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Measuring the Median: The Risks of Inferring Beliefs from Votes

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Abstract
A large number of studies of ideological congruence, and of the effect of public opinion on policy outcomes more generally, have relied on the Kim-Fording (KF) measure of median voter opinion. This measure has the great virtue of being readily calculable – no direct measurement of voter opinion is required – but it rests on assumptions concerning party locations and voter behaviour that are unquestionably incorrect, at least some of the time. This article explores the sensitivity of the KF measure to violations of its core assumptions through simulation experiments. It then uses public opinion data to assess the degree to which consequential levels of violation occur in actual democratic systems. The article concludes with a discussion of what the KF median really measures and where it can – and cannot – be safely used.

The connection between public opinion and government policy is at the very heart of democratic politics; governments that consistently advance policies that do not reflect what their citizens want jeopardize their systems' democratic credentials.[1] Because of its central role in standard conceptions of liberal democracy, empirically assessing the linkage between opinion and policy has long been a major concern for students of democratic governance. The question is, how is this to be done?

The median voter theorem affords some leverage on this issue. The theorem stipulates that – under certain assumptions – what the voting public wants can be represented by what the median member of that public wants.[2] This approach reduces the task of measuring public opinion to that of measuring the opinion of a single (notional) individual. The key assumption is that opinion can be captured adequately by a single policy dimension – which does not seem too great a stretch, given the dominance of the left-right dimension in most established democracies.[3]

The median voter theorem not only simplifies the task of measuring public opinion; it also suggests an understanding of how the linkage between citizens and governments ought to operate. Given the median's privileged position in a one-dimensional policy space (no other position is majority preferred to it), a straightforward interpretation would conclude that government policy should mirror the preferences of the median citizen or voter. This assumption has led to a lively debate over the extent to which, and the conditions under which, this correspondence or 'congruence' exists in extant democracies. Seminal among these contributions are McDonald and Budge's extensive evidence that congruence is generally

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[1] A recent statement of this common assumption is provided in HeeMin Kim, Bingham Powell and Richard Fording, 'Electoral Systems, Party Systems, and Ideological Representation: An Analysis of Distortion in Western Democracies', *Comparative Politics*, 42 (2010), 167–85.

[2] Duncan Black, *The Theory of Committees and Elections* (Cambridge: Cambridge University Press, 1958).

[3] This is demonstrated in Michael McDonald and Ian Budge, *Elections, Parties, Democracy: Conferring the Median Mandate* (Oxford: Oxford University Press, 2005), pp. 61–90.

present in democratic regimes[4] and Powell's individual and collaborative investigations that focus on the impact of electoral rules and party-system traits on the degree of congruence.[5] The consensus that greater congruence implies greater democratic quality – brought sharply into focus by the widespread use of the term 'distortion' as a synonym for incongruence – has made congruence, at times, an explicit criterion for judging democratic forms, as in Lijphart's evaluation of democratic models[6] or Carey and Hix's evaluation of electoral rules.[7]

This literature relies heavily a widely held understanding of how the two key concepts – government policy and median public opinion – can be measured. The standard measure of government policy is the weighted mean position of the parties in government, with the parties' legislative seat shares serving as the weights. This method does not directly measure what governments do, but instead relies on the assumptions that the parties participating in a government will attempt to bring government policy in line with the policies they stand for and will succeed in proportion to their relative legislative sizes. The advantage of this approach is that its measurement demands are relatively minimal; all that is required (apart from legislative seat shares) is some measurement of parties' left-right positions. The Comparative Manifestos Project's coding of party manifestos in a wide range of democratic countries since 1945 provides perhaps the most commonly used source for this purpose,[8] although both expert and public opinion surveys have also been employed.

Given the ready availability of party position estimates, it would certainly be convenient if they could also be used to estimate the independent variable – median opinion. Some time ago, Kim and Fording stepped into this breach by proposing to estimate median voter left-right opinion at the time of an election based on the positions of the parties in each system and their respective vote shares.[9] Assuming its assumptions are met, their method allows the median voter's position to be measured as readily as the government's left-right position, thus permitting a relatively straightforward assessment of congruence in liberal democracies.

This general approach to assessing the connection between policy and popular preferences, although widely utilized, can be disputed in a number of respects. The most

[4] McDonald and Budge, *Elections, Parties, Democracy*.

[5] Bingham Powell, *Elections as Instruments of Democracy: Majoritarian and Proportional Visions* (New Haven: Yale University Press, 2000); Bingham Powell, 'Election Laws and Representative Government: Beyond Votes and Seats', *British Journal of Political Science*, 36 (2006), 291–315; Bingham Powell, 'The Ideological Congruence Controversy: The Impact of Alternative Measures, Data, and Time Periods on the Effects of Election Rules', *Comparative Political Studies*, 42 (2009), 1475–97; John Huber and Bingham Powell, 'Congruence between Citizens and Policy-Makers in Two Visions of Liberal Democracy', *World Politics*, 46 (1994), 291–326; and Bingham Powell and George Vanberg, 'Election Laws, Disproportionality and Median Correspondence: Implications for Two Visions of Democracy', *British Journal of Political Science*, 30 (2000), 383–411.

[6] Arend Lijphart, *Patterns of Democracy: Government Forms and Performance in Thirty-Six Countries* (New Haven and London: Yale University Press, 1999).

[7] John Carey and Simon Hix, 'The Electoral Sweet Spot: Low-Magnitude Proportional Electoral Systems', *American Journal of Political Science*, 55 (2011), 383–97.

[8] Hans-Dieter Klingemann, Andrea Volkens, Judith Bara, Ian Budge and Michael McDonald, *Mapping Policy Preferences II. Estimates for Parties, Electors and Governments in Eastern Europe, European Union and OECD 1990-2003* (Oxford: Oxford University Press, 2006).

[9] HeeMin Kim and Richard Fording, 'Voter Ideology in Western Democracies, 1946-1989', *European Journal of Political Research*, 33 (1998), 73–97; HeeMin Kim and Richard Fording, 'Voter Ideology in Western Democracies: An Update', *European Journal of Political Research*, 42 (2003), 95–105. This approach has recently been expanded in Jan-Emmanuel de Neve, 'The Median Voter Data Set: Voter Preferences Across 50 Democracies', *Electoral Studies*, 30 (2011), 865–71.

fundamental is whether the connection should be interpreted in one-to-one terms: might not mere 'responsiveness' (policy changes that reflect changes in public opinion) be enough to satisfy democratic criteria?[10] Another debatable issue concerns the definition of congruence: is the alignment of median opinion with government policy sufficient, or should the distribution of opinion be taken into account?[11] A third question concerns the measurement of government policy: should the policy response be measured in terms of what governments (or their member parties) say they want to do, or in terms of what they actually manage to achieve?

