1 + \frac{d^*}{S}\right) = V\left(1 + \frac{d^*}{S}\right).$$

And Σv (the sum of both parties' actual votes) $= \sum V + d^*(Y)\left(\frac{V(Y)}{S(Y)} - \frac{V(X)}{S(X)}\right) = \sum V$ (the sum of both parties' votes that would pertain given a zero shock). This is the result of the way we constructed the shock term: gains for one party are mirrored by losses for the other, so that the actual votes cast are equal to the total that would occur were there no shock.

Dividing (2) through by Σv (or $\sum V$), the result for both parties is that $s = S + d^*$. Given d^*'s uniform distribution between $-d/2$ and $+d/2$, it follows that

$$prob(s(Y) > 0.5) = 0.5 + \frac{S(Y) - 0.5}{d}$$

(3) $$\therefore U(Y) = b(R - g) + 0.5 + \frac{S(Y) - 0.5}{d}.$$

So, until the shock d^* is realized, party *Y*'s probability of winning an election depends on the vote share it would win in a shock-less world ($S(Y)$) and the density of the popularity

shock variable (*d*). $S(Y)$ itself depends on its potential voter base and its political capital, both of which, as we will shortly discuss, depend on the party's policy platform. Thus parties (which will alternate in government as d^* fluctuates) have to choose ideological position, which trades off potential voters against political capital, and public spending, which trades off rents against election chances.

B. *Potential Voters*

In Section 1 and Figure 1 we specified how potential voters respond to the ideological choices made by *Y* and *X*. Now let party *Y* spend (i.e. not extort as rent) *g* and party *X* spend g^X; and let the effect of public spending *g* (g^X) be to increase (lower) the number of potential Y voters by $f(g)$ ($f(g^X)$). So parties can increase their territory beyond the critical point $\frac{x+y}{2}$ in Figure 1 by improving their performance and increasing *g*. We assume that $f(g)$ and $f(g^X)$ are of identical form; that $f'(g) > 0 > f''(g)$; and that voters compare the incumbent party's spending with that of the opposition party last time that it was in power. For example if both parties spend the same *g* (and there is no shock) then the critical point in Figure 1 remains at $\frac{x+y}{2}$. If the left-wing party spends more then the critical point is to the right of this point, and if the right-wing party spends more then the critical point moves to the left. Hence

$$L(Y) = (x+y)/2 + f(g) - f(g^X)$$

and

(4) $$L(Y)_y = 0.5 \text{ and } L(Y)_g = f'(g).$$

C. *Political Capital*

Given the unanimity of political scientists (see e.g. Patrick Seyd et al, 1996) on the subject, we assume that party activists and donors are more skewed toward the political extremes than the electorate as a whole. In what follows we assume that political capital is spread across the ideological spectrum with a distribution $K(\theta) = Ae^{|c(0.5-\theta)|}$ where $c \geq 0$, the size of c determining how skewed towards the extremes. (In the limiting case of $c = 0$ political capital, like potential voters, is distributed uniformly).

Thus there is a stock of political capital part of which parties can obtain through choosing their policy platforms. It is this that drags parties away from the ideological middle ground. We assume that activists and contributors help a party if they like it enough (i.e. if the psychic gains of helping it exceed the trouble.) A natural assumption is that, in the absence of public spending, the psychic gains of helping a party are inverse to your ideological distance from it, but the cost (time, money and effort) is constant. Let z be the critical ideological distance. So donors and activists supply political capital if they are within this distance of one party and not the other. Political capital that is within this distance of both parties goes to whichever is closer. Thus party Y's range of political capital will be between $\max(0, y-z)$ and $\min((x+y)/2, y+z)$. Figure 4 illustrates the case where the limits are $(y-z, y+z)$. Party Y increases its political capital by moving away from the centre.

We now assume that activists and donors, like potential voters, are susceptible to efficient government. To incorporate this idea we assume that spending *g* by party *Y* will widen its range of capital by $\beta(g)$ at the leftward end, while at its rightward end it picks up capital that is no more than $[\beta(g)-\beta(g^X)]$ further away from it than it is from *X*. (Spending g^X by party *X* has analogous effects.) *Y*'s range of activists will thus be between $\max(0, y-z-\beta(g))$ and $\min(0.5[x+y+\beta(g)-\beta(g^X)], y+z+0.5[\beta(g)-\beta(g^X)])$. In what follows we assume that $\beta(g)$ and $\beta(g^X)$ are identical in form and that $\beta'(g)>0>\beta''(g)$.

D. *Some Observations*

[1] Since $f(g)$ and $f(g^X)$ have identical forms, as do $\beta(g)$ and $\beta(g^X)$, and the distributions of both potential voters and political capital are symmetrical between left and right, it follows that the two parties' incentives, as they choose public spending and ideological distance from the centre, are identical. So in any Cournot-Nash equilibrium the parties' positions are symmetrical in the sense that they are equidistant from the middle ground, and extort rents to the same extent as each other, i.e. $x+y=1$ and $g=g^X$. Hence $0.5(x+y+\beta(g)-\beta(g^X))=0.5$ and $y+z+\beta(g)-\beta(g^X)=y+z$

[2] We can be sure that $y \geq z+\beta(g)$; $y-z-\beta(g)<0$ would mean the party's left flank would be truncated at zero and it would always pay it to move towards the centre. (A move to the centre would gain both potential voters and centre-ground political capital

without losing any of the ideologically-extreme capital.) Hence $\max(0, y - z - \beta(g)) = y - z - \beta(g)$.

[3] The combined effect of observations [1] and [2] is to restrict Y's range of capital to $(y - z - \beta(g), \min[y + z, 0.5]$. But we now also assume that $z > 0.25$. (Effectively, we have ruled out the case where a party is simultaneously too moderate for some potential activists and too extreme for others: allowing this possibility greatly complicates the mathematics without yielding any additional insight.) If z>0.25, it follows that $y + z > y - z + 0.5 \geq y - z - \beta(g) + 0.5 \geq 0.5$. Hence $\min[y + z, 0.5] = 0.5$. *Y*'s range of capital is thus $(y - z - \beta(g), 0.5)$.

