
Using VAAs to explore the dimensionality of the policy space: experiments from Brazil, Peru, Scotland and Cyprus

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Abstract: Research into Voting Advice Applications (VAA) has hitherto been concerned with technical issues over the use of VAAs as a tool to help people vote. This paper shows that data generated by VAAs can also be used for research into how policy preferences of voters can be conceptualised in terms of a multi-dimensional policy space. Specifically, analysis of data extracted from VAAs deployed in Brazil, Peru, Scotland and Cyprus reaffirm the importance of existing concepts of Left and Right, as well as a second dimension of social conservatism versus social liberalism (sometimes known as GAL-TAN), as defining features of the policy space. This paper also shows how data from VAAs can be used to map the ideological profiles of party supporters.

Keywords: VAAs; policy dimensions; parties; Left-Right GAL-TAN; Peru; Brazil; Scotland; Cyprus; factor analysis; Mokken Scale Analysis.

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1 Introduction

The use of Voting Advice Applications (VAAs) has, in recent years, become a new topic for scholarly research. Hitherto, the focus of the research has been on VAA design. However, VAAs also provide a rich source of data on the political orientations of those who use them. It is this research potential of VAAs that this paper seeks to exploit. Specifically, the paper explores the potential of VAA-generated data to identify latent policy dimensions amongst the responses of VAA users and to map the ideological orientations of partisan supporters along these dimensions.

A fundamental question for scholars of voting behaviour is the extent to which voters' opinions on different issues are linked together by some sort of *ideological coherence*. If such linkages exist, we would expect that if an individual holds a certain view on one issue, he or she would hold a congruent view on a related issue. On the other hand, if these linkages are weak, we would expect most citizens to hold many random and contradictory political views, unrelated one from the other, as Converse suggests (Converse, 1964). Most models of voting behaviour assume the former view.¹ In particular, it is often hypothesised that individuals construct their policy preferences along a Left-Right scale; in other words, they identify with a certain set of core values – or ideologies – which can be placed on a spectrum from Left, representing a socialist ideology, to Right, which embodies a free market, capitalist ideology. Typically Left and Right refer to *economic* ideologies, specifically who should own the means of production – the public or the private sector. In 1990 Bartolini and Mair argued that the Left-Right dimension remained the dominant dimension in most Western countries (Bartolini and Mair, 1990).

However, following the collapse of communism in eastern Europe and the former Soviet Union and the tendency of centre-left parties in western Europe to adopt a pro-free market ideology, the old Left-Right divide was seen to have lost much of its salience. Instead a new set of issues has become more pertinent. In many countries, especially in Western Europe, attitudes towards crime, immigration and environmental issues seem to have become more important in defining inter-party competition than the economic issues that have traditionally divided Left and Right. Kitschelt therefore identified a new axis of party competition to distinguish libertarian from authoritarian values (Kitschelt, 1994). More recently this dimension has been termed the GAL-TAN dimension, with GAL representing green/alternative/libertarian values and TAN representing traditionalism/authority / nationalism (Marks et al., 2006).

Some scholars conflate economic and non-economic issues into a single Left-Right dimension, which is “the common way in which voters, media, candidates, and officeholders describe and define the politics of the era” (Aldrich, Dorobantu and Fernandez, 2010, p.5). Such an approach assumes the Left-Right dimension to be a conceptual constant, even if it may be associated with different clusters of issues and values in different places and at different times. However, the assumption that these sets of issues and values are indeed associated with one another in the minds of voters and political elites alike would benefit from empirical verification.

This leads to the wider question of how we operationalise policy dimensions in empirical research. A significant body of research has attempted to place political parties along a number of ideological scales and has used a variety of methods in order to define each scale and place each party. Approaches that assume a single aggregate Left-Right scale as given tend to rely on the subjective impressions of experts (Castles and Mair, 1984) or ordinary citizens (Aldrich et al., 2010) to locate parties on this scale. Some studies develop this approach further by exploring the policy areas that experts use to define the Left-Right scale in different national settings (Huber and Inglehart, 1995; Benoit and Laver, 2007). Warwick uses expert surveys to locate party positions along three pre-given scales (Left-Right; clerical-secular or libertarian-authoritarian; and materialist-post-materialist), and (optionally) one extra self-defined scale (Warwick, 2005). Similarly, Kitschelt and his colleagues use elite surveys to position parties in Central and Eastern Europe along Left-Right and GAL-TAN scales that are defined according to certain pre-selected issue areas (Kitschelt et al., 1999). Another approach is

to use data from content analysis of party manifestos to locate parties along one or more scales; Budge, Robertson and Hearl use a two stage factor analysis to identify latent ideological dimensions from data generated by this method (Budge et al., 1987).

Hitherto, both the analysis of the dimensionality of the policy space and party mapping have mostly focussed on the United States, Australasia and the European core, including, more recently, Central and Eastern Europe (see, for example, Castles and Mair, 1984; Kitschelt et al., 1999). However, this study will compare four rather diverse national or subnational entities from three regions in which these approaches are more rarely used, despite the fact that political parties are widely studied here. These entities are Scotland (northern Europe), Cyprus (south-eastern periphery of Europe), Brazil (Latin America) and Peru (Latin America). The method used is to exploit an online platform called a Voting Advice Application (VAA) deployed prior to significant elections in each entity to generate opinion data. The data consists of the responses of users to VAA issue statements. Factor analysis combined with Mokken Scale Analysis will first be used to extract latent policy dimensions from it. Party supporters will then be identified from amongst the VAA users and mapped according to any policy dimensions that are found to be relevant. In this way, we will attempt to identify the ideological profiles of what V.O. Key describes as “the party in the electorate”, i.e. rank and file supporters of parties as opposed to officeholders or policy-makers (Key, 1964).

The paper will proceed as follows. First a brief overview will be provided of Voting Advice Applications (VAA), and the potential of this device as a data gathering tool will be flagged. Second, using data generated from VAAs deployed in the four countries, factor analysis and Mokken Scale Analysis will be used to identify the most pertinent policy dimensions in the ideological space. Using these methods, I shall show that the Left-Right dimension and the GAL-TAN dimension do indeed have some empirical relevance in the countries concerned. To further illustrate the potential benefits of this method for political scientists, I shall then identify from our data samples those users that expressed affiliation towards one or other political party and from there shall attempt to plot the positions of party supporters according to the policy dimensions we identify. The position of each party on the ideological map will then be compared. Finally, I will provide an overview of the findings in the form of a short conclusion.

2 Voting Advice Applications (VAAs)

During the past decade, VAAs have been employed in a number of diverse national settings, first and foremost as a device to help voters decide who to vote for on the basis of their policy preferences. Typically, the online questionnaire consists of approximately 30–40 policy statements on which parties’ or candidates’ positions are coded, either by academic experts or by the parties and/or candidates themselves. Users navigate the VAA website and then indicate the extent to which they agree with each statement (typically on a four- or five-point Likert scale) and the device then produces some kind of profile of candidates/parties according to the extent of concordance with user responses.

Recent scholarly work on VAAs has focussed on issues relating to their design and application, rather than their potential as a research tool. Topics of research include the relevance of ideological dimensions such as Left-Right and GAL-TAN for statement selection (Costa Lobo et al., 2010), the potential impact of VAAs on voting behaviour (Fivaz et al., 2010) and the coding of political parties (Trechsel and Mair, 2011; Wagner

and Ruusuvirta, 2011). However, given that they can generate very large datasets that contain the policy preferences of a large number of users², VAAs provide an immense source of empirical data that could be of great interest to students of political behaviour. Work to exploit such data has so far been rather limited; exceptions include a descriptive summary of how voters are advised (Costa Lobo et al., 2010) and a rather more thorough-going analysis of the impact of VAA recommendations on stated voting intention (Wall et al., 2012). It is the aim of this paper to fill this gap by using VAA-generated data to map the policy space in four different national settings.

One immediate question that arises with VAAs is the issue of sample representativeness. Typically VAAs are accessed by a self-selected sample of relatively well-educated (and disproportionately young or middle-aged) voters and cannot therefore be considered to be a representative sample of the electorate. Can we, therefore, make reliable inferences about the population at large from data provided by such a non-representative sample? Evidence suggests that the method of applying factor analysis followed by Mokken Scale Analysis prove robust insofar as the dimensions or scales extracted remain relatively unaltered when the method is repeated on an artificial sample that has been sampled to approximate the voting preferences of the population at large (Wheatley et al., 2012). Further discussion of the representativeness issue is provided later in the paper.