All these are legitimate questions, but this article will focus on another issue: the measurement of median opinion itself. Kim and Fording aimed to measure 'the median ideological position within the electorate',[12] based on the assumptions that the left-right dimension is present in most (if not all) industrialized democracies, that it constitutes a primary (if not *the* primary) determinant of vote choice in these systems and that it is comparable across systems. They note that the bulk of the available evidence supports the probability of the first two assumptions and the plausibility of the third, a view that, broadly speaking, remains valid today. As we shall see in the next section, however, the satisfaction of these assumptions is not sufficient to ensure that the Kim-Fording (KF) measure will produce accurate measurements of median left-right opinion. Other things, including some rather unlikely ones, must also be in place.

When this is not the case, the consequences can be serious. Measurement error in an independent variable tends to bias estimates of its causal impact, typically by underestimating the effects; hence it usually introduces a conservative bias to the findings. With the KF measure, however, this tendency may be reversed: under plausible scenarios, it could induce a significant overestimation of the degree of ideological congruence in democratic systems. Even when the focus is on the less demanding trait of policy responsiveness, the KF measure could mislead in fundamental ways. Given its pervasive use in studies of key democratic traits such as these, much of what we think we know about democratic governance could be significantly off the mark.

We therefore put the KF measure under the microscope in this article. Our concern is primarily related to its possible adverse effects in studies of ideological congruence and policy responsiveness, but the findings are also relevant to the measure's other applications, including as a measure of 'policy mood' in the political economy literature[13] and as an assessment of the political centre in party positioning studies.[14] The discussion will begin by

[10] Perhaps the best-known model of responsiveness is Wlezien's 'thermostatic' model, which holds that government policy responds to 'relative' public preferences, but not in any one-to-one fashion. See Stuart Soroka and Christopher Wlezien, *Degrees of Democracy: Politics, Public Opinion and Democracy* (Cambridge and New York: Cambridge University Press, 2010). This work also provides a concise survey of the extensive literature on responsiveness (pp. 14–20).

[11] This issue is explored in Matt Golder and Jacek Stramski, 'Ideological Congruence and Electoral Institutions', *American Journal of Political Science*, 54 (2010), 90–106.

[12] Kim and Fording, 'Voter Ideology in Western Democracies', p. 79.

[13] Randolph Stevenson, 'The Economy and Policy Mood: A Fundamental Dynamic of Democratic Politics?', *American Journal of Political Science*, 45 (2001), 620–33.

[14] James Adams and Samuel Merrill, 'Why Small, Centrist Third Parties Motivate Policy Divergence by Major Parties', *American Political Science Review*, 100 (2006), 403–17; James Adams and Zeynep Somer-Topcu, 'Moderate Now, Win Votes Later: The Electoral Consequences of Parties' Policy Shifts in Twenty-Five Postwar Democracies', *The Journal of Politics*, 71 (2009), 678–92; James Adams and Zeynep Somer-Topcu, 'Policy Adjustment by Parties in Response to Rival Parties? Policy Shifts, Spatial Theory and the Dynamics of Party Competition in Twenty-Five Post-War Democracies', *British Journal of Political Science*, 39 (2009), 825–46; and

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presenting the measure itself and illustrating some of the conditions that can throw it off. These potential sources of inaccuracy will next be systematically explored by means of simulation experiments. Having established some major sources of potential error, the likely presence of these circumstances in extant democratic systems will then be evaluated using survey data from the Comparative Study of Electoral Systems (CSES) datasets.[15] The article will conclude with a discussion of what the KF median really measures and where it can – and cannot – be safely used.

THE KIM-FORDING MEASURE

The KF measure of the voter median assumes that each voter and party in a given political system can be allocated a position along a single dimension or scale of political belief. It need not be a left-right dimension, but it must be the basis for vote choice – that is, voters are assumed to vote for the party closest to them on it. This proximity voting rule defines 'party segments' of the scale: each party's segment ranges from the midpoint between its position and that of its closest neighbour on one side to the midpoint between its position and that of its closest neighbour on the other side. With these segments defined, it is possible to stipulate the final assumption, which is that voter opinion is uniformly distributed along the segment containing the median voter.

The segments are crucial because they structure the calculation of the voter median. The essence of the procedure is to start with the lower bound of the segment that contains the median voter and then calculate how far along that segment one would have to go to get to that voter's position (assuming a uniform distribution of voters in the segment). The general formula is:

$$KF\ median = L + [\{(50 - C)/F\} \times W], \tag{1}$$

where L is the lower end of the interval containing the median, C is the percentage of voters below the interval containing the median, F is the percentage of voters in the interval containing the median and W is the width of that interval.[16]

What factors might affect the ability of the *KF median* to find the middle of voter opinion accurately? Consider first a case in which the measure's assumptions hold: there is only one salient policy dimension, voters know where the parties are located on this dimension, voters invariably vote for the closest party and their distribution within the median party's interval is uniform.[17] In these circumstances, the *KF median* will be

(F'note continued)
Jonas Pontusson and David Rueda, 'The Politics of Inequality: Voter Mobilization and Left Parties in Advanced Industrial States', *Comparative Political Studies*, 43 (2010), 675–705.

[15] *Comparative Study of Electoral Systems, 1996-2001: Module 1 Micro-District-Macro Data* [dataset], (Ann Arbor: University of Michigan, Center for Political Studies, 2003); *Comparative Study of Electoral Systems, 2001-2006: Module 2 Full Release* [dataset], (Ann Arbor: University of Michigan, Center for Political Studies, 2007).

[16] McDonald and Budge introduce a slight amendment for cases in which the party supported by the median voter is the leftmost or rightmost party on the scale (McDonald and Budge, *Elections, Parties, Democracy*, pp. 113–4). The justification for this amendment is more practical than theoretical, but the circumstance that gives rise to it – a median party at an extreme of the party system – occurs only rarely and need not concern us further.

[17] This article also assumes that the analyst who is calculating the KF median shares the voters' knowledge of party locations. If this is not the case, the result may be inaccurate even if all the other assumptions are met.

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accurate regardless of the number or distribution of parties in the system. This is the case even though an irregular distribution of party positions along the scale would cause their segments to be both unequal in length and 'lopsided', that is, the segments would not be centred on party positions, which means that party positions would not be centred on the positions of their voters. These asymmetries do not affect the accuracy of the *KF median* because the party positions themselves do not enter into the KF formula; the only positional data are the endpoints of the segments, which in this scenario are accurate.