So the centre ground political capital is always working for the party, and the critical marginal capital is located at the extreme of the party's range. Political capital (before shocks) can therefore be written as the integral of the density function between these two limits:

$$K(Y) = \int_{y-z-\beta(g)}^{0.5} K(\theta) d\theta = \frac{A}{c}\left(e^{c(0.5-y+z+\beta(g))} - 1\right) \quad (5)$$

The comparative statics (i.e how political capital responds to changes in ideological stance) can now be considered. Suppose *y* increases by *dy*. *Y*'s activists will now be in the range ($y + dy - z - \beta(g), 0.5 + 0.5dy$) i.e.

$$K(Y)_y = 0.5(K(\theta)|_{\theta=0.5}) - (K(\theta)|_{\theta=y-z-\beta(g)})$$

The first term in this expression represents centre ground political capital, captured from the other party, while the second represents capital on the fringe which stops work

altogether as the party deserts it. Given it is relative political capital that is important in determining the vote share we can write the sum of *Y*'s gain and *X*'s loss as:

(6) $K(Y)_y - K(X)_y = (K(\theta)|_{\theta=0.5}) - (K(\theta)|_{\theta=y-z-\beta(g)}) = A\left(1 - e^{c(0.5-y+z+\beta(g))}\right) = -cK(Y)$

Equation (6) gives a useful and simple result: when the left-wing party marginally shifts to the centre, its relative political capital falls proportionately to its existing stock. Thus even though the centrist shift increases capital in the centre, and also eats into the opposition's capital, the net effect on relative political capital is still negative due to the larger loss on the party's extremist wing.

E. *Ideological Equilibrium*

Now consider how the parties choose their ideological position so as to maximize their objective in equation (3). Differentiating this with respect to *y* yields

$$d.U_y = S(Y)_y = \left(\frac{(V(Y)}{V(Y)+V(X)}\right)_y = \frac{V(Y)_y - V(X)_y}{4V(Y)}$$

The last equality follows from the fact we are considering a Nash equilibrium where pre-shock votes are equal and $V(Y) = V(X)$. Substituting in $V = K^{\alpha}L^{1-\alpha}$, plus the facts that in equilibrium $L(Y) = L(X) = 0.5$ and $L(Y)_y + L(X)_y \equiv 0$, gives

(7) $$S(Y)_y = \frac{\alpha}{4K(Y)}\left(K(Y)_y - K(X)_y\right) + (1-\alpha)L(Y)_y$$

or, substituting in from (3) and (6),

$$U(Y)_y = \frac{1}{d}[S(Y)_y] = \frac{1}{d}\left(\frac{1-\alpha}{2} - \frac{\alpha c}{4}\right)$$

and thus, for all $0.5 \geq y \geq z + \beta(g)$, $U(Y)_y > 0$ iff $\alpha < \frac{2}{c+2}$.

If, therefore, α is less than this critical value (call it α^*), it will always pay *Y* (and *X*) to move nearer the centre, and the two parties will converge at $x = y = 0.5$. If $\alpha > \alpha^*$, it will always pay *Y* to move away from the centre. However it will not end up at $y = 0$, but rather at $y = z + \beta(g)$, the point at which, as we have discussed, any further leftward move results in an unambiguous loss of votes.[4] *X*, by similar reasoning will end up at $x = 1 - z - \beta(g^X)$.

So, as capital becomes less important in delivering the vote (i.e. as α falls), parties move to the centre. This always picks up potential votes, but now does so at a reduced cost in terms of political capital. If the stock of capital is very skewed towards the political extremes (high *c*), the move to the centre as α falls will be delayed, but there will always be some α low enough to precipitate it. By contrast, if $c = 0$, parties converge at all positive α. This is straightforward. If $c = 0$, activists have the same rectangular distribution as voters. It follows that, each time party *Y* inches towards the centre it loses two left-wing activists and gains one centrist one from party *X*. Both parties are therefore down one activist, and party *Y* has nothing to lose by moving towards the centre. Since it will also be gaining potential voters by doing so, it will move to the centre. The value of α is beside the point. (If, contrary to our assumption, *c* were actually negative, this would all be true *a fortiori*.)

But, unless $c \leq 0$, we have discontinuity. Parties are either at the centre, with $y = x = 0.5$ or polarized to the point that their leftmost (rightmost) activist is the leftmost (rightmost) person in the country, the point where $y = z + \beta(g)$. We will call these alternatives the 'median voter' outcome and the 'polarity' outcome. Our estimate that $\alpha = 2/3$ for a typical OECD country, together with the fact that the two main parties do not converge in the ideological centre, implies that *c* must be at least unity. In other words political capital is sufficiently skewed towards the extremes of the ideological spectrum that it grows, as the centre is vacated, at a more-than-unitary exponential rate.

III. The Quality of Government

So far we have seen the two parties choosing ideological locations. Whether they converge on the centre, or locate themselves so as to maximize political capital, depends on the value of α in the VPF. In this section we consider the implications of the VPF for the choice of public spending, *g*. Recall that what is not spent on public good is rents extracted from the electorate. Social welfare therefore depends on *g,* and it turns out that *g* itself depends crucially on the vote production function parameter *α*.

A. *How social welfare depends on the weighting of the vote production function*

From (3), public spending will be at the point where

$$U(Y)_g = -b + \frac{S(Y)_g}{d} = 0 \tag{8}$$

By analogy with (7)

$$S(Y)_g = \frac{\alpha}{4K(Y)}\left(K(Y)_g - K(X)_g\right) + (1-\alpha)L(Y)_g \tag{9}$$

which, combined with (4) and (8), gives:

$$f'(g) = L(Y)_g = \frac{bd}{1-\alpha} - \frac{\alpha}{4(1-\alpha)K(Y)}\left(K(Y)_g - K(X)_g\right). \tag{10}$$

This first order condition clearly depends on how relative political capital responds to better government $\left(K(Y)_g - K(X)_g\right)$. But the size of $K(Y)_g$ itself depends on whether ($y - z - \beta(g)$), the left frontier of activism, is zero or greater than zero.