Another potential pitfall relates to the use of VAAs for mapping party supporters according to various policy dimensions, which is one of the aims of this paper. Here the problem is that the VAA is marketed as – and indeed its purported function is – a tool that is used by voters who have not yet decided how to vote. Surely, therefore, it cannot purport to tell us anything about the policy orientations of *party supporters*? However, the reality is that voters fill in a VAA for a wide variety of reasons, often because they have a general interest in politics and elections, or even out of sheer curiosity. Well-designed VAAs, such as those that are the focus of this paper, contain within them supplementary questions that distinguish between “party supporters” and “floating voters”, by allowing users to declare whether or not they have a preferred party.

3 The experiment

In the experiment that forms the basis for this paper, VAAs were deployed in four different national settings: in Brazil and Peru during the run-up to the first round of presidential elections that took place in each country on 3 October 2010 and 10 April 2011 respectively, in Scotland before the elections to the Holyrood parliament on 5 May 2011, and in Cyprus before the parliamentary elections of 22 May 2011.³ In each case the VAA was operational for approximately 4 weeks prior to the election. Respondents who filled it in were asked to give their opinion on a set of thirty policy statements that were designed by local experts to reflect the most salient political issues of the time and to cover a wide range of issue topics, including economic policy, law and order, immigration, environment, as well as issues relating to national sovereignty and/or the rights of national minorities. For each policy statement respondents were offered a five-point Likert scale: “Completely Agree”, “Agree”, “Neither Agree nor Disagree”, “Disagree”, and “Completely Disagree”. In addition a user could indicate “No Opinion”. At the same time, parties (in the case of parliamentary elections) or candidates (in the case of presidential elections) were also coded on each of the thirty policy statements by

experts and by representatives of the candidates/parties themselves and the VAA matched the responses of each user with the expert coding for each party in order to find the party that corresponded best to the user's policy preferences.

Respondents were asked to provide additional details, such as age, sex, party affiliation and voting intention. For party affiliation, the option "none" was always available. They were also asked why they intended to vote for their party or candidate of choice, and in each case at least one of the options available was concordance with the policies or ideology of the party or candidate. Those that a) expressed a particular party affiliation, and b) claimed to vote for reasons of policy/ideology were flagged as "core" party supporters and were subsequently used in the party mapping process.⁴ All the data provided by respondents were stored for analysis. In all cases a relatively large dataset was generated. In Table 1, the left hand column shows the total number of entries, while the right hand column shows the number of completed entries after extensive cleaning (for details of how the cleaning procedure was carried out, see the Appendix).

Table 1 Size of datasets

<i>Territories</i>	<i>All entries</i>	<i>Cleaned entries</i>
Brazil	23,917	19,069
Peru	52,321	40,627
Scotland	19,236	14,864
Cyprus	7,333	5,470

In order to identify latent policy dimensions from the four datasets, we first generated a matrix of polychoric correlations on the user response data. We then performed a factor analysis (principal factors in STATA) using the matrix as input. This method of dimension reduction is particularly appropriate for ordinal or categorical data. The number of dimensions extracted was based on the eigenvalues associated with each factor (for details, see the Appendix). After the number of factors to extract had been identified, a varimax rotation was used to best identify groups of items that measured more or less the same concept. The next step was to group together all items that loaded onto the same dimension with a loading of at least 0.4 (or below -0.4) and perform Mokken Scale Analysis (MSA) on those items to determine whether or not they could be combined to form a single scale that conforms to the monotone homogeneity model (Mokken, 1971; van der Ark et al., 2008). A lower bound for the item scalability coefficient (H_i) was set at 0.3 and if a single item loaded onto two scales of similar strength, this item was considered to be ambiguous and discarded from further analysis. In this way scales were constructed that corresponded best with the main dimensions extracted from the factor analysis.

4 The dimensionality of the policy space

Tables 2, 4, 6 and 8 (overleaf) show the policy dimensions extracted through factor analysis with varimax rotation in Brazil, Peru, Scotland and Cyprus. These dimensions are listed in the tables as dim 1, dim 2 and (if necessary) dim 3 in the order that they were extracted. All weightings greater than 0.4 are highlighted in bold, as they indicate that a particular issue statement is particularly important with respect to a given dimension.

Tables 3, 5, 7 and 9 show the items that belong to the corresponding Mokken scales. Altogether, two dimensions were extracted from the Peru and Cyprus datasets, while three were extracted in the Brazil and Scotland datasets. In all four cases, at least one dimension was, broadly speaking, found to represent the traditional Left-Right divide between free market liberals and state interventionists, while another represents a spectrum of values belonging to the so-called GAL-TAN dimension identified above. In Brazil, two dimensions relating to the economy were extracted, both of which appeared to represent some kind of Left-Right axis. In Scotland the third dimension extracted appeared to relate to Scottish independence. Looking at each dimension on a case-by-case basis from Tables 2–9, we can now describe each case in rather more detail.

Table 2 The policy space: Brazil

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
1	The consumption of marijuana should be decriminalised in Brazil.	0.1559	-0.4818	0.1558
2	Brazil should adopt the death penalty for heinous crimes	-0.2725	0.2965	-0.1581
3	The Brazilian state, rather than the public sector, should be the owner of the most important businesses and industries of the country.	0.6144	-0.0184	0.2093
4	The market can resolve the problems in our society because it distributes resources in a more efficient manner than the state.	-0.5356	0.3006	-0.1043
5	The government should limit, by law, interest rates charged by banks.	0.5441	0.1792	-0.0576
6	The working day should be reduced without reduction of wages as a way of generating jobs.	0.6111	-0.044	0.1724
7	There should be a limit to the size of land ownership as a way of releasing land for agrarian reform.	0.6564	-0.1169	0.2441
8	It should be easier for companies to hire and fire employees.	-0.4295	0.1849	-0.1368
9	To keep unemployment rates low it would be acceptable to have a higher rate of inflation.	-0.0538	-0.0891	0.3853
10	To balance the federal budget it is better to raise taxes than to cut spending.	0.1808	-0.2509	0.5718
11	The Brazilian government should sign international agreements that protect the investment of foreign companies in Brazil.	-0.26	0.1886	0.0725
12	Brazil should contribute troops and resources to UN peacekeeping missions.	-0.0327	0.1192	0.2044
13	It is important for Brazil to avoid opposing the interests of government of the United States.	-0.3691	0.3015	0.0525
14	Brazil should make more effort towards integration with neighbouring countries than in relations with the United States and Europe.	0.4880	-0.1217	0.2126
15	It is more important to encourage economic growth than to protect the environment.	-0.3802	0.0007	0.233
16	It is better to finance road construction by charging tolls than through taxes levied on all taxpayers.	-0.388	0.1555	0.0074

Table 2 The policy space: Brazil (continued)

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
17	The government should require Petrobras to buy more Brazilian products, even if this reduces the company's profits.	0.3847	0.1891	0.0512
18	Brazilian and foreign companies should have the same opportunities in the exploration of the pre-salt layer.	-0.4622	0.1555	0.0774
19	The Brazilian government should invest more in nuclear power plants for electricity generation.	-0.2166	0.0847	0.2072
20	The profits from the extraction of oil should stay with the producing states and not be divided among all states of the federation.	-0.2703	0.1132	0.0069
21	The government should spend more on public health services, even if this may involve raising taxes.	0.1438	-0.0718	0.7183
22	The government should spend more on public education (state schools from first grade), even if this may involve raising taxes.	0.0926	-0.1472	0.6824
23	Public universities should charge tuition fees to those who have a proven ability to pay them.	-0.1225	0.292	0.0586
24	The government should increase the number of families receiving Family Allowance.	0.3655	-0.174	0.4347
25	Gay couples should have the right to marry.	0.1647	-0.6715	0.1306
26	It is important that a politician should believe in God.	0.0157	0.7527	-0.121
27	Abortion in the early stages of pregnancy should be decriminalized.	0.0412	-0.6237	0.1529
28	It is fair that public universities should reserve places for people of African descent (black people and mulattos).	0.4453	-0.2141	0.3981
29	It is fair that public universities should reserve places for people from low income families.	0.4182	-0.0887	0.3001
30	A constituent assembly should be convened exclusively to pursue political reform.	0.2257	0.1791	-0.0421