If we move away from the uniform distribution stipulation and adopt the more realistic assumption that voter opinion is normally distributed, error will begin to appear. The KF formula can be expected to produce reasonable results if the median party's segment is located in the centre of the voter distribution, since this region of the distribution is relatively flat and hence not too far from uniformity (the same is true at the extremes, although this situation is much less likely). The normal distribution is steepest in the regions that are moderately left of centre and moderately right of centre; here, the uniform distribution assumption will be especially vulnerable. These tendencies will be conditioned by the degree of spread in voter positions: a concentration in the middle may heighten the contrast, while a relatively broad spread may ameliorate it. Much may also depend on where the true median falls in the median party's segment. If it lies close to the lower or upper bound of the segment, the proportion of voters whose positions are inferred erroneously from a uniform distribution will be relatively small. Violations of the uniform distribution assumption would then be relatively innocuous, even though the segment itself is not well centred on the true median.

Error will also appear to the extent that the assumption of one-dimensional proximity voting does not hold. There are several ways in which this might occur. The most obvious is if vote choices involve some degree of random error. This situation may occur because voters make errors in determining which party is closest to them on the scale or because they introduce idiosyncratic criteria of judgment; that is, they apply their own evaluative criteria. It stands to reason that, other things being equal, the *KF median* will tend to become unreliable as proximity voting diminishes, although one would not expect it to become biased. Error that is independent of positioning should not shift the KF scores more often in one direction than the other.

Another kind of non-proximity influence on vote choice is valence. The term 'valence' has been given many meanings,[18] but as used here, it refers to any influence that is shared among voters and hence unrelated to voter-party distances. Candidate appeal is one commonly cited type of valence, as are judgments that one party is more competent to govern than another. The potential impact of valence is different from the other factors considered to this point because it may systematically bias the *KF median*. For instance, if the parties on one side of the true median receive more votes than their position alone would indicate because they are considered more competent to govern, the *KF median* will shift in that direction.

Such a shift may be more than just an occasional or minor occurrence. In his recent investigation spanning nine countries across twenty-two years, Clark found that party valence, as indicated by the occurrence of events that reflect party competence, integrity or unity, has a pronounced effect on subsequent electoral performance – perhaps as much

[18] A useful review of the literature on valence is provided in Michael Clark, 'Valence and Electoral Outcomes in Western Europe, 1976–1998', *Electoral Studies*, 28 (2009), 111–122.

as policy proximity itself.[19] Since the *KF median* depends on vote choices, this tendency for votes to reflect valence will cause the *KF median* to do the same. This effect would be fine if voters change their own left-right positions in line with their changing evaluations of party competence, but if they maintain some distinction between where they stand ideologically and how they evaluate parties, the *KF median* will be biased accordingly.

Voters who use more than one policy dimension to make their vote choices may also unwittingly interfere with the *KF median*'s capacity to do its intended job. Let us assume, for simplicity, that there are two policy dimensions that play a significant role in vote choices. If the dimensions are independent of each other, the impact of the second dimension on the KF median should resemble that of random error, since it will be unconnected with the party configuration that structures the KF measure. Thus the measure will tend to become inaccurate as second-dimension considerations loom larger in vote choices. To the extent that the dimensions are correlated (that is, party positioning on the second dimension resembles that on the first), this inaccuracy should diminish (other factors being equal).

Although other possible influences on vote choice that would distort the KF measure may be suggested,[20] the present analysis will focus on these influences, which are either inherently true or have a great deal of evidence and plausibility to support them. As noted earlier, our approach is two-pronged: we investigate the impact of these factors using both simulated and real data. The first prong comes in the next section, which details the results of a series of simulation experiments that explore the susceptibility of the *KF median* to variations in the factors mentioned above.

SIMULATING VIOLATIONS OF THE KF ASSUMPTIONS

The main advantage of using simulations is that we can compare the *KF median* with the true median and thereby assess its accuracy in a wide variety of situations. We will examine a number of simulated environments, each of which captures variation within a particular trait or cluster of traits. While different environments incorporate different features of political systems, they all have certain features in common. Specifically, each simulated environment is explored by means of 10,000 elections, each held in a distinct (unrelated) political system that contains 10,000 voters. These voters have positions x_i on a left-right dimension that are drawn randomly from a truncated normal distribution with range [0, 1] and mean = 0.5. The standard deviation of this distribution varies randomly across systems. So do the numbers and positions of parties. Each system has a randomly selected number of parties ranging from three to seven, and their positions are drawn randomly from the same distribution that provided the voters' positions for that system.[21]

[19] Clark, 'Valence and Electoral Outcomes'.

[20] Examples include the possibility of directional voting (George Rabinowitz and Elaine Macdonald, 'A Directional Theory of Issue Voting', *American Political Science Review*, 83 (1989), 93–121) and discounted voting (Bernard Grofman, 'The Neglected Role of the Status Quo in Models of Issue Voting', *The Journal of Politics*, 45 (1985), 230–7). Both offer somewhat different understandings of how policy is taken into account by voters, and both are contested. Another possibility is that voters vote with government outcomes in mind. Whether the anticipated outcomes involve the whole legislature (Orit Kedar, 'When Moderate Voters Prefer Extreme Parties: Policy Balancing in Parliamentary Elections', *American Political Science Review*, 99 (2005), 185–99) or particular coalitions within it (Raymond Duch, Jeff May and David Armstrong, 'Coalition-Directed Voting in Multiparty Democracies', *American Political Science Review*, 104 (2010), 698–719) is unclear, however. Future studies should explore these possibilities.

[21] The sole limitation imposed on party positions is that they cannot all be located on one side of the median voter's position.

Further details on the specifications for each set of simulations are provided in the online appendix.

The output from these simulations includes a variety of measures that will be discussed in due course. One point of commonality is that in all of the analyses, the principal variable of interest is the *KF deviation*, that is, the deviation of the *KF median* from the true median. The absolute value of this variable is used when the focus is solely on inaccuracy in the KF measure; where it is possible to anticipate the direction of this accuracy, the variable is used in its original or signed form.

A Pure Proximity Voting Environment

The first experiment deals with the factors that affect the accuracy of the *KF median* in an almost 'ideal' environment, in which the only violation of KF assumptions is that voter positions are normally, rather than uniformly, distributed. In this environment, voter *i*'s utility for party *j* (U_{ij}) is based entirely on left-right proximity, defined here as the absolute distance between the two positions:

$$U_{ij} = -|x_i - x_j| \tag{2}$$

As one might expect, the KF measure is very accurate in these simulations. The absolute value of the KF deviation averages only 0.00118 units (SD=0.0018) on the 0-1 scale across the 10,000 elections. The scatter is not just random, however. As discussed earlier, the size of the KF deviation should be influenced by the location of the median party's segment relative to the centre of the voter distribution. This possibility can be explored with the aid of a variable, the *Absolute Median Segment Deviation*, which measures the absolute distance between the centre of the median party segment and the true voter median. The smaller this distance is, the more accurate the KF measure should be.