Case 1: The Median Voter Outcome ($\alpha < \alpha^*$, $y = 0.5$)

Here a rise in g will, on our above assumptions, rake in activists at both Y's fringes, widening their range by $\beta'(g)$on the left and $0.5\beta'(g)$ in the centre, the latter group also being lost to X. Thus the sum of Y's gain and X's loss can be written as:

$$K(Y)_g - K(X)_g = \beta'(g)\left(K|_{\theta=0.5} + K|_{\theta=0.5-z-\beta(g)}\right) = \beta'(g)A\left[1 + e^{c(z+\beta(g))}\right] \tag{11}$$

Substituting (11) into the first order condition (10), and using (5), (which gives the result that when $y = 0.5$, $K(Y) = \frac{A}{c}\left(e^{c(z+\beta(g))} - 1\right)$), we have:

$$f'(g) = \frac{bd}{1-\alpha} - \left(\frac{\alpha}{1-\alpha}\right)\frac{\beta'(g)c}{4}\left[\frac{e^{c(z+\beta(g))}+1}{e^{c(z+\beta(g))}-1}\right]. \tag{12}$$

Our objective is to see how public spending, g, responds to changes in the relative importance of the two arguments in the VPF, i.e. to the parameter α. The condition for $\left(f'(g)\right)_\alpha < 0$, and hence (given $f''(g) < 0$) the condition for $g_\alpha > 0$, is

(13) $$\beta'(g) > \frac{4db}{c}\left[\frac{e^{c(z+\beta(g))}-1}{e^{c(z+\beta(g))}+1}\right].$$

Let us call the expression[5] on the RHS of (13) β'^{*}. Therefore, when $\beta'(g) > \beta'^{*}$, $g_\alpha > 0$, i.e. any increase in α is good for welfare, so that the optimum within the range is its top end, $\alpha = \alpha^{*}$. If $\beta'(g) < \beta'^{*}$, then political capital is not sufficiently sensitive to good government. The ideal is $\alpha = 0$, i.e. we would like potential voters to have maximum say in the formation of government.[6]

The intuition here is that the incentive to govern better (raise g) depends on how many extra votes this would bring in. The more freely the supply of a factor (*k* or *l*) responds to better government, the more the standard of government will itself respond to that factor carrying more weight in the VPF. If the supply of, say, political capital is sensitive to g *and* the vote is sensitive to the supply of political capital, the electoral payoff from giving up rents is high and parties will act accordingly.

Case 2:The Polarity Outcome ($\alpha > \alpha^{*}$, $y = z + \beta(g)$)

If $y - z - \beta(g) = 0$, there is no more capital on the leftward fringe to rake in if *g* rises any more. (i.e. the most left-wing person in the country is already working for party *Y*.) Consequently *Y* gains no activists at $y - z - \beta(g)$ by improving its behavior and

(14) $$K(Y)_g - K(X)_g = \beta'(g)(K|_{\theta=0.5}) = \beta'(g)A.$$

Substituting (14) into (10), and using (5), which gives the result that when $y = z + \beta'(g)$, $K(Y) = \frac{A}{c}(e^{0.5c} - 1)$, we have

(15) $$f'(g) = \frac{bd}{1-\alpha} - \left(\frac{\alpha}{1-\alpha}\right)\frac{\beta'(g)c}{4\left(e^{0.5c} - 1\right)}.$$

Thus the condition for $\left(f'(g)\right)_\alpha < 0$, and hence $g_\alpha > 0$, is[7]

(16) $$\beta'(g) > \frac{4db(e^{0.5c} - 1)}{c}.$$

Call the expression on the RHS of (16) β'^{**}. As in the median voter case (13), an exogenous fall in $\beta'(g)$ makes g_α more likely to be negative.[8] We have already seen the essential intuition. Low $\beta'(g)$ means there is little mileage to be got from trying to please activists and donors; it is thus potential voters' opinions which will be more effective in stopping governments from taking too many rents. We therefore want the power of potential voters to be enhanced still more by lower α. Think of the activists and potential voters as two vigilantes, both trying to enforce good government. If you have two vigilantes and two sticks, you get maximum enforcement when the bigger vigilante gets the bigger stick. So when $\beta'(g)$ is low (high), low (high) α will raise g.

Two further propositions follow from (13) and (16):

PROPOSITION 1. *g undergoes a downward jump as α rises through α^**. Proof: g is always set such that $S(Y)_g = bd$ (equation (8)). Comparison of (11) and (14) in the light of (9) shows that as α crosses α^* from below, $S(Y)_g$ falls discontinuously. Therefore the

government will alter *g* until $S(Y)_g$ rises back to bd. Since $S(Y)_{gg} < 0$, the change in *g* must be downwards.

The logic behind this proposition is that as α crosses α^* from below, the parties diverge from the centre. Now higher *g* will no longer pull in activists from the ideological fringe as they will be working for party *Y* anyway. The incentive to spend falls and so does spending.

PROPOSITION 2. *It is possible for* g_α *to be positive in α's lower range and negative in its upper, but not vice versa*. Proof: Since $g|_{\alpha=\alpha^{*+}} < g|_{\alpha=\alpha^{*-}}$ (Proposition 1), $f(g)|_{\alpha=\alpha^{*+}} > f(g)|_{\alpha=\alpha^{*-}}$. Since $[f(g)]_\alpha|_{\alpha=\alpha^{*+}} - [f(g)]_\alpha|_{\alpha=\alpha^{*-}} = (1/\alpha)\{f(g)|_{\alpha=\alpha^{*+}} - f(g)|_{\alpha=\alpha^{*-}}\}$, it now follows that $[f(g)]_\alpha|_{\alpha=\alpha^{*+}} > [f(g)]_\alpha|_{\alpha=\alpha^{*-}}$ and hence $g_\alpha|_{\alpha=\alpha^{*+}} < g_\alpha|_{\alpha=\alpha^{*-}}$, i.e. g_α as well as *g* jumps downwards at α^*. Given that α^* is the only value of α at which g_α can change sign (notes 6 and 7) it follows that $g_\alpha < 0$ at $\alpha < \alpha^*$ necessarily implies $g_\alpha < 0$ at $\alpha > \alpha^*$ but not vice versa.

The logic this time is as follows: g_α is positive when political capital is good at inducing better government, i.e. when its allegiance is sensitive to the quality of government. It will always be more sensitive in the 'median voter' case because here higher *g* brings in

capital from both wings of the party, not just the 'moderate' one. Thus if g_α is positive even in the 'polarity' case, it will certainly be so in the 'median voter' one.