Table 3 Mokken Scales for Brazil with Scalability Coefficients (H_i)

<i>Item</i>	<i>Question</i>	<i>Scales</i>		
		<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
1	The consumption of marijuana should be decriminalized in Brazil.	0.394		
3	The Brazilian state, rather than the public sector, should be the owner of the most important businesses and industries of the country.	0.396		
4	The market can resolve the problems in our society because it distributes resources in a more efficient manner than the state.	0.313		
6	The working day should be reduced without reduction of wages as a way of generating jobs.	0.379		

Table 3 Mokken Scales for Brazil with Scalability Coefficients (H_i) (continued)

Item	Question	Scales		
		Dim 1	Dim 2	Dim 3
7	There should be a limit to the size of land ownership as a way of releasing land for agrarian reform.	0.421		
10	To balance the federal budget it is better to raise taxes than to cut spending.			0.396
14	Brazil should make more effort towards integration with neighbouring countries than in relations with the United States and Europe.	0.338		
21	The government should spend more on public health services, even if this may involve raising taxes.			0.610
22	The government should spend more on public education (state schools from first grade), even if this may involve raising taxes.			0.611
25	Gay couples should have the right to marry.		0.470	
26	It is important that a politician should believe in God.		0.470	
27	Abortion in the early stages of pregnancy should be decriminalized.		0.469	
Overall scalability coefficient (H) for each scale		0.372	0.451	0.549

Note: Items 24 and 28 could be scaled with both the first scale (Dim1) and the third Scale (Dim 3) with $H_i > 0.3$. As such they were deemed ambiguous and dropped.

Table 4 The policy space: Peru

Item	Question	Dim 1	Dim 2
1	The Peruvian state, rather than the public sector, should be the owner of the most important businesses and industries of the country.	0.6562	-0.0110
2	The market can resolve the problems in our society because it distributes resources in a more efficient manner than the state.	-0.2434	0.2333
3	The government should limit, by law, interest rates charged by banks.	0.5840	0.1344
4	The government should control the prices of essential goods.	0.6529	0.1561
5	It should be easier for companies to hire and fire employees.	-0.3132	0.0590
6	To keep unemployment rates low it would be acceptable to have a higher rate of inflation.	0.1401	-0.1687
7	To balance the budget it is better to raise taxes than to cut spending.	0.1928	-0.2927
8	The Peruvian government must honour the terms of the contracts on which foreign companies have invested in Peru.	-0.4764	0.1528
9	It is more important to encourage economic growth than to protect the environment.	-0.1789	0.1544
10	It is better to finance road construction by private investment than through taxes levied on all taxpayers.	-0.2394	0.1918
11	Do you agree with a windfall tax on mining?	0.5458	-0.0600
12	After the reduction of IGV (general sales tax) from 19% to 18%, do you think that IGV should be reduced still further?	-0.0321	0.2127
13	The government should spend more on public health services, even if this may involve raising taxes.	0.2915	-0.2648

Table 4 The policy space: Peru (continued)

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>
14	The government should spend more on public education, even if this may involve raising taxes.	0.2736	-0.3012
15	Do you agree that teachers' salaries should be increased unconditionally?	0.3462	-0.0438
16	Camisea gas should cover domestic consumption before being exported.	0.5457	0.0977
17	The Free Trade Agreement with the United States should be renegotiated.	0.6891	-0.0357
18	Peru should make more effort towards integration with neighbouring countries than in relations with the United States and Europe.	0.4814	-0.0700
19	Peru should introduce the death penalty for the rape of minors.	0.1616	0.5225
20	The consumption of marijuana should be decriminalized in Peru.	0.0703	-0.5211
21	Homosexual couples should have the right to establish civil partnerships.	-0.0094	-0.5927
22	Abortion in the early months of pregnancy should be decriminalized.	0.0950	-0.4268
23	Should Compulsory Military Service be re-introduced?	0.2131	0.4399
24	Do you agree that the budget for the defence sector should be increased?	0.1390	0.3469
25	A strict public security policy should be established, even if it violates the human rights of offenders.	0.1184	0.5266
26	The state child care program (Wawa Wasi) should be expanded.	0.2332	-0.0027
27	Do you agree that the salaries of senior public officials should be increased?	-0.3598	-0.1908
28	Should compulsory voting be maintained?	0.2097	0.1597
29	Should the Congress once again have two chambers: Deputies and senators?	0.0060	-0.2397
30	Parliamentary immunity should be abolished.	0.1565	0.1028

Table 5 Mokken scales for Peru with scalability coefficients (H_i)

<i>Item</i>	<i>Question</i>	<i>Scales</i>	
		<i>Dim1</i>	<i>Dim 2</i>
1	The Peruvian state, rather than the public sector, should be the owner of the most important businesses and industries of the country.	0.409	
3	The government should limit, by law, interest rates charged by banks.	0.392	
4	The government should control the prices of essential goods.	0.418	
11	Do you agree with a windfall tax on mining?	0.323	
16	Camisea gas should cover domestic consumption before being exported.	0.327	
17	The Free Trade Agreement with the United States should be renegotiated.	0.400	
20	The consumption of marijuana should be decriminalized in Peru.		0.457
21	Homosexual couples should have the right to establish civil partnerships.		0.445
22	Abortion in the early months of pregnancy should be decriminalized.		0.430
Overall scalability coefficient (H) for each scale		0.383	0.444

Table 6 The policy space: Scotland

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
1	For less serious offenses, shorter, community sentences should replace imprisonment.	-0.1183	-0.5272	0.2403
2	To reduce crime, the criminal justice system must clamp down harder on illegal drug use.	0.1508	0.6149	-0.0614
3	Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife-crime.	0.0562	0.5774	-0.1290
4	We need to ringfence the number of police.	-0.0407	0.2292	0.0978
5	People must accept more surveillance (CCTV) to fight against terrorism and other violent crimes.	0.1504	0.5341	-0.1404
6	A single Scottish police force would be the most efficient way to safeguard public safety.	0.1749	-0.0345	0.1073
7	The highest economic priority of the Government should be paying off the public debt in the short term.	0.5655	0.3055	-0.1224
8	Government policies should promote quality of life over economic growth.	-0.4436	-0.2103	0.2724
9	The Scottish Government should make more use of tax varying powers to raise revenue.	-0.2292	-0.1727	0.3702
10	In the current economic climate, the Government should maintain the size of the public sector.	-0.6373	-0.0311	0.1631
11	The third sector (voluntary organisations and charities) should have a larger role in providing public services.	0.3708	0.0996	0.0570
12	Scotland would be better off with an expansion of the powers devolved to the Scottish Parliament.	-0.1018	-0.1233	0.7957
13	In Westminster, new laws affecting England should only be voted on by MP's with English constituencies.	0.1684	0.0769	0.3223
14	Scotland would be better off, economically and socially, if it was an independent country within the European Union.	-0.0787	-0.0884	0.8022
15	Elections would be more fair if the Alternative Vote system replaced the First-Past-the-Post system.	-0.1518	-0.3500	0.2813
16	UK membership in the Euro should be ruled out indefinitely.	0.1772	0.4191	-0.1315
17	Economic growth is more important than reducing greenhouse gases.	0.3176	0.4287	-0.1716
18	Investment in public transport should be promoted through green taxes such as road taxes.	-0.2056	-0.3207	0.1691
19	Scotland must continue to build and use nuclear power stations.	0.2704	0.1499	-0.4458
20	Free bus passes should only be available for the least well off and not for all people over a particular age.	0.3038	-0.1189	-0.1157
21	A special policy on immigration should be established for Scotland, allowing more immigration into Scotland than England.	-0.1290	-0.5463	0.2874
22	Britain should scrap the Trident nuclear weapons system.	-0.2827	-0.4467	0.5275
23	The UK mission in Afghanistan is necessary in the fight against terrorism.	0.2444	0.2726	-0.3313

Table 6 The policy space: Scotland (continued)