The other factor that we expect will improve the accuracy of the KF measure is the closeness of a median segment's bounds to the true median. To capture this effect, we use *Bound Closeness*, that is, the minimum distance that separates the median segment's bounds from the true median. Since a median segment that is both off centre and that has bounds relatively distant from the true median may produce an especially large amount of error, we also include the interaction of these two variables.[22]

The first model of Table 1 reports the results of regressing the absolute KF deviation on these variables. All effects have the expected positive signs. In addition, they collectively account for almost four-fifths of the variance in KF errors, indicating that they effectively capture the inaccuracy introduced by assuming that voter opinion is uniformly distributed, when in fact its distribution is (truncated) normal.

The next step is to examine the ways in which the spread of voters influences the accuracy of the KF measure. Since the shape of the voter distribution increasingly resembles that of a uniform distribution as voter opinion becomes more spread out, the expected effect on the absolute KF deviation is negative. This influence will be measured by the *voter standard deviation* (the standard deviation of the voter distribution). This variable should affect accuracy both directly and indirectly: as voters become more spread out, the effects emanating from the median segment's positioning should be reduced. To capture this influence, the regression also includes its interactions with the variables included in Model 1.

[22] Some of the interactions used in our analyses are dominated by one of their components, which undermines the interaction's capacity to play its intended role and creates excessive collinearity in the models. To deal with this problem, we standardized each variable before forming products.

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TABLE 1 *Influences on KF Accuracy Under Proximity Voting, With and Without Error*

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Intercept	$-0.002^{\ddagger}$	(0.000)	0.000	(0.000)	$0.011^{\ddagger}$	(0.001)	$-0.006^{\ddagger}$	(0.001)
Minimum bound	$0.040^{\ddagger}$	(0.000)	$0.044^{\ddagger}$	(0.000)	$0.127^{\ddagger}$	(0.007)	$0.121^{\ddagger}$	(0.006)
Absolute median segment deviation	$0.048^{\ddagger}$	(0.000)	$0.052^{\ddagger}$	(0.000)	$0.305^{\ddagger}$	(0.007)	$0.254^{\ddagger}$	(0.006)
Minimum bound × absolute median segment deviation	$0.001^{\ddagger}$	(0.000)	$0.001^{\ddagger}$	(0.000)	$0.004^{\ddagger}$	(0.000)	$0.004^{\ddagger}$	(0.000)
Voter standard deviation			$-0.009^{\ddagger}$	(0.000)	$-0.021^{\ddagger}$	(0.006)	$-0.019^{\ddagger}$	(0.005)
Absolute median segment deviation × voter standard deviation			$-0.0004^{\ddagger}$	(0.000)	$-0.001^{\ddagger}$	(0.000)	$-0.001^{\ddagger}$	(0.000)
Minimum bound × voter standard deviation			$-0.0003^{\ddagger}$	(0.000)	$-0.001^{\ddagger}$	(0.000)	$-0.001^{\ddagger}$	(0.000)
Voter standard deviation × minimum bound × absolute median segment deviation			$-0.0004^{\ddagger}$	(0.000)	$-0.001^{\ddagger}$	(0.000)	$-0.001^{\dagger}$	(0.000)
Error term standard deviation							$0.189^{\ddagger}$	(0.003)
Adjusted R^2	0.789		0.865		0.221		0.406	

Note: The dependent variable is the absolute KF deviation. The data consist of 10,000 simulated elections based on left-right proximity voting. Models 3 and 4 introduce random error. All interaction terms are based on standardized versions of component variables.
$^{\dagger}p < 0.01$ in a one-tailed test; $^{\ddagger}p < 0.001$ in a one-tailed test.

The regression results are shown in the second model of Table 1. As expected, the *voter standard deviation* has a negative impact: the broader the voter distribution, the more accurate the KF measure. The factors associated with the position of the median party's segment relative to the true voter median retain their strong positive effects. However, as anticipated, the interactions with the *voter standard deviation* variable are all negative, indicating that their impact diminishes as voters become more spread out. It is noteworthy that these factors explain more than 85 per cent of the variance in KF deviations from the true voter median.

In sum, when voting is based solely on left-right proximity but left-right opinion is normally (rather than uniformly) distributed, the accuracy of the KF measure is largely determined by (1) the positioning of the median party's segment relative to the true median and (2) the spread of voter opinion. While these factors can make the *KF median* variable inaccurate, it is important to stress that the actual amount of error produced appears to be very small. Violations of the uniform distribution assumption, at least to the extent simulated here, are not devastating for the KF measure.

Introducing Random Error

We now examine what happens in the more realistic scenario in which utility is calculated with some degree of random error. In this set of simulated elections, the utility that voter i has for party j (U_{ij}) takes the form:

$$U_{ij} = -|x_i - x_j| + e_i, \tag{3}$$

where e_i is a normally distributed random error with mean=0 and a standard deviation that varies across elections. The random error component represents deviations from the pure proximity vote due to one or more voter-specific factors, such as the degree of competence an individual voter attributes to a given party or a mistaken perception of a party's position. The key underlying assumption here is that these tendencies are idiosyncratic rather than systematic (unlike, for example, the valence attributed by the electorate to a party, which will be considered later).

In the simulations, we varied the amount of error across elections and examined how it affected the absolute KF deviation. The error term for each voter's utility for each party was drawn from a normal distribution with a mean of zero and a standard deviation drawn from a uniform distribution with range [0, 0.2]. Given the normality of each error distribution, the most extreme case would be an error of about $\pm$ 0.6, which is about half of the left-right policy scale. Error at this level is highly unlikely, however, both in reality and in our simulated environment. In fact, across all utility calculations, the error component averages about one-quarter of the total (the rest is determined by policy distance). Thus, in general, voters in these simulations remain largely motivated by policy distance.

We begin this analysis by re-estimating the second model of Table 1 using this new set of simulations. The results are shown in Model 3. Note that the factors related to the position of the median party's segment relative to the true voter median are still relevant, as is the *voter standard deviation* and its conditioning effect on those factors. The big difference is that the explained variance has been reduced enormously, indicating that random error – although not particularly large, on average – is now the dominant determinant of KF deviations.

Model 4 adds the *error standard deviation*. The magnitude of the error clearly has a marked influence on the magnitude of the KF deviation. However, much remains unexplained; because the amount of error introduced into any single utility function is a random draw from the error distribution used in that election, it varies from voter to voter. The *error standard deviation*, in other words, just gives a rough picture of the amount of error added to utility calculations in a given election, not a precise indication.