B. *Global optima*

To go from local to global optima, we need to incorporate the fall in *g* (Proposition 1) as α crosses the critical threshold of α^*. Putting this fact together with (13) and (16) gives us Figure 5, which depicts the three possible cases (the fourth one, a downward slope below and an upward one above α^*, has just been ruled out in Proposition 2.) There is, however, one detail in Figure 5 that is not explicitly given by (13) and (16); namely that $g(C) > g(A)$ in Figure (5a) but $g(A) > g(C)$ in Figure (5b). But this must always be the case, since the condition for $g(C) > g(A)$ turns out to be identical to the condition for being in Figure (5a) rather than Figure (5b) in the first place.[9]

Let us now interpret and compare the situations in Figures (5a), (5b) and (5c). Recall that for levels of α below α^* political capital is less important in terms of generating votes and parties locate at the centre (the median voter outcome.) For levels of α greater than α^*, political capital is sufficiently important in the vote production function to give the polarity outcome.

In Figure (5a), activists are more responsive to better government than voters are, and hence more effective at keeping the government up to the mark. As they become more important to the government, therefore, government improves – but with an interruption

as α crosses α^*. At this point government spending no longer brings in activists on the extreme left (right) as well as centrist ones – parties become polarized and the extremists would be helping them regardless of any improvement in the quality of government. This one-off drop in the electoral rewards from pleasing activists produces a one-off drop in public spending.

In Figure (5c) political capital is relatively insensitive to good government and it is potential voters who are most swayed by the government giving up rents. Government, therefore, improves with the reward to the government from pleasing potential voters (as α falls). If $\beta'(g)$ is low, then anything is better than $\alpha = 1$, where the government faces a set of voters it has no incentive to please and a set of activists who give it little thanks when it does. As α rises, government spending falls, exacerbated by the one-off drop as α crosses α^*.

Figure (5b) is the intermediate case. When α is high, only the centre activists respond to better government (the extremists are helping it anyway). This is sufficient for the situation to resemble Figure (5c). But when the radicals' response kicks in as α falls through $\alpha = \alpha^*$, this not only produces the standard jump in g, but also gives the government enough "buyable" activists for the balance of incentive to change, tipping us into the world of Figure (5a). Further reductions in α are now undesirable; the ideal is to be just to the left of α^*.

As for policy implications, in case (5c), anything which makes a party's vote less dependent on effective organization is unambiguously good for welfare. In (5a), $\alpha = 0$ (organization irrelevant) is the worst outcome. However, nothing, and certainly not compulsory voting, will make party workers completely superfluous. Making voting compulsory does not get everyone to vote, as a look at Australia will show. There is still a role for suasion, encouragement, and knocking up one hour before the polls close.

This raises the possibility that α might be 'fine-tuned' by varying the penalties for not voting ($\alpha = 0.01$ with executions, 0.05 with jail, $0.1 - F + F^2$ where F is the size of the fine?) In that case, compulsory voting could conceivably be an improvement even in case (5a), provided that α is initially greater than α^*. (Incompletely successful compulsion also raises the theoretical possibility that compulsory voting might make activists *more* important: suppose there were a great many people who could be persuaded to vote by heavy fines *and* heavy canvassing, but only in combination.)

In case (5b), moving to $\alpha = 0$ is always an improvement when $\alpha > \alpha^*$ and always bad when $\alpha < \alpha^*$. Compulsory voting, even assuming it does not lead to $\alpha = 0$, will be an improvement *if* it has the effect of making α cross the α^* boundary.

Our empirical work suggests a value of α of about 2/3. The fact that that parties remain ideologically distinct suggests this is high enough for democracies to end up between points *C* and *D* regardless of the sensitivity of political capital to good governance. A reduction in α of the right size would thus improve government even in case (5a), and all

such reductions do so in cases (5b) and (5c). Assuming compulsory voting does reduce the role of capital (to the extent people now go and vote anyway), it would raise economic welfare in both these cases. The same could be said for on-line voting, or anything which either reduces the cost of voting or raises the cost of not voting.

Finally, does this theory carry any implications for State funding of political parties? So far as an unearned income makes volunteers and private finance less essential to a party machine, it too would reduce the value of α, with the consequences discussed above. The issue is a complicated one, however, so far as (1) some electioneering is probably done better by enthusiastic amateurs even if you can afford professionals, (2) your ideology might still affect your ability to attract staff, even if they are paid (3) the distinction between party income and governmental rent would blur, leading to the presence of income effects in our utility function.

IV. Conclusion

In this paper we propose a vote production function that encapsulates the importance of elements like a strong membership and campaign funding for political parties. It is because of such political capital that parties maintain ideological distance from each other. There is reasonable empirical support for the vote production function and in particular we show that ideology affects voting behavior once political capital variables, as proxied by membership and campaign expenditure, are accounted for.

The fact that parties don't converge in the centre implies that political capital is more heavily concentrated towards the ideological extremes than is the potential vote. Our estimate of $\alpha = 2/3$, plus the failure of parties to converge, implies c>1 i.e. political capital is quite steeply banked towards the two ideological fringes.

Finally, you get the best government when the government can buy the largest number of additional votes by improving its performance and reducing its rent-seeking or wasteful activities. So the question is: will sidelining the party organizations make this electoral bonus larger or smaller? The answer depends whether the activists are more or less responsive to better government than the voters. If they are less responsive, then anything which makes them less important – including compulsory voting – will make the total vote more elastic as government gives up rents, and so deliver better government.

NOTES

[1] Country specific time trends are composed of an interaction of a time trend and country dummies. These are included because turnout has trended downwards for most countries, but to different degrees – see Wattenberg (2002). Of course, equation (1) relates to the *relative* vote, so if turnout for both parties falls equiproportionately then such time trends may not be necessary, although we include them to account for varying falls in turnout across the ideological spectrum. The regression analysis also included time effects common to all countries but these were insignificant in all cases.

[2] At first sight omission seems a drastic course of action, but it only deprives us of 7 observations.