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
24	Local control of public services is more important than the efficiency gains from centralising services.	-0.1983	0.1087	0.1606
25	Policies should encourage personal responsibility rather than public, or government, responsibility for individual welfare.	0.5996	0.3022	-0.0592
26	Free medical prescriptions for all should be abolished.	0.4426	-0.0241	-0.3778
27	Schools established by parents and voluntary associations should be allowed to compete for public funds with state schools.	0.4745	0.2603	0.0223
28	Outsourcing to private companies could make the Scottish NHS more efficient.	0.6325	0.2323	-0.1734
29	Spending on the Scottish NHS should be protected regardless of the total budget.	-0.4983	0.2704	0.2518
30	University students should contribute to the costs of their education after graduation.	0.4326	0.1257	-0.2393

Table 7 Mokken scales for Scotland with scalability coefficients (H_i)

<i>Item</i>	<i>Question</i>	<i>Scales</i>		
		<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
1	For less serious offenses, shorter, community sentences should replace imprisonment.		0.371	
2	To reduce crime, the criminal justice system must clamp down harder on illegal drug use.		0.387	
3	Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife-crime.		0.363	
5	People must accept more surveillance (CCTV) to fight against terrorism and other violent crimes.		0.366	
7	The highest economic priority of the Government should be paying off the public debt in the short term.	0.412		
10	In the current economic climate, the Government should maintain the size of the public sector.	0.358		
12	Scotland would be better off with an expansion of the powers devolved to the Scottish Parliament.			0.491
14	Scotland would be better off, economically and socially, if it was an independent country within the European Union.			0.500
19	Scotland must continue to build and use nuclear power stations.			0.381
21	A special policy on immigration should be established for Scotland, allowing more immigration into Scotland than England.		0.359	
22	Britain should scrap the Trident nuclear weapons system.			0.425

Table 7 Mokken scales for Scotland with scalability coefficients (H_i) (continued)

<i>Item</i>	<i>Question</i>	<i>Scales</i>		
		<i>Dim 1</i>	<i>Dim 2</i>	<i>Dim 3</i>
25	Policies should encourage personal responsibility rather than public, or government, responsibility for individual welfare.	0.441		
27	Schools established by parents and voluntary associations should be allowed to compete for public funds with state schools.	0.351		
28	Outsourcing to private companies could make the Scottish NHS more efficient.	0.426		
Overall scalability coefficient (H) for each scale		0.396	0.369	0.450

Table 8 The policy space: Cyprus

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>
1	In the negotiations for the Cyprus' problem, the Government has made unacceptable concessions.	0.6959	0.3868
2	A bi-zonal, bi-communal federation with one sovereignty and citizenship is an acceptable solution.	-0.7022	-0.1714
3	The current process of resolving the Cyprus problem should be abandoned by replacing it with a five-party conference (Gr / Cypriots, T / Cypriots, Greece, Turkey and the EU).	-0.0969	0.3775
4	Even if an agreed settlement is achieved, with the Turkish Cypriots we will have to live separately rather than together.	0.5829	0.2663
5	Turkey should join the EU because this will help solve the Cyprus problem.	-0.5792	0.0385
6	The mobilisation of Turkish-Cypriots for being released from Turkey is important in helping the prospect of a final settlement of the Cyprus problem.	-0.3707	-0.2207
7	Cyprus does not have to demand at the present moment the abolishing of the British bases.	-0.3537	0.0694
8	The position of Cyprus is in NATO.	0.2169	0.7194
9	Cyprus must apply for membership in the program "Partnership for Peace".	0.3320	0.7199
10	The Cypriot economy has not benefited from EU membership.	0.1781	-0.4353
11	The corporate profits tax should be increased for two years from 10% to 11%.	-0.1688	-0.6588
12	The tax of property should be increased for the 5,000 biggest land owners.	-0.1244	-0.5202
13	The semi-governmental organizations in general should be privatized.	0.1288	0.7223
14	The economy functions better as far as the state intervenes less and companies are provided with more liberty to operate.	0.2008	0.7175
15	The institution of the ATA is outdated and should be abolished.	0.0455	0.6028
16	The fiscal deficit should be covered largely by additional taxation of wealth.	-0.0885	-0.6359

Table 8 The policy space: Cyprus (continued)

<i>Item</i>	<i>Question</i>	<i>Dim 1</i>	<i>Dim 2</i>
17	It is better to increase taxes than to cut spending on education and health.	-0.1004	-0.3087
18	Foreign investments, like the one by the state of Qatar, should be facilitated by the government.	-0.1649	-0.0209
19	Military spending should be increased even if this means increasing the public deficit.	0.6343	0.1194
20	The system of social welfare (social security and pensions) should be rather managed by the private sector.	0.2226	0.6346
21	The entry of foreign workers generally harms rather than benefits the Cypriot economy.	0.7308	-0.0250
22	There should be found a way so that political asylum seekers and political refugees do not get any financial benefits.	0.7214	0.2731
23	The increasing presence of foreign immigrants strengthens the multicultural identity of Cyprus.	-0.4289	-0.1475
24	The institutionalization of pupils unionism will help the more active involvement of youth in politics.	-0.2269	-0.4272
25	Cyprus should follow the example of other European countries and allow civil partnerships between homosexual couples.	-0.5531	0.0748
26	The views of the Church of Cyprus should be seriously taken into account regarding the formulation of the country's policy-making.	0.7575	0.2075
27	To increase the sense of security, civil and political liberties should be limited.	0.4091	0.1213
28	Criminality is due to the large number of immigrants who are in Cyprus.	0.7636	0.2155
29	The protection of the environment should not be an obstacle for economic development.	0.1463	0.1202
30	The owners of golf courts contribute vitally to the economy and this why they should not be further burdened with additional "green" taxes on excessive water consumption.	0.1441	0.2868

Table 9 Mokken scales for Cyprus with Scalability coefficients (Hi)

<i>Item</i>	<i>Question</i>	<i>Scales</i>	
		<i>Dim1</i>	<i>Dim 2</i>
2	A bi-zonal, bi-communal federation with one sovereignty and citizenship is an acceptable solution.	0.430	
4	Even if an agreed settlement is achieved, with the Turkish Cypriots we will have to live separately rather than together.	0.406	
5	Turkey should join the EU because this will help solve the Cyprus problem.	0.364	
8	The position of Cyprus is in NATO.		0.466
9	Cyprus must apply for membership in the program "Partnership for Peace".		0.508
11	The corporate profits tax should be increased for two years from 10% to 11%.		0.416

Table 9 Mokken scales for Cyprus with Scalability coefficients (H_i) (continued)

<i>Item</i>	<i>Question</i>	<i>Scales</i>	
		<i>Dim1</i>	<i>Dim 2</i>
13	The semi-governmental organizations in general should be privatized.		0.483
14	The economy functions better as far as the state intervenes less and companies are provided with more liberty to operate.		0.497
15	The institution of the ATA is outdated and should be abolished.		0.393
16	The fiscal deficit should be covered largely by additional taxation of wealth.		0.380
19	Military spending should be increased even if this means increasing the public deficit.	0.394	
20	The system of social welfare (social security and pensions) should be rather managed by the private sector.		0.445
21	The entry of foreign workers generally harms rather than benefits the Cypriot economy.	0.460	
22	There should be found a way so that political asylum seekers and political refugees do not get any financial benefits.	0.482	
25	Cyprus should follow the example of other European countries and allow civil partnerships between homosexual couples.	0.354	
26	The views of the Church of Cyprus should be seriously taken into account regarding the formulation of the country's policy-making.	0.466	
28	Criminality is due to the large number of immigrants who are in Cyprus.	0.513	
Overall scalability coefficient (H) for each scale		0.431	0.449

Note: Item 1 could be scaled with both scales with $H_i > 0.3$. As such it was deemed ambiguous and dropped.

Brazil

The first dimension extracted from the Brazil dataset from factor analysis is found to be very much related, directly or indirectly, to the role of the state in regulating the free market. Items 3, 4, and 5 in Table 2 make explicit reference to the role of the state, while Items 6, 7, 8, 28 and 29 are rather broader value questions in which the role of the state is implied. Items 14 and 18 relate to the direction of Brazilian foreign policy, although Item 18 suggests that foreign policy may be seen through the lens of whether or not to allow foreign companies to exploit Brazil's natural resources, which clearly relates to how the economy should be regulated. Items 3, 4, 6, 7 and 14 belong to a single scale, according to MSA (see Figure 3). The third dimension extracted also relates to economic policy, specifically welfare provision; Items 21, 22, 24 and, indirectly, Item 10 all relate to welfare provision (Table 2). Items 10, 21 and 22 form a single Mokken Scale (Table 3). Both the first and the third dimensions, especially the first, appear to correspond to what is generally understood as a Left-Right axis in terms of economic policy, with positive loadings on both dimensions corresponding to "left-wing" issue statements and negative loadings corresponding to "right-wing statements" in Table 2. Social issues relating to personal morality would appear to load onto the second dimension extracted; specifically these issues concern the use of soft drugs (Item 1), homosexuality (Item 25), religion

(Item 26) and abortion (Item 27). All these four items are found to form a single scale when MSA is applied. This dimension would appear to correspond to the GAL-TAN dimension identified in the literature.