Turning now to the actual amount of error in the KF measure, recall that the absolute deviation of *KF median* from the true voter median in the no-error environment averaged just 0.00118 units (SD = 0.0018). With the introduction of random error, the average absolute KF deviation is now 0.02 units (SD = 0.025). Given that medians are likely to be concentrated in the middle of the scale (between approximately 0.45 and 0.55), an error of this size is far from inconsequential. Thus even a small, non-systematic amount of random error in voters' utility functions may cause a substantial inaccuracy in the KF measure.

Introducing Valence

As noted before, the concept of valence refers to systematic non-positional influences on voter choice, such as a commonly held estimation of a party leader's charisma or a party's fitness to govern. Consistent with standard practice, our utility function conveys this type of effect by using an additional term, V_j . Thus, the utility that voter i has for party j (U_{ij}) becomes:

$$U_{ij} = \beta V_j - (1 - \beta)\left|x_i - x_j\right| + e_i, \tag{4}$$

where β ($0 \leq \beta \leq 1$) is a mixing parameter that determines the weight or salience of the valence component relative to the distance component.

We calculated valence in two different ways. In the first set of simulations, each party's raw valence was a random draw from a continuous uniform distribution with range [0, 1]. These raw valences were then converted into proportions and rescaled so that the mean valence per system is equal to the mean voter-party distance in the system (see online appendix for details). In the second set of simulations, each party's raw valence was taken from a skew-normal curve, centred on the mean of the left-right scale and skewed to a random degree in either direction in every election. These raw valences were then transformed as above.

In order to examine the impact of valence on the accuracy of the KF measure as salience varies, simulations were run with the β coefficient set at 0, 0.1, 0.2, 0.3, 0.4 and 0.5 for both versions of valence. The impact of valence is captured not just by the valence salience, β, but also by the extent to which valence is centred to the right or left of the true median. We measure the centre of valence using the valence-weighted mean party position; the deviation of this position from the true median, denoted the *valence deviation*, assesses how far to the left or right of the true voter median the valence is centred. An interaction term between β and the *valence deviation* is also included to capture the possibility that the valence effect increases with increasing levels of salience. Note that in this set of regressions, the dependent variable is the KF deviation, not the absolute KF deviation. This is because we can anticipate the direction in which the *KF median* should deviate: it should be drawn in the direction of the valence centre, particularly as valence becomes more salient vis-à-vis policy distance.

The most convenient way to convey the overall nature of the regression results is on graphs (the regression results themselves are not reported, but are available on request). Figure 1 plots predicted values when the KF deviation is regressed on these three valence-based variables for both operationalizations of the concept. As predicted, the *KF median* tends to deviate in the direction that valence deviates whenever valence itself matters ($\beta > 0$), and the relationship becomes more pronounced as valence becomes more important in utility calculations. The effects are quite a bit stronger when valence is based

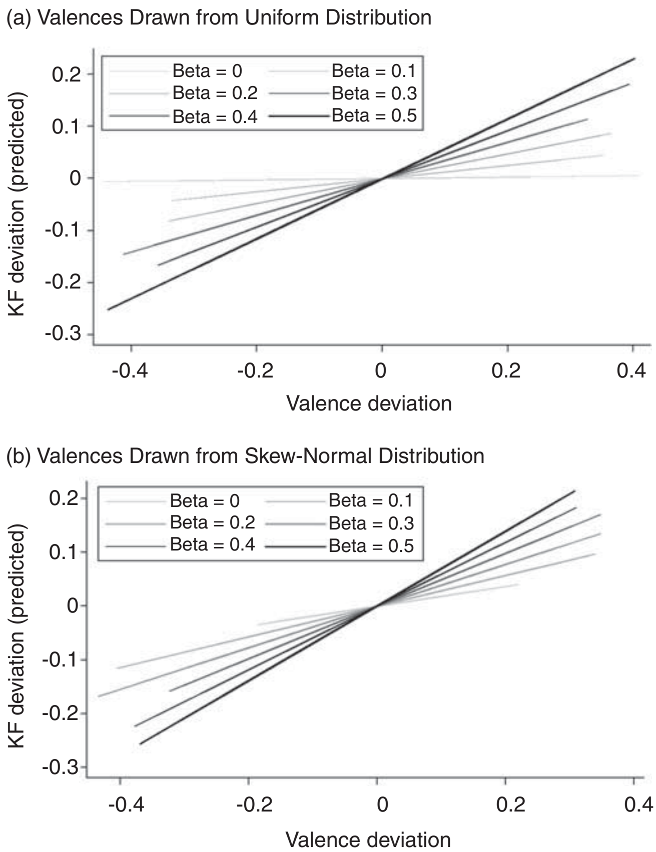

Fig. 1. The Effect of Valence on KF Deviations

on skew-normal distributions (the slopes are uniformly larger and the explained variance jumps from 37 per cent to 79 per cent), presumably because the effect exerted by valence is more consistently in a single direction.

Introducing a Second Dimension

The final step is to introduce a second policy dimension into the calculation of voters' utility. Since the relative importance of the two dimensions can vary across systems, a mixing parameter, γ, must also be included in the calculation of utility. With these additions, the utility that voter *i* has for party *j* is now given by:

$$U_{ij} = \beta V_j - (1-\beta)\left[\gamma\left|x_{i1} - x_{j1}\right| + (1-\gamma)\left|x_{i2} - x_{j2}\right|\right] + e_i, \tag{5}$$

where γ $(0 \leq \gamma \leq 1)$ denotes the relative salience of the left-right dimension (dimension 1) vis-à-vis the second dimension in a given system.

The introduction of a second dimension requires a new set of positions for both voters and parties. Simply performing a second draw for each voter and party would be misleading, however. The problem is that policy dimensions (such as the left-right dimension, a clerical-secular or a materialist-postmaterialist dimension) may not be

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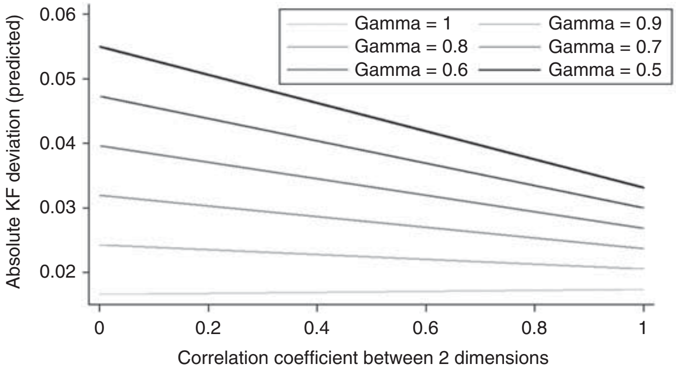

Fig. 2. The Effects of Dimensional Salience (Gamma) and Between-Dimension Correlation on KF Deviations

totally independent of each other. It is therefore essential to allow for the possibility of a correlation between dimensions in the simulations. The simulation procedure handles this issue by selecting a correlation from a uniform distribution with range [0, 1]. Positions on the second dimension are then derived using the formula:

$$x_{2'} = rx_1 + \sqrt{1-r^2 x_2}, \tag{6}$$

where x_1 is the position of a voter or party on the first dimension, x_2 is a randomly generated number drawn from the same distribution as x_1, r is the correlation between dimensions, and $x_{2'}$ is the second dimension position for this voter or party. In order to isolate the effect of adding the second dimension, we ran the simulations with varying levels of γ (0.5, 0.6, 0.7, 0.8, 0.9, 1.0) but with $\beta=0$ (no valence).