[3] Won't the weight party *Y* attaches to its re-election depend partly on the rents it then hopes to get? And aren't these likely to be related to the current ones? Putting in an interactive term along these lines immensely complicates the mathematics without yielding essentially different conclusions. We therefore assume here that politicians serve only one term of office and do not care what rents their successors get. However, whether they retire before or just after the election, they care about winning it for their party.

[4] Remember that equation (6) was derived explicitly on the basis that $y \geq z + \beta(g)$. The condition we have derived for the sign of $U(Y)_y$ thus applies only when y exceeds this lower limit.

[5] At first sight the sign of g_α seems to depend here on the absolute value of $\beta'(g)$ rather than its relation to $f'(g)$. This would be hard to understand if true. But in fact it *is* the relation of $\beta'(g)$ to $f'(g)$ which counts here, as one would expect. Each value of $\beta'(g)$

implies a particular equilibrium value of $f'(g)$, as equation (12) shows. The relation of $\beta'(g)$ to $f'(g)$ is thus implicit in (13), which could equally well have featured $f'(g)$ as the ostensible key variable and omitted $\beta'(g)$.

[6] Complications would arise if $\beta'(g)$ exceeded β'^{*} over some of the range $\alpha < \alpha^{*}$ but not all of it. Fortunately this can't happen: if $\beta'(g) > (<)\beta'^{*}$ at $\alpha = \alpha^{*}$, then (13) $g_{\alpha} > (<)0$, and hence $[\beta'(g)]_{\alpha} < (>)0$. Furthermore $[\beta(g)]_{\alpha} > (<)0$ and hence from the RHS of (13) $\left|\beta'^{*}\right|_{\alpha} > (<)0$. Hence any excess (deficiency) of $\beta'(g)$ over β'^{*} at $\alpha = \alpha^{*}$ will become steadily more pronounced as α moves towards zero.

[7] Like (13), and for the same reasons, (16) will either always hold or never hold as α varies within the relevant range (see previous footnote.)

[8] i.e. A fall in $\beta'(g)$ caused by a fall in the responsiveness of $\beta(g)$ to g, not by a rise in g (which would also reduce $f(g)$, making the effect on g_{α} ambiguous.)

[9] Let subscripts 1 and 3 denote values of variables at point A and point C respectively. Then, from (12), (15) and (16)

$$(f'(g))_1 - (f'(g))_3 = bd - \frac{bd}{1-\alpha^{*}} + \left(\frac{\alpha^{*}}{1-\alpha^{*}}\right)\frac{(\beta'(g))_3 c}{4\left(e^{0.5c}-1\right)} = \left(\frac{\alpha^{*}}{1-\alpha^{*}}\right)db\left(\frac{(\beta'(g))_3}{\beta'^{**}} - 1\right).$$

Hence $f'(g)|A > f'(g)|C$, i.e. $g(C) > g(A)$, iff $(\beta'(g))_3 > \beta'^{**}$, the necessary and sufficient condition for being in Fig. (5a) rather than Fig. (5b).

DATA APPENDIX

The analysis focuses on general elections across countries and through time. Data on ideology and membership are available at the national level and vary considerably through time and across countries. We placed no restrictions on the selection of data so as to obtain the largest data set possible. The full data set is available on request.

Data on the percentage vote for left-wing and right-wing parties were obtained from Keesing's Contemporary Archives. For our ideology measure we used the 'vanilla' measure constructed by Gabel and Huber (2000), which was their preferred measure using alternative aggregation methods using manifestos data. These data assign a value between 0 (extreme left) and 10 (extreme right) for all major political parties in Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, The Netherlands, New Zealand, Norway, Sweden and the UK for general elections between 1950 and 1992. These data were divided by 10 to obtain values of x and y between 0 and 1.

Susan Scarrow provided us with aggregate membership data of individual parties and inevitably this has gaps (see Scarrow, 2000, and Webb, Farrell and Holliday, 2002), especially as the relative measure used in the regressions requires concurrent data for both parties, but nonetheless is the most comprehensive set of data feasible. The data set analyzed in tables 1 and 2 is summarized in table A1.

TABLE A1. MEMBERSHIP DATA

Country	Elections	Number of obs.
Australia	1966, 1972, 1990	3
Austria	1953, 1956, 1959, 1962, 1966, 1970, 1971, 1975, 1979, 1983, 1986, 1991	12
Belgium	1961, 1965, 1968, 1974, 1977, 1978, 1981, 1985, 1987	9
Canada	1974, 1979, 1980, 1984, 1988	5
Denmark	1960, 1964, 1966, 1968, 1971, 1973, 1975, 1977, 1979, 1981, 1984, 1987, 1988, 1990	14
France	1958, 1962 ,1967, 1968, 1981, 1988	6
Germany	1957, 1961, 1965, 1969, 1972, 1976, 1980, 1983, 1987, 1990	10
Ireland	1987, 1989	2
Italy	1968, 1972, 1976, 1979, 1983, 1987, 1992	7
Japan	1960, 1979, 1980	3
The Netherlands	1959, 1963, 1967, 1971, 1972, 1977, 1981, 1982, 1986, 1989	10
New Zealand	1954, 1960, 1972, 1975, 1978, 1981, 1984, 1987	8
Norway	1961, 1969, 1973, 1977, 1981, 1985, 1989	7
Sweden	1960, 1964, 1968, 1970, 1973, 1976, 1979, 1982, 1985, 1988, 1991	11
United Kingdom	1964, 1966, 1970, 1974 (both), 1979, 1983, 1987, 1992	9
Total		116

Data on campaign expenditure is provided by Katz and Mair (1992). In some countries parties are not obliged to report their finances, and this limits the data-set further. Table A2 summarizes the data-set analyzed in table 3, for which both campaign expenditure and membership data were available.