Peru

In Peru, as in Brazil, the first dimension extracted corresponds to the regulatory role of the state (Items 1, 3, 4 and 11 in Table 4). Similar to Brazil, four items, Item 8, Item 16, Item 17 and Item 18, that also load onto this dimension relate to Peruvian foreign policy, although once again the emphasis is on the effect of opening up Peruvian markets to foreign (especially U.S.) capital; Items 8, 16 and 17 all relate to foreign trade and investment. Items 1, 3, 4, 11, 16 and 17 form a single scale if MSA is applied (Table 5). Once again, this dimension would appear to delimit left-wing views on the economy from right-wing views. Finally, as was the case with Brazil, the second dimension extracted seems to correspond with the GAL-TAN dimension as issue statements that load onto this dimension concern law and order (Items 19, 20 and 25), gay rights (Item 21), abortion (Item 22) and defence (Item 23). Only three of these items – Item 20, Item 21 and Item 22 – could be aggregated into a single Mokken scale (Table 5).

Scotland

Three dimensions were extracted from the Scotland dataset (see Table 6). The first dimension extracted relates closely to the traditional notion of Left versus Right in the economic sense, as it covers issues such as personal responsibility versus responsibility of the state (Item 25), public services (Items 26–30) and deficit reduction (Items 7 and 10). It also includes the relative benefits of economic growth and quality of life (Item 8). Items 7, 10, 25, 27 and 28 can be combined to form a single Mokken scale (Table 7). The second dimension very much relates to issues linked with the GAL-TAN dimension, specifically law and order (Items 1, 2, 3 and 5), membership of the European single currency (Item 16), the environment (Item 17) and immigration (Item 21). Five of these items – Items 1, 2, 3, 5 and 21 – form a single Mokken scale. Finally the third dimension extracted has a very specific meaning in the Scottish context; attitudes towards Scottish independence. Items 12 and 14 both relate to this issue and load strongly onto this third dimension. It is noteworthy that the issue of whether to continue to build and use nuclear power stations (Item 19) also load onto this dimension, rather than onto the GAL-TAN dimension, onto which environment-related issues are supposed to load. Most likely this is because nuclear power is seen by many pro-independence Scots as an imposition from London. Similarly, the Trident submarine-launched nuclear ballistic missile system (Item 22), which is based on Scotland's west coast, is opposed by Scottish nationalists and viewed as an issue relating to Scottish sovereignty and therefore loads onto the independence dimension. Although, as one would expect with issues of defence, it also loads onto the first (GAL-TAN) dimension, it forms a much stronger Mokken scale with the "independence" Items 12, 14 and 19 than with the five GAL-TAN items identified above.

Cyprus

Most of the issue statements that load onto the first dimension extracted from the Cyprus dataset relate to the GAL-TAN dimension (Table 8). Items that load onto this dimension involve the future status of Cyprus (Items 1, 2, 4 and 5), military spending (Item 19), immigration (Items 21, 22, 23 and 28), gay rights (Item 25), the role of the Church (Item 26) and the prioritisation of security (Item 27). Items 2, 4, 5, 19, 21, 22, 25, 26 and 28 can be combined to form a single Mokken scale (Table 9). This scale pits those with a

hardline nationalist attitude towards the Turkish part of Cyprus and social conservatives against those seeking compromise on the status of Cyprus and social liberals. The second dimension is mainly one that separates the economic Left from the economic Right. Items that load onto this dimension relate to the role of the state (Items 13, 14 and 20), redistributive taxation (Items 11, 12, 15 and 16) and EU membership (Item 10). It is noteworthy that two foreign policy issues relating to NATO membership load onto this dimension (Items 8 and 9), with (unsurprisingly) a pro-NATO attitude associated with the Right and an anti-NATO attitude relating to the Left. The somewhat idiosyncratic issue of pupils' unionism (Item 24) is also incorporated into this dimension with a favourable attitude towards pupils unionism associated with the Left. MSA combines Items 8, 9, 11, 13, 14, 15, 16 and 20 into a single scale (Table 9).

5 Mapping party supporters

The Mokken Scales shown in Tables 3, 5, 7 and 9 enable us to assign a value between 0 and 1 to each user with respect to all three dimensions extracted. Details of how this was done are provided in the Appendix. All dimensions were normalised in such a way that values close to 0 were associated with the Left (so that they would occupy a left position if represented graphically) and with the GAL end of the GAL-TAN axis and values close to 1 were associated with the Right and with the TAN end of the GAL-TAN axis. The next step was to identify the core supporters of all significant parties in the manner described above. Only those parties in which a) at least 100 core supporters could be identified from our sample, and b) won at least 3% in the corresponding parliamentary elections (which took place simultaneously with presidential elections in Brazil and Peru) were included for analysis.⁵ The parties in all four cases that were included for analysis, together with the number of core supporters identified for each party, are shown in Table 10.

Table 10 Number of core supporters of each party in sample

<i>Brazil</i>		<i>Peru</i>		<i>Scotland</i>		<i>Cyprus</i>	
<i>Party</i>	<i>No.</i>	<i>Party</i>	<i>No.</i>	<i>Party</i>	<i>No.</i>	<i>Party</i>	<i>No.</i>
PT	996	ALPROG	2107	SNP	1245	AKEL	665
PSDB	572	F2011	448	LAB	1157	DISY	571
PV	711	PAP	283	CONS	477	DIKO	163
DEM	103	PNP	690	LIBDEM	673	EDEK	135
		PPC	707	GREEN	726	EVROKO	227
		PPos	992				
		SolNac	183				

Tables 11–14 show the means and standard deviations for core ideological supporters of each party with respect to the relevant dimensions in all four cases, as well as the means and standard deviations for the entire sample. The more ideologically coherent the supporters of a particular party are, the lower the standard deviation of that party's supporters with respect to that of the entire sample.

Table 11 Brazil. Means and standard deviation of positions of ideological party supporters

<i>Means</i>	<i>PT</i>	<i>PSDB</i>	<i>PV</i>	<i>DEM</i>	<i>ALL</i>
Dim 1 (Economic Left-Right 1)	0.322	0.613	0.416	0.682	0.437
Dim 2 (GAL-TAN)	0.303	0.469	0.379	0.531	0.413
Dim 3 (Economic Left-Right 2)	0.461	0.621	0.585	0.656	0.575
<i>Standard Deviations</i>					
Dim 1 (Economic Left-Right 1)	0.168	0.174	0.177	0.212	0.215
Dim 2 (GAL-TAN)	0.249	0.247	0.253	0.303	0.274
Dim 3 (Economic Left-Right 2)	0.221	0.202	0.203	0.207	0.226

Table 12 Peru. Means and standard deviation of positions of ideological party supporters

<i>Means</i>	<i>ALPROG</i>	<i>F2011</i>	<i>PAP</i>	<i>PNP</i>	<i>PPC</i>	<i>PPos</i>	<i>Solnac</i>	<i>ALL</i>
Dim 1 (Economic Left-Right 1)	0.478	0.435	0.453	0.184	0.509	0.397	0.363	0.400
Dim 2 (GAL-TAN)	0.572	0.631	0.575	0.504	0.599	0.475	0.640	0.535
<i>Standard Deviations</i>								
Dim 1 (Economic Left-Right 1)	0.188	0.202	0.187	0.125	0.191	0.177	0.180	0.190
Dim 2 (GAL-TAN)	0.235	0.220	0.238	0.269	0.238	0.247	0.250	0.255

Table 13 Scotland. Means and standard deviation of positions of ideological party supporters