Unlike the valence factor, the presence of a second dimension does not create any directional expectations; that is, it is impossible to predict which direction the *KF median* will deviate towards based on the degree of correlation between dimensions or their relative salience. The analysis therefore regresses the absolute (rather than signed) KF deviation on the mixing parameter γ, the dimensional correlation coefficient r and the interaction between the two. The expectation is that as the correlation between parties' and voters' positions on the two dimensions decreases (that is, the second dimension becomes more independent of the first), the *KF median* will become less accurate. Figure 2 demonstrates this effect. It also shows that the tendency becomes more pronounced the more salient the second dimension is.[23]

Although we have not reported the regression results themselves in the valence and second-dimension analyses, it should be noted that adding these considerations to the regression models does not substantially change the results reported earlier. In other words, even where valence is a powerful influence or where the second dimension plays an important role, the positioning of the median segment and the amount of error continue to affect the accuracy of the KF measure. In general, then, we can say that the *KF median*'s accuracy as a measure of the voter median diminishes to the extent that: (1) voters' left-right positions are not uniformly distributed; (2) voters make errors in

[23] Interestingly, even at very high levels of dimensional correlation (r is never exactly 1 in these simulations but becomes very close), the lines never converge.

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calculating proximity or introduce idiosyncratic considerations; (3) voters place importance on valence considerations and (4) voters care about other policy dimensions, especially those that are relatively independent of the left-right dimension.

ASSUMPTION VIOLATIONS IN PRACTICE

Violations of the assumptions that underlie the KF measure clearly have the potential to introduce inaccuracy in its estimates of the median, but to what extent is this potential realized with real-world data? Using real data means that we cannot isolate and manipulate the circumstances that produce error as we did in the simulation experiments, but it does allow us to examine the aggregate impact of assumption violations. We shall be particularly concerned with the extent to which: (a) the one-dimensional proximity voting principle is violated and (b) these violations can be linked to inaccuracy in the KF measure.

One means of assessing the extent to which the proximity principle is violated is simply to examine the proportion of voters that does not vote for the party closest to them on the first or left-right dimension. In itself, this proportion can be misleading, however, since it does not take off-setting deviations from the proximity assumption into account. A better approach would be to consider whether these deviations favour one direction over the other. For each voter, the amount of *directional bias* would be indicated by the extent to which the party voted for is to the left or right of the closest party to the voter's position. For instance, a vote for a party 0.2 units to the left of the voter's position when the closest party is 0.1 unit to the right of that position would indicate a directional bias of −0.3 units. Averaged across all voters in a given election, the resulting variable would register the degree to which the electorate as a whole has voted more to the left or right than proximity voting would predict.

This measure's potential relevance can be gauged from the simulations data. A good place to look for directional bias is in the simulated data that involve valence. Consider, for example, the data set that incorporates skew-normal valence, one-dimensional proximity voting and random error. The mean level of directional bias across the 10,000 simulated elections is very close to zero (0.0001), as one would expect. But the standard deviation across elections is 0.045, suggesting a fair degree of variation in directional bias. This bias, in turn, correlates very highly with the KF deviation ($r = 0.870$). In fact, regressing the KF deviation on mean directional bias produces an intercept near zero ($\alpha = -0.001$, SE = 0.0002) and a slope of one ($\beta = 1.000$, SE = 0.0052), indicating a near-perfect one-to-one relationship: when voters on average vote one unit to the left (right) of the party closest to them, one can expect the *KF median* to shift approximately one unit to the left (right) of the true voter median.

Another way to approach the issues of violations in one-dimensional proximity voting and their impact on the KF measure is at the level of parties. The advantage of this approach is that we can focus exclusively on the parties that are involved in the calculation of the KF measure (the median party and parties to its left). The KF formula indicates that both the total percentage of the vote that goes to parties to the left of the median and the vote percentage that goes to the median party have negative effects on the *KF median*: the larger each of these is, the lower (more to the left) the KF measure will be (*ceteris paribus*). These properties imply that if these parties receive more votes than pure proximity voting would allocate to them, then the KF measure will be biased to the left of the true voter median; if they receive fewer votes, the *KF median* will be biased to the right.

We can test this intuition using the same simulated data set. The test requires that two variables are constructed: (1) the difference between the proportion of votes that parties below the median party received and the proportion that pure proximity voting would have given them and (2) the same difference for the median party itself. These variables will be labelled *vote differential – parties below median party* and *vote differential – median party*, respectively. The expectation is that both variables will negatively affect the KF deviation (that is, higher than expected values will shift the KF measure to the left). The first model of Table 2 shows that this is indeed the case: both variables show negative impacts that jointly account for about 80 per cent of the variance in KF deviations.

Let us turn now to real-world data. As noted earlier, the survey data that will be used for this investigation consist of the first two modules of the CSES collection of national election surveys. This collection is particularly useful because most of the surveys it contains asked respondents to place both themselves and the parties of their systems on an eleven-point left-right scale. Generally speaking, the vote percentages that each party received in elections to the lower house of the national legislature are also included. This information will be used to construct both the *KF median* and the 'true' voter median, as discussed below. With one exception, the analysis will include all national elections for which these variables were provided.[24]

Calculating the *KF median* requires information on party positions and vote percentages. In the present analysis, party positions will be estimated using the mean positions given to them by survey respondents. Despite the demanding nature of this task, it appears that respondents, on average, did a very good job of locating parties in left-right terms.[25] In the present data, for instance, party positions estimated in this manner correlate very highly ($r=0.90$) with the positions estimated by the CSES investigators; there is reason, moreover, to suspect that some of the discrepancy can be traced to shortcomings in the latter.[26] Another consideration favouring the use of voter-based estimates is that error in these estimates tends to be less damaging to the KF measure's accuracy.[27] The vote percentages will be those provided in the CSES data for elections to the lower house of the national legislature.

[24] The exception is Chile 2005, where 62 per cent of respondents placed themselves, improbably, at '1' on the scale.