TABLE A2. ELECTIONS WHERE BOTH MEMBERSHIP AND CAMPAIGN EXPENDITURE DATA WERE AVAILABLE

Country	Elections	Number of observations
Austria	1959, 1962, 1966, 1970, 1971, 1975, 1979, 1983, 1986, 1991	10
Ireland	1987	1
Italy	1976, 1979, 1983, 1987	4
The Netherlands	1967, 1971, 1977, 1981, 1982, 1986, 1989	7
Norway	1977, 1981, 1985, 1989	4
Sweden	1970, 1973, 1976, 1979, 1982, 1985, 1988	7
United Kingdom	1964, 1966, 1970, 1974 (both), 1979, 1983, 1987	8
Total		41

In most countries it is straightforward to identify the principle left- and right-wing parties. When there is more than one party in a coalition then the membership data is aggregated and the ideology data is an average of the party-specific ideology scores with weights according to vote shares obtained in the election. In all countries there are third parties whose own policy platforms may affect the vote shares of the protagonists considered here. However, the key arguments remain, that the ideological location and relative political capital of the two principle ideologically aligned parties will affect vote shares. Table A3 details the parties used in the analysis.

TABLE A3. POLITICAL PARTIES

Country	Left-wing	Right-wing
Australia	ALP (Labour)	Liberal & Country Parties
Austria	SPO (Socialists)	OVP (People's Party)
Belgium	PSB-BSP (Socialists)	PLP-PVV (Liberals)
Canada	Liberals	Progressive Conservatives
Denmark	Social Democrats	Conservatives & Liberal Democrats
France	Socialists	Gaullists
Germany	Social Democrats	Christian Democrats
Ireland	Labour	Fianna Fail & Fine Gael
Italy	PCI (Communists) + PSI (Socialists)	Christian Democrats, PLI (Liberals), MSI (neo-fascists)
Japan	JSP (Socialists)	LDP (Liberals)
The Netherlands	PvDA (Labour)	VVD (Freedom and Democracy)
New Zealand	Labour	National
Norway	DNA (Labour)	Centre, Christian Peoples, Conservatives, Liberals
Sweden	SAP (Social Democrats)	Centre, Liberal Peoples, Moderate Unity
United Kingdom	Labour	Conservatives

TABLE 1. ESTIMATION OF THE VOTE PRODUCTION FUNCTION USING MEMBERSHIP

$$\log\left(\frac{v_Y}{v_X}\right) = \underset{(0.030)}{0.179}\ \log\left(\frac{k_Y}{k_X}\right) + \underset{(0.075)}{0.212}\ \log\left[\frac{x+y}{2-x-y}\right]$$

Number of Observations	109
$\overline{R}^2$	0.41
Heteroscedasticity omissions	Canada, Ireland
Cameron + Trivedi Heteroscedasticity test (p-value)	0.004
RESET test (p-value)	0.26
H0: $b_1 = 1 - b_2$ (p-value)	0.000

TABLE 2. ERRORS IN VARIABLES REGRESSION OF VOTE PRODUCTION FUNCTION USING MEMBERSHIP

$$\log\left(\frac{v_Y}{v_X}\right) = \underset{(0.039)}{0.603}\ \log\left(\frac{k_Y}{k_X}\right)\ \underset{(0.034)}{0.365}\ \log\left[\frac{x+y}{2-x-y}\right]$$

Number of Observations	109
$\overline{R}^2$	0.89
Heteroscedasticity Omissions	Canada, Ireland
p-value of model hypothesis	0.576

TABLE 3. ESTIMATION OF THE VOTE PRODUCTION FUNCTION USING MEMBERSHIP AND CAMPAIGN EXPENDITURE

Unrestricted Regression:

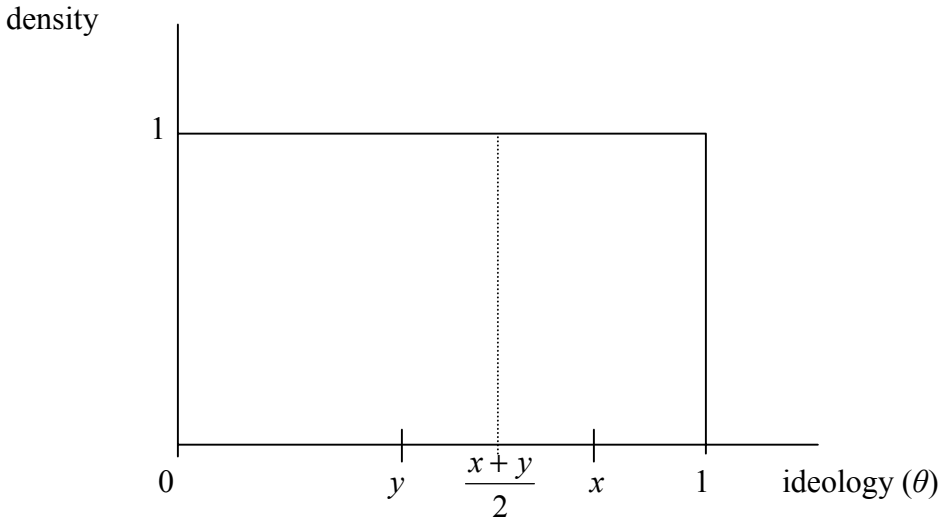
$$\log\left(\frac{v_Y}{v_X}\right) = \underset{0.096}{0.193}\log\left[\frac{k_Y}{k_X}\right] + \underset{(0.114)}{0.452}\log\left[\frac{f_Y}{f_X}\right] + \underset{(0.223)}{0.192}\log\left[\frac{x+y}{2-x-y}\right]$$

Restricted Regression:

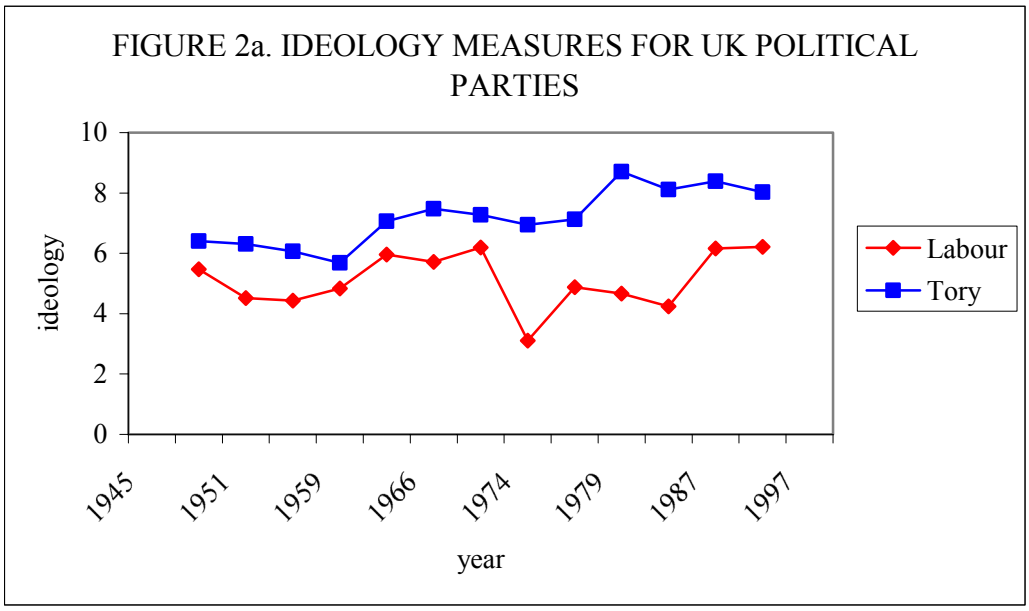
$$\log\left(\frac{v_Y}{v_X}\right) = \underset{0.068}{0.189}\log\left[\frac{k_Y}{k_X}\right] + \underset{(0.068)}{0.480}\log\left[\frac{f_Y}{f_X}\right] + \underset{(0.066)}{0.331}\log\left[\frac{x+y}{2-x-y}\right]$$

Number of observations	41
$\overline{R}^2$	0.68
Heteroscedasticity Omissions	None
RESET test (p-value)	0.001
Cameron + Trivedi test for Heteroscedasticity (p-value)	0.079
H0: $b_3 = 1 - b_1 - b_2$ (p-value)	0.609

FIGURE 1. POTENTIAL VOTERS



Given policy platforms, x and y, members of the electorate to the left (right) of the critical point, $\frac{x+y}{2}$ are potential voters for the left- (right-) wing party.



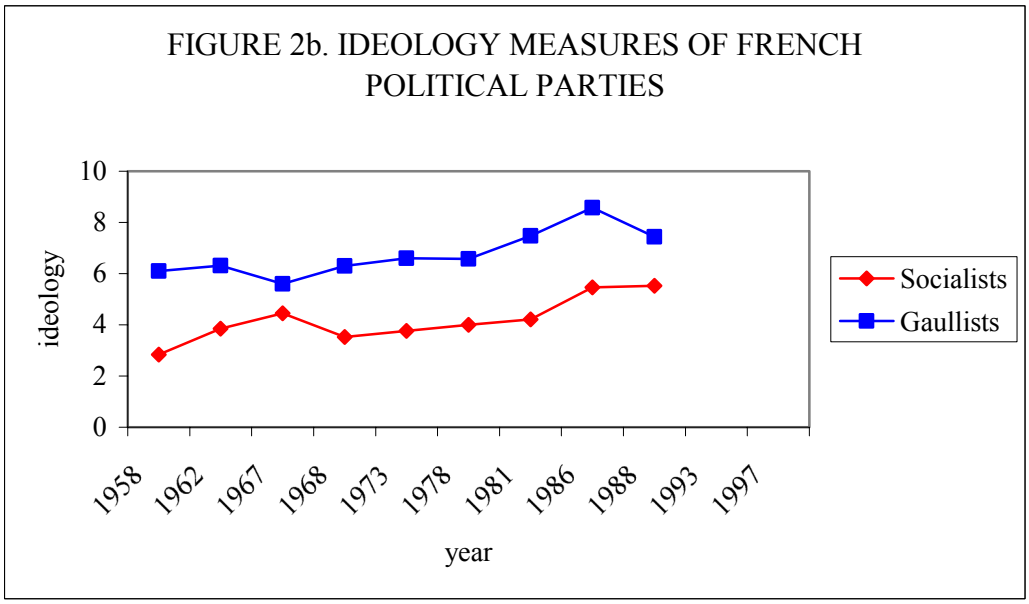
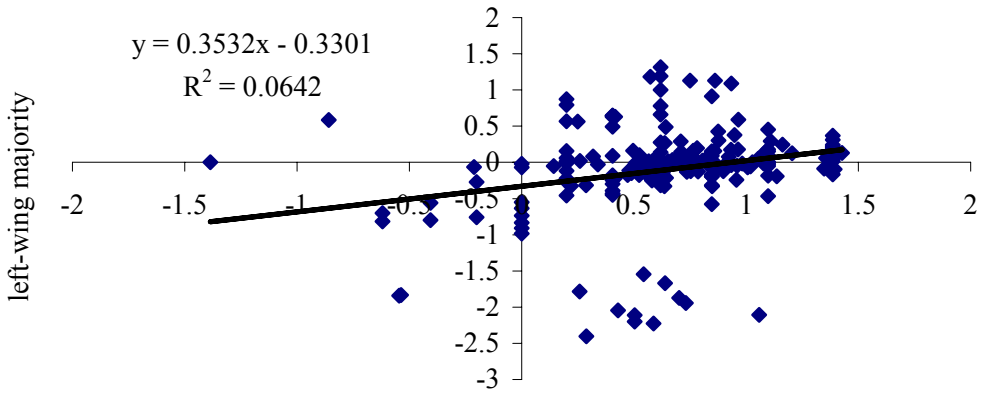