<i>Means</i>	<i>SNP</i>	<i>Sc. Labour</i>	<i>Sc. Conservative</i>	<i>Sc. LibDem</i>	<i>Sc. Green</i>	<i>ALL</i>
Dim 1 (Economic Left-Right)	0.383	0.323	0.736	0.485	0.294	0.428
Dim 2 (GAL-TAN)	0.408	0.496	0.651	0.385	0.296	0.479
Dim 3 (Independence)	0.822	0.440	0.241	0.495	0.708	0.571
<i>Standard Deviations</i>						
Dim 1 (Economic Left-Right)	0.183	0.172	0.157	0.178	0.178	0.207
Dim 2 (GAL-TAN)	0.200	0.187	0.178	0.178	0.172	0.209
Dim 3 (Independence)	0.175	0.186	0.176	0.179	0.182	0.250

Table 14 Cyprus. Means and standard deviation of positions of ideological party supporters

<i>Means</i>	<i>AKEL</i>	<i>DISY</i>	<i>DIKO</i>	<i>EDEK</i>	<i>EVROKO</i>	<i>ALL</i>
Dim 1 (GAL-TAN)	0.259	0.529	0.599	0.528	0.703	0.502
Dim 2 (Economic Left-Right)	0.158	0.651	0.512	0.453	0.581	0.482
<i>Standard Deviations</i>						
Dim 1 (GAL-TAN)	0.144	0.190	0.146	0.165	0.136	0.228
Dim 2 (Economic Left-Right)	0.153	0.145	0.155	0.158	0.169	0.230

Figures 1–4 represent these values in a graphical format. In the case of Brazil, the second economic dimension is not mapped because it distinguishes poorly between party supporters (see Table 11). For Brazil, Peru and Cyprus the positions of party supporters are therefore mapped on just two dimensions: the main economic Left-Right axis (labelled *x* in the maps) and the GAL-TAN axis (labelled *y*). For Scotland, where the third dimension (labelled *z*) relating to Scottish independence is important in discriminating between party supporters, three maps are included (*x* versus *y*, *x* versus *z* and *y* versus *z*). The mean party supporter is marked by a point labelled with the party's abbreviation (see glossary) and the standard deviation of the values of that party's supporters on each dimension is indicated by an ellipse in which the radius in each dimension is equal to the standard deviation along that dimension.

Figure 1 Brazil. Positions of Ideological Party Supporters in Policy Space

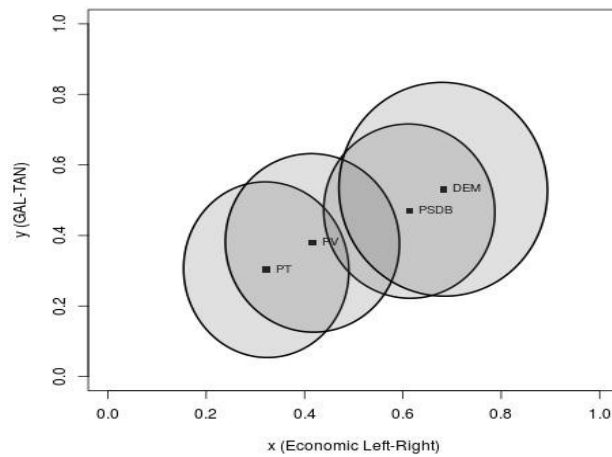


Figure 2 Peru. Positions of Ideological Party Supporters in Policy Space

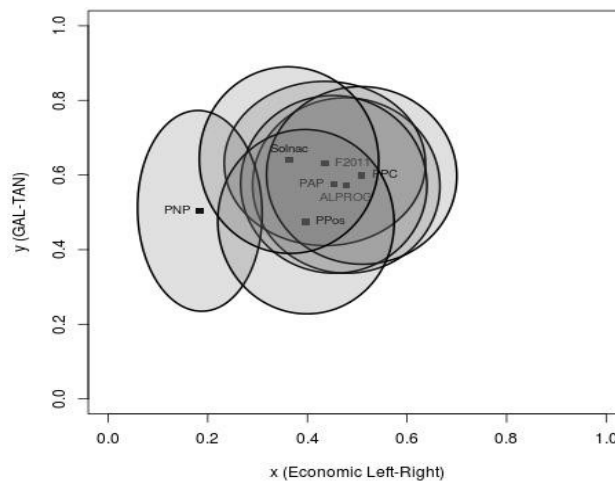


Figure 3 Scotland. Positions of Ideological Party Supporters in Policy Space

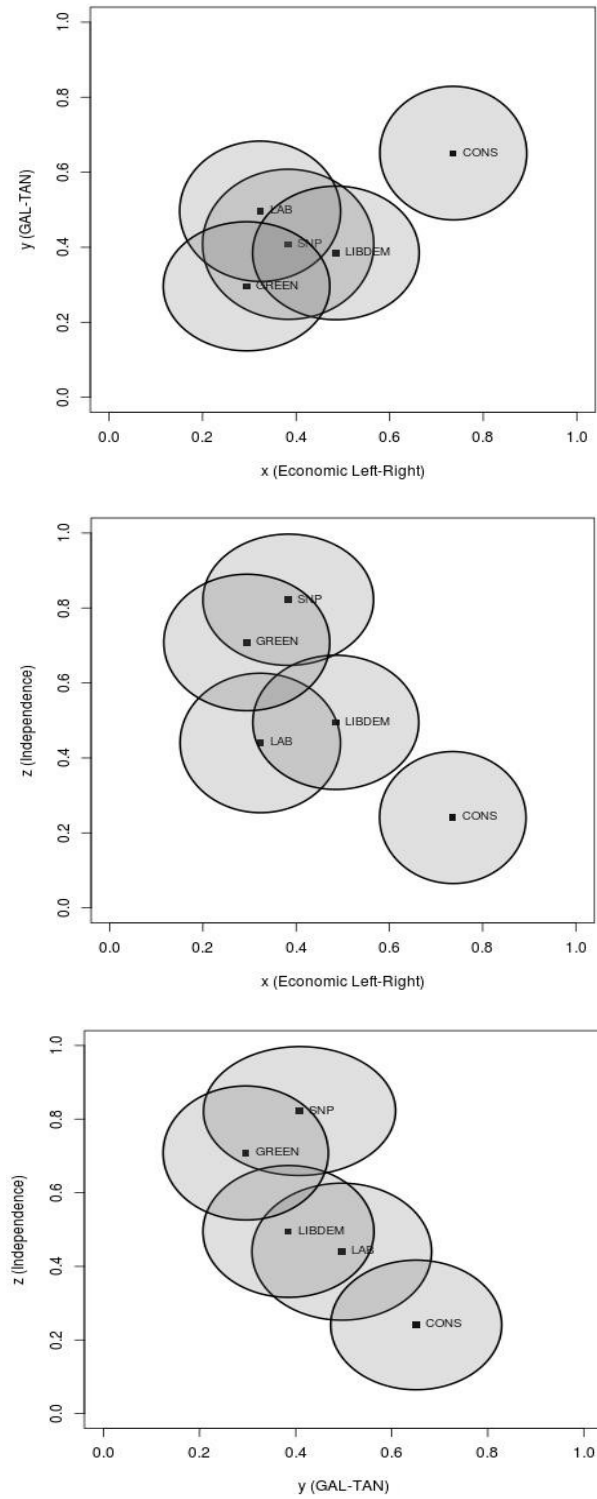
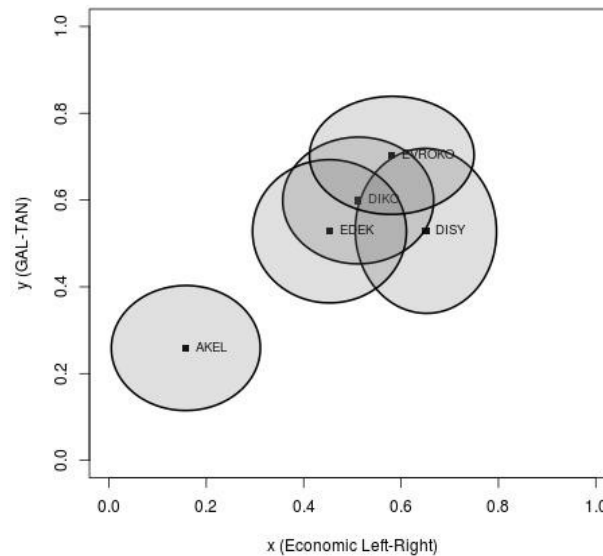