[25] Not all judgments of individual and party positions fit this description, of course. Following Warwick (Paul V. Warwick, 'Bilateralism or the Median Mandate? An Examination of Rival Perspectives on Democratic Governance', *European Journal of Political Research*, 49 (2010), 1–24), respondents who placed all parties at the same position were treated as not having rendered meaningful judgments and were excluded. In addition, in some countries, sizeable numbers of respondents placed themselves at an extreme of the scale ('0' or '10') and did the same with at least some of the parties, suggesting very distorted views of the left-right policy space. Accordingly, respondents who placed themselves at an extreme and who reported a party range of at least eight points were excluded. This method produced approximately normal distributions of left-right opinion in all countries except Chile 2005 (see note 24).

[26] The possibility of inaccuracy in the expert judgments is discussed in Warwick, 'Bilateralism or the Median Mandate?', pp. 11–2. There may also be systematic bias. Curini (Luigi Curini, 'Experts' Political Preferences and Their Impact on Ideological Bias', *Party Politics*, 16 (2010), 299–321) has recently revealed a tendency for experts to exaggerate the extremeness of parties for which they have less sympathy, especially extreme right parties.

[27] If voters collectively misperceive party locations and act accordingly, the inaccuracy in the KF measure will tend to resemble that produced by random error. If positions derived from other sources are used, which do not agree with the voters' collective estimates, an additional source of possible inaccuracy is introduced.

TABLE 2 *The Impact of Deviations from Perfect Proximity Voting in Simulated and Real (CSES) Data*

	Model 1: Simulated Data			Model 2: CSES Data		
	Coeff.	(S.E.)	Standardized Slope	Coeff.	(S.E.)	Standardized Slope
Intercept	−0.000	(0.001)		0.026	(0.047)	
Vote differential – parties below median	−0.557†	(0.003)	−1.21	−0.059†	(0.004)	−1.06
Vote differential – median party	−0.283†	(0.002)	−0.85	−0.029†	(0.004)	−0.62
Adjusted R^2	0.797			0.774		
N	12,000			59		

Note: The dependent variable is the KF deviation. The simulated data set is that based on a skew-normal valence term.
†$p < 0.001$ in a one-tailed test.

The true voter median in an election will be measured by respondents' median left-right self-placement in the national survey (omitting suspect or clearly meaningless responses as indicated in note 25). Although the accuracy of these responses may also be questioned, the fact that respondents were able, in the aggregate, to provide very accurate estimates of party positions suggests that they are likely to have been at least as adept, again in the aggregate, at locating their own median or central position.[28] One obstacle to using these responses, however, is that they are all in the form of integer values; thus the position of the median respondent is likely to be a relatively uninformative 5 or 6 in all systems. This obstacle can be circumvented by adopting the interpolation method that Kim and Fording employed.[29] In this application, the segments are defined by the eleven evenly spaced integers of the left-right scale presented to respondents, rather than by the positions of the parties. The same assumption of a uniform distribution of positions in the median segment is required, although here the median segment is likely to be narrower (since there are more segments) and more centred in the middle of the distribution. Both properties should reduce the distorting impact of the assumption relative to its impact on the *KF median*.[30]

Let us begin with the KF deviations themselves. Across the fifty-nine elections for which we have the necessary data, the average *KF median* is 5.30. Applying the procedure outlined above for estimating the true voter median produces a very similar average value of 5.16. This similarity in average values does not mean that the two methods produce similar values in individual elections, however. In fact, the average extent to which the KF measure deviates from the true value is 0.50 units.

What generates this difference? Indeed, what justifies considering the KF measure 'deviant' and the opinion-based measure 'true'? The simulation experiments described in the previous section established that the KF measure is particularly prone to produce deviant values when valence or other factors cause overall voting behaviour to deviate systematically from what the proximity rule would predict. Let us therefore examine how well the assumption of left-right proximity voting holds up in these data.

In the fifty-nine elections under examination here, more than two-thirds (68.7 per cent) of voters, on average, did not vote for the party that is closest to their position on the left-right scale. This would appear to be a high rate of violation of the key assumption underlying the KF measure but, as noted earlier, higher rates of non-proximity voting do not automatically lead to higher KF deviations: violations of the assumption may offset one another or be irrelevant to the calculation of the *KF median*. This is borne out by the total absence of a relationship between KF deviations and the proximity voting rate

[28] This is disputed in McDonald and Budge, *Elections, Parties, Democracy*, pp. 114–5. Warwick, 'Bilateralism or the Median Mandate?' assesses these claims and finds them unsupported by the evidence he examines. The high degree of similarity between the CSES results to be presented and the simulation results (where the true median is known) provides further evidence in favour of survey-based medians.

[29] This is a standard method for estimating the median in discrete distributions. See, for example, Lyman Ott and Michael Longnecker, *An Introduction to Statistical Methods and Data Analysis*, 6th edition (Belmont, CA: Brooks/Cole Cengage Learning, 2010), p. 80.

[30] The simulated data bear this out. In the data set in which vote choice is determined solely by left-right proximity, allocating each voter to the nearest 0.1 on the 0-1 scale (which is roughly equivalent) and applying this method produces an absolute mean error of 0.0008 (SD = 0.0006) across 10,000 simulated elections. This is one-third less than the KF error (mean = 0.0012, SD = 0.0018). Both levels of error are, of course, very small. The difference is that the KF median will become more deviant as valence and other facfactors come to play a role, whereas this median will not.

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($r = -0.007$, $p = 0.956$). What matters instead is the degree of directional bias. Across the fifty-nine elections, the mean directional bias averages 0.03, with a standard deviation of 0.41, which (taking into account the difference in scales) is very similar to that reported above for the skew-normal valence simulations. More importantly, the KF deviation and the mean directional bias are correlated in these data as well ($r = -0.547$, $p < 0.001$). In fact, the regression of the former on the latter also produces a one-to-one relationship ($\alpha = 0.011$, SE = 0.008; $\beta = 0.991$, $SE = 0.201$), suggesting that electorates that vote, on average, one unit to the left (right) of their proximity choices can be expected to produce *KF medians* that deviate one unit to the left (right) of the true median.

Let us now focus the analysis a little more by moving to the level of parties, particularly those that matter for the calculation of the *KF median*. Our concern is the extent to which these parties receive larger or smaller vote shares than would be expected under pure proximity voting. With the simulated data, it was straightforward to compare the vote shares that parties actually received with the vote shares they would have received under left-right proximity voting; here, a more indirect procedure is required. We have noted that, with the elimination of some highly suspect responses, the distributions of left-right positions in all fifty-nine elections appear to be roughly normal. We assume that all distributions are in fact normal and can therefore be characterized by their means and standard deviations. On this basis (and given the party positions in each system), it is possible to calculate the vote shares that each party should have received under strict proximity voting. With this information, we can calculate the two key variables: the vote differential for parties below the median party and the vote differential for the median party itself. As before, both variables should have a negative impact on the *KF median*: the more the votes of these (sets of) parties exceed proximity-based expectations, the more the *KF median* will be shifted to the left.