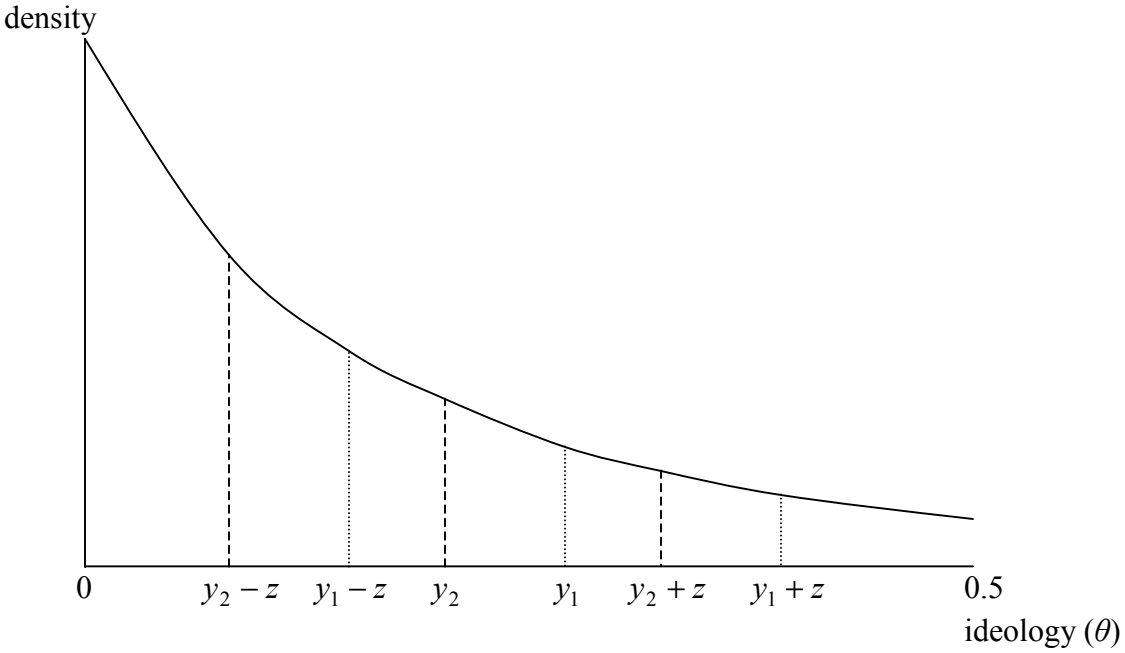
Figure 2 shows the raw Gabel and Huber ideology time-series data for the left- and right-wing parties in the UK and France.

FIGURE 3. LEFT-WING MAJORITY VS RELATIVE IDEOLOGICAL LOCATION



The left-wing majority is measured as $\log\left[\frac{v_Y}{v_X}\right]$ with left and right parties defined in the appendix. The relative ideological position, or location variable as we define it in the text, is measured by $\log\left[\frac{x+y}{2-x-y}\right]$ where x and y are constructed using the Gabel and Huber data.

FIGURE 4. POLITICAL CAPITAL



A party's political capital depends on its ideological location. Consider for example two policy platforms y_1 and y_2. In the first case party *Y*'s political capital consists of the area under the curve bounded by $y_1 - z$ on the left and $y_1 + z$ on the right. In the second case party *Y*'s political capital consists of the area under the curve bounded by $y_2 - z$ on the left and $y_2 + z$ on the right. When parties move to the extremes (or at least no further than *z*) they increase their political capital. The same holds for party *X*.

FIGURE 5. HOW PUBLIC SPENDING RESPONDS TO THE IMPORTANCE OF POLITICAL CAPITAL IN THE VOTE PRODUCTION FUNCTION

Fig. 5a:

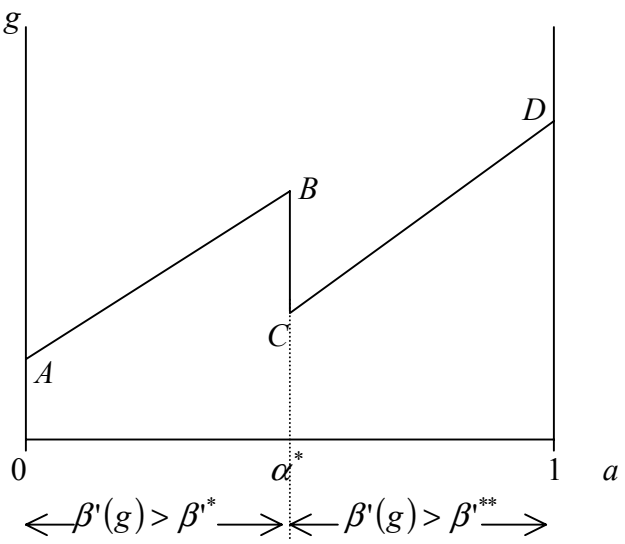


Fig. 5b:

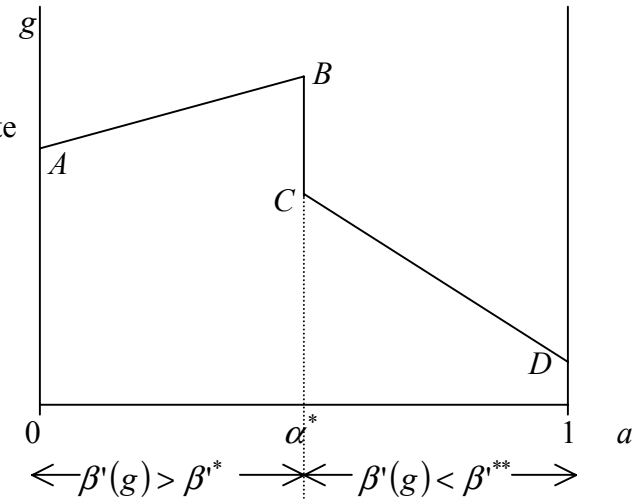
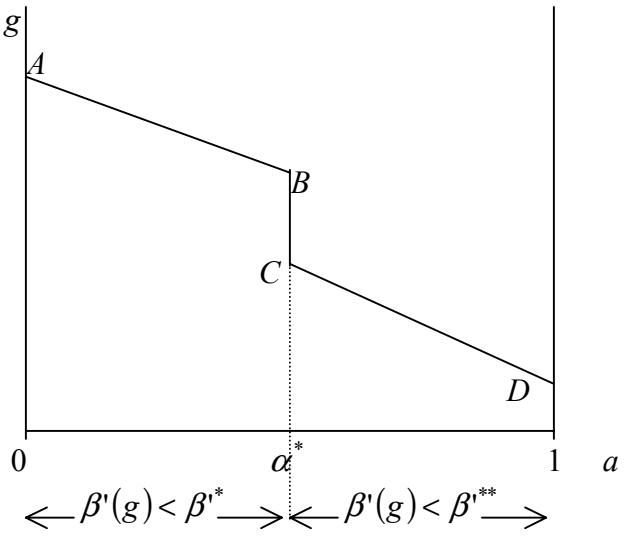


Fig. 5c:



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