Figure 4 Cyprus. Positions of Ideological Party Supporters in Policy Space

The features of the party maps in each case can be summarised as follows:

Brazil

In Figure 1, the four parties analysed are more or less distributed along a line running from the bottom left quadrant of the map to the top left at an angle of approximately 30 degrees with the horizontal. Taking a position significantly to the left of centre along the economic axis and clearly on the GAL side of the GAL-TAN axis are the supporters of the Partido dos Trabalhadores (PT, Workers' Party). This would appear logical given that the PT is the main left-wing party in Brazil. In the centre is the Partido Verde (PV, Green Party), which, unlike its counterparts in Europe takes a more or less centrist position in economic policy, and despite being strongly committed to environmental issues, its presidential candidate, Marina Silva, is an evangelical Christian and tends to take a conservative viewpoint on a number of social issues, such as abortion. It is unsurprising, therefore that PV supporters also hold a centrist position on the GAL-TAN axis. The Partido da Social Democracia Brasileira (PSDB, Brazilian Social Democracy Party) is most the important opposition to the governing PT and, despite its name, is centre or centre-right, rather than left, in accordance with the position its supporters occupy on the map. Finally, the Democratas (DEM, Democrats) are considered to be the main right-wing party in Brazil and the positions of the supporters of this party on the map once again conform to this orientation.

Peru

Parties in Peru are generally poorly institutionalised (Cotler, 1995, p.17) and are often hard to associate with any clear ideology or political programme. Many are created merely to promote the presidential ambitions of certain individuals; the Partido Nacionalista Peruano (PNP, Peruvian Nationalist Party), Fuerza 2011 (F2011, Force 2011), Peru Posible (PPos, Possible Peru), were all founded in recent years to support the

candidatures of Ollanta Humala, Keiko Fujimori and Alejandro Toledo, respectively. The only two historical parties that retain significant strength today are the Partido Aprista Peruano (PAP, American Popular Revolutionary Alliance, also known as APRA), originally founded in 1924, and the Partido Popular Cristiano (PPC, Christian People's Party), founded in 1966. PAP was originally considered to be a social democratic party, although President Alan Garcia, who belonged to the party, pursued policies often considered as right-wing during his presidency of 2006-11 by allowing foreign corporations to enter indigenous lands to exploit natural resources and then cracking down violently on indigenous protesters. The PPC is generally considered to be centre-right and conservative and this appears to be confirmed by the position of its supporters in Figure 2 as the most right-wing. The location of supporters of the PNP to the left of the map is also to be expected, given Humala's strong anti-capitalist rhetoric. The other parties are hard to distinguish on Figure 2, although most are vaguely centrist or centre-right. This reflects the fact that they have no clear policy profile.

Scotland

The maps in Figure 3 show that parties in Scotland take fairly well-defined ideological positions. In terms of the x (Economic Left versus Right) and y (GAL-TAN) dimensions, the two main parties in Scotland, the Scottish National Party (SNP) and the Scottish Labour Party, occupy somewhat similar positions, although SNP supporters are both somewhat more right-wing in economic terms and rather more liberal in social terms than Labour supporters. The dimension that best differentiates these two parties, however, is the z (independence) dimension with SNP supporters (unsurprisingly) significantly more pro-independence than Labour supporters. Amongst the smaller Scottish parties, the Scottish Conservative Party and the Scottish Green Party represent two extremes; Conservative supporters are by far the most right-wing party in economic terms (high values of x), are the most hardline on social issues such as crime and immigration (high values of y) and are even more unionist than Labour supporters (high values of z). Green Party supporters, on the other hand, are at the opposite end of the spectrum with respect to all three axes; they are the most economically left-wing, the most socially liberal and are also pro-independence (albeit slightly less so than the SNP). Finally, supporters of the Scottish Liberal Democrats are at the same time more economically right-wing and more socially liberal than both Labour and the SNP, but are neither as socially liberal as Green supporters nor as economically right-wing as Conservative supporters. Liberal Democrat supporters are also mildly anti-independence, although their view on the matter are not as strong as either Labour or Conservative supporters. Overall, these findings are very much in conformity with how Scottish parties are conceptualised, both by experts and by the general public. The Green party is strongly left-wing, while the Conservative Party is considered to be the most right-wing party. The SNP is distinguished by its pro-independence stance, while Scottish Labour has in recent years both moved to the right in economic terms and has become more hardline on social issues, reflecting the "New Labour" rhetoric that has guided the London-based party since Tony Blair's victory in 1997. Since their coalition with the Conservatives in Westminster, the Liberal Democrats are generally considered to be centre-right in terms of economic issues, but remain libertarian on social issues.

Cyprus

The main feature observed in Figure 4 is the sharp polarisation between supporters of Anorthotikon Komma Ergazomenou Laou (AKEL, Progressive Party of Working People) on the one hand and the other (centrist and right-leaning) parties on the other. AKEL is a communist party that strives for rapprochement with Turkish Cypriots and it is therefore unsurprising that its supporters are to be found towards the left of the political spectrum in economic terms and at the “GAL” end of the GAL-TAN scale. The most ideological coherent party on the centre-right is Evropaiko Komma (Evroko, the European Party), which, despite its name, is populist, economically right-leaning and nationalist, and is plotted where one would expect it to be, towards the top right-hand corner of the map. Dimokratikos Sinagermos (DISY, the Democratic Rally) is the main centre-right party and is presently the largest party in parliament; economically it is strongly on the right of the spectrum but is less nationalist than EVROKO (EVROKO was formed after a split in DISY over the Annan Plan in which the faction that later formed part of EVROKO bitterly opposed the plan). Dimokratikon Komma (DIKO, the Democratic Party) defines itself as a centre party, and Kinima Sosialdimokraton (Movement for Social Democracy, EDEK), despite being a member of the European Socialist Party and Socialist International, moved to the centre after the party’s Trotskyist youth wing (EDEN) was expelled from the party in the early 1980s. All these positions are fairly consistent with the positions of party supporters as illustrated in Figure 4.

6 Cross-case comparison

The dimensions that were identified from factor analysis and Mokken Scale Analysis should reflect, at least in part, the ideological cleavages present in society in each case. It is widely acknowledged that such cleavages are rather weak in Peru and Brazil in comparison with European countries, and even in relation to other Latin American countries such as Chile and Uruguay (Torcal and Mainwaring, 2003; Jones, 2005; Bornschier, 2009). Our analysis would tend to confirm this; the dimensions extracted are clearer and more unambiguous in the cases of Cyprus and Scotland than in the cases of Peru and Brazil. From the Peru data, only nine items were scalable using MSA, while for Brazil twelve items were scalable, for Scotland fourteen and for Cyprus seventeen, suggesting that user responses were more random and less structured in the first two cases compared with the last two.

Also of interest is the *nature* of the dimensions that emerged. In all four cases a Left-Right dimension based on the role of the state, on the one hand, and/or private enterprise, on the other, was extracted. However, some subtle differences in the nature of this dimension could be observed between cases. In Brazil and Peru, issues relating to foreign relations appeared to load onto it because of the existence of a discourse on the exploitation of natural resources by foreign companies. It is noteworthy that in Peru a number of “traditional” Left-Right issues, such as taxation and spending (Items 7, 13 and 14), the ability of companies to hire and fire workers (Item 5) and even the role of the market (Item 2) did *not* load onto this dimension, while issues revolving around foreign relations, trade and the use of natural resources clearly did. The nature of so-called GAL-TAN dimension also varies from case to case. In Brazil and Peru, issues relating to ethics and morality dominate this dimension, possibly reflecting the role of the

Catholic Church and a religious-secular divide. This would tend to confirm the findings of authors who point to the recent emergence of ideological divides in Latin America based on issues such as religiosity and abortion (Moreno, 1999, p.22). In Scotland, questions of immigration and law and order form the backbone of the GAL-TAN dimension, while in Cyprus, the “Cyprus question” on the future status of Cyprus, as well as issues relating to defence and immigration prevail. This latter finding is unsurprising given that critical questions on the relationship between Greek and Turkish Cypriots have bedevilled the island throughout the past half century. Finally, despite the letter “G” in GAL from “green”, environmental issues do not appear to load strongly onto the GAL-TAN dimension in any of the cases.