The second model of Table 2 shows the results. In this case, the results are very similar to those produced using the skew-normal set of simulations (Model 1): both variables have the expected negative relationships with the KF deviation, with the vote differential for the parties below the median exerting the dominant influence. Even the proportion of explained variance, at 77.4 per cent, is approximately the same.

In sum, the analysis of the CSES data reveals that the *KF median* deviates from the opinion-based median in ways that highly resemble its deviations in some of the simulations. It is not simply that voters frequently violate the proximity voting assumption; rather, voters in these elections tend to shift either to the left or the right of their most proximate choices, which shifts the *KF median* to the left or right, accordingly. The *KF median* captures these shifts because it is based not on opinion *per se* but on voting behaviour, which clearly reflects more than left-right proximity. The implications of these findings are explored more fully in the concluding section.

IMPLICATIONS FOR RESEARCH

Kim and Fording's measure was originally intended to locate the electorate's median ideological position. The fact that the measure ignores non-voters may not be much of a problem; in the fifty-nine CSES elections covered here, the opinion-based citizen median is virtually identical to the opinion-based voter median ($r = 0.99$). But the fact that it is based on vote choice rather than opinion itself does matter. As the simulation experiments reported here have shown, when factors other than left-right policy distance enter into the vote calculus – for instance, the perceived competence of a party or the appeal of its leader, the influence of other policy dimensions, errors in identifying the best choice given

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one's preferences or idiosyncratic judgments – the *KF median* can become noticeably inaccurate. More specifically, when these factors cause overall vote choices to deviate to the left or the right of what left-right proximity would predict, then the *KF median* will follow.

For some applications, this may not matter very much. If the objective is to measure policy demands as expressed in voting[31] or simply to control for the 'political centre of gravity',[32] the *KF median* may be an appropriate, or at least an acceptable, choice. However, if the goal is to assess the degree of ideological congruence or policy responsiveness, using the *KF median* can be far from inconsequential. It is easy to see why. Suppose that a rising level of popularity for parties on the right causes votes to drift rightward in an election. This in turn will (a) cause the *KF median* to shift to the right and (b) raise the odds that the next government formed will be right wing, or at least more right wing than the present one (since the more right-wing parties will have received increased vote shares). If this happens, the voter median and government policy will appear to have co-varied, consistent with the ideological congruence thesis – even though the fundamental left-right positioning of voters may not have changed at all.

Denmark provides an example of this scenario. The 2001 election in that country produced a considerable movement to the right from the 1998 election results, with the Venstre party picking up fourteen seats (an increase of one-third) and the Social Democrats (SD) losing eleven. As a result, the *KF median* moves from 5.29 to 6.71 on the CSES scale. The rightward shift in votes also resulted in the SD-led government being replaced by a Venstre-led one, generating a shift in government left-right position from 4.15 to 7.30.[33] Thus, government position appears to have moved rightward with a shift in median left-right opinion, suggesting responsiveness, if not congruence. In fact, however, the median citizen position based on respondent self-placements scarcely changed at all: it was 5.36 in the 1998 survey and 5.39 in the 2001 survey.

While this example may be atypical, in that it shows a total disconnect between *KF* and true medians, its exceptionalism may be one of degree only. In Warwick's analysis of the CSES data, *KF medians* were found to relate much more closely to government positions than those calculated directly from respondent self-placements.[34] This difference suggests that the use of the *KF median* exaggerates the strength of the opinion/policy connection in a systematic fashion.

The adverse consequences do not stop here; the KF measure may also cause the nature of the opinion/policy connection to be misunderstood. When measured using survey data, relatively small changes in median position appear to generate much larger changes in government policy stances.[35] Given that left-right position is usually seen as a relatively

[31] For example, Simen Markussen, 'How the Left Prospers from Prosperity', *European Journal of Political Economy*, 24 (2008), 329–42.

[32] For example, Pontusson and David Rueda, 'The Politics of Inequality'; Adams and Somer-Topcu, 'Moderate Now, Win Votes Later' and Adams and Somer-Topcu, 'Policy Adjustment by Parties in Response to Rival Parties?'.

[33] Following standard practice, the government positions are estimated from the seat-weighted mean positions of their member parties.

[34] Across forty-eight elections, Warwick, 'Bilateralism or the Median Mandate?', p. 15, found that the KF median accounts for 53.5 per cent of the variance in government positions, while the survey-based median accounted for just 31.4 per cent.

[35] Warwick, 'Bilateralism or the Median Mandate', p. 15; see also Paul V. Warwick, 'Government Intentions and Citizen Preferences in Dynamic Perspective'', *British Journal of Political Science*, 41 (2011), 599–619, p. 610.

fixed property of individuals – evolving over time, certainly, but not bouncing back and forth with every change in government direction – changes in the left-right median that are small relative to changes in intended government position are precisely what one would expect. But the presence of such a 'multiplier effect', if confirmed by further research, would point to a very different understanding of the opinion-policy relationship: one in which congruence no longer figures either as the central reality or as the standard for democratic evaluation.

Awareness of these dangers has been increasing recently. A good case in point is Kang and Powell's investigation of the connection between left-right preferences and welfare spending.[36] They observe that the KF measure, which they utilize, is 'not quite the same thing as the unmediated preference of the median citizen';[37] apart from the fact that not all citizens vote, 'median voter preferences [so measured] may be affected by party offerings. One might consider these 'induced' preferences rather than authentically pre-political ones'.[38]

But is this enough? Kang and Powell's relegation of this discussion to a footnote and their use of 'expressed' as a synonym for 'induced' suggest that they believe these induced preferences will not be very much different from unmediated ones. We have seen that this could be so: if left-right proximity is the only factor that drives vote choices, the KF measure can estimate the left-right median opinion with reasonable accuracy, even through the filter of party choice. It is much more likely, however, that vote choices involve other considerations as well – valence, other party dimensions, personal criteria, misjudgments of party positions and so on. If any of these are operative, the KF measure will pick them up. The *KF median* therefore runs a considerable risk of incorporating considerations that have nothing to do with policy positions or that involve policy areas independent (or largely independent) of the left-right dimension. If the concern is with *ideological* congruence or responsiveness on a dominant left-right dimension, as it so often is, these properties make the KF measure a problematic tool to rely on.

[36] Shin-Goo Kang and Bingham Powell, 'Representation and Policy Responsiveness: The Median Voter, Election Rules, and Redistributive Welfare Spending', *The Journal of Politics*, 72 (2010), 1014–28.

[37] Kang and Powell, 'Representation and Policy Responsiveness', p. 1016.

[38] Kang and Powell, 'Representation and Policy Responsiveness', p. 1016.