In the previous section we saw how the positioning of party supporters along two or three dimensions more or less corresponded with the expected positions of these parties in terms of their programmes. However, we also saw how, especially in the case of Peru, the positions of the supporters of some parties were rather vague and poorly defined (Figure 2). We would expect that the distinctiveness of the policy preferences of party supporters would depend on the nature of the linkages between parties and citizens. Kitschelt et al. identify three types of linkages: *programmatic linkages*, in which voters identify with the values or policies of a given party, *clientelistic linkages* in which supporters of the party are motivated by the promise or delivery of public goods to their communities (patronage) and *charismatic linkages* in which voters are attracted to the party due to the charismatic appeal of the leader (Kitschelt et al., 1999, pp.47–48). Comparing the maps of party supporters across the four countries, we can see from Figures 1–4 that the ideological profile of party supporters is significantly more coherent and well-defined in the two European cases than in Peru. Brazil, in this respect, would seem to take an intermediate position. This would appear to suggest that programmatic linkages are more important in the European cases, while in Peru voter-citizen linkages are more often based on either clientelism or the charismatic appeal of a leader than with the policy programme of the party (Cotler, 1995). In Peru, even when voters wish to select the parties that promote “their” policies, they may find it difficult to identify such parties.

The insights we can glean from the Latin American cases also reveal certain limitations regarding the representativeness of the data we obtain. Despite the fact that Brazil is regularly cited as a case in which the programmatic structuring of political parties is weak (Cotler, 1995; Mainwaring, 1995), party supporters who completed the VAA still seem to share reasonably clear ideological profiles. However, it is quite possible that parties form different types of linkages with citizens from different sectors of the population. As Kitschelt and his colleagues point out, “politicians and parties may combine different modes of accountability in complex ‘portfolios’ in which different affective and rational mechanisms are deployed simultaneously or in a differentiated fashion targeted at different constituencies, for example, party programs and clientelistic exchange” (Kitschelt et al., 2010, pp.20–21). Thus, our Brazilian sample, drawn as it is disproportionately from relatively youthful, urban and well-educated sectors of society⁶, far more than less advantaged members of society, may be attracted by party programmes. The effect of this may be to produce a clearer ideological profile for Brazilian parties than may have been the case if rank-and-file supporters had been sampled.

In societies with (relatively) high and equal levels of education and therefore (relatively) equal access to information amongst most citizens, the sampling bias may not matter much for our analysis, due to the rather insignificant differences between the sample and the rest of the population. An analogous study draws on response data generated by the 2011 Scottish Vote Compass (on which this paper also draws) and repeats the dimension extraction procedure on a sub-sample of users that were extracted from the dataset in proportion to their vote intention in such a way as to replicate the voting behaviour of Scottish voters on polling day. Applying the same methodologies of dimension extraction as used in this paper both to the complete (clean) dataset of Scottish VAA users, and to the smaller, politically representative sample, it finds that the two samples produce almost identical results (Wheatley et al., 2012).⁷ However, in societies in which a significant segment of society is less well-educated and, more importantly, not well-informed about the political sphere at national level, we should be sceptical about whether our conclusions can be applied to the wider population and accept that they may only tell us something about a mainly urban, well-educated and politically engaged subset of society. Such a proviso should apply in particular to Peru and Brazil.

A key aim of this paper has been to identify latent dimensions from users' responses to 30 issue statements. However, a critic could counter that the local experts who designed the questionnaire may have chosen these thirty statements on the basis of their pre-conceived ideas about the dimensions that underlie the policy space. The risk is that the dimensions extracted tell us less about the political orientations of users and more about the assumptions of the questionnaire designer. While we recognise this risk, it should be pointed out that around half of the issue statements (in the cases of Cyprus and Scotland) or even more (in the cases of Peru and Brazil) are found not to belong to any salient dimension at all, suggesting that many of the issue statements selected are idiosyncratic issues that arise in the election campaign and therefore do not reflect any intentional "ordering" on the part of the designer. Moreover, items in all questionnaires were subdivided into between four and seven topic categories (e.g. Economy, Law and Order, Society, Environment). While it is beyond the scope of this paper to go into the details of technical design, the important point is that items listed under the same category often did not load onto the same dimension. Thus, items under the category "Society" loaded onto at least two different dimensions in three out of four cases (three different dimensions in the case of Scotland). Similarly, no consistent pattern could be discerned between items in the category "Environment" in the three cases in which this category was used (all except Peru). If the designers did indeed base their questions around pre-conceived policy dimensions, one would expect issue statements in each designer-imposed category to be congruent with one another in terms of users' evaluations. However, we do not observe this because each item is chosen according to its salience in the election campaign, not by virtue of its relationship with other items or with any underlying policy dimension.

7 Conclusion

In this paper, data extracted from VAAs were used to identify underlying policy dimensions in four widely different national and sub-national contexts and to map the positions of party supporters in the space defined by these dimensions. The paper does not claim that using this method of party mapping is superior to existing methods, such

as surveys of party elites or comparison of manifestos; instead it makes the rather more modest claim of adding to the existing repertoire of methods. Given that party supporters who complete VAAs are typically well-educated and interested in politics, this method focuses on the intermediate level in the hierarchy of political parties, between rank-and-file supporters that may be attracted by non-programmatic appeals, on the one hand, and party elites, on the other.

The analysis provided above has shown that the two-dimensional model of ideological space does indeed have some empirical validity in the four cases studied in this paper. In all cases a Left-Right dimension based on the desired role of the state with respect to the free market, as well as a GAL-TAN dimension, based on social, moral, national and/or environmental issues could be identified. In Brazil, a second economic dimension was identified, although it was not clear why VAA users perceive the issues embodied by this dimension as independent from the issues of the main Left-Right axis. In Scotland, a third dimension relating to the relationship between Scotland and the rest of the United Kingdom was observed.

The identification of ideological dimensions enabled us to plot the positions of party supporters in all four cases on maps defined by two (or three) axes: x (based on the main Left-Right scale), y (based on a GAL-TAN scale) and z (in Scotland, associated with Scottish independence). The maps identified a polarisation of party supporters in Cyprus, clear policy niches for each party's supporters in Scotland, somewhat more vague ideological trends amongst party supporters in Brazil and a rather fuzzy and inchoate profile in Peru.

Hitherto, research on VAAs has concentrated on technical issues relating to VAA design as well as the potential impact of such platforms on voting behaviour. This is both welcome and inevitable in a new field of research, but should be considered a first stage. The time is now ripe to extend the field of study to make it relevant to some of the more traditional concerns of political science, especially in the field of political behaviour and party politics. By showing how VAAs can be used not only as a voting aid but as a tool to generate valid data for research purposes, this paper has made a modest contribution in this direction. We would expect that in the future, VAA-generated data will be used far more extensively in this direction. However, as this paper has also made clear, researchers also need to be aware of the limitations of VAA data and should use it to supplement, rather than replace, the existing repertoire of research tools in the study of political behaviour.

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Appendix: Technical issues

Cleaning

User responses from each VAA were coded numerically. For responses to issue statements the response “Completely Agree” was coded with the value 4, “Agree” – 3, “Neither Agree nor Disagree” – 2, “Disagree” – 1 and “Completely Disagree” – 0. “No opinion” responses were treated as missing values. Before carrying out any analysis, the data was cleaned by excluding the following entries: 1) all cases in which the time taken to complete the 30 issue statements was less than 120 seconds; 2) all cases in which the time to respond any one issue statement was less than two seconds; 3) all cases in which the time taken to respond to three or more issues statements was less than 3 seconds⁸; 4) all cases in which the respondent answered fifteen successive issue statements in the same way. Finally, to make provisions for cases in which an individual completes a questionnaire more than once, a filtering technique was used to identify multiple entries from the same computer, which were then removed.⁹

Dimension reduction

The dimension reduction technique used was the principal factors method of factor analysis, available on STATA. However, this method assumes the variables on which factor analysis is performed to be continuous and to follow a multivariate normal distribution. With categorical variables, such as user responses to VAA items, this assumption may not hold. A two-step method was therefore employed: first a polychoric correlation matrix was generated from the user responses and factor analysis was then performed using the matrix as input.¹⁰ To identify the number of dimensions to extract, the method used was to examine the scree plot of eigenvalues against the factor number. Once the scree plot began to level out, no further factors were extracted (see Figure A1). The eigenvalues of the first six factors for each of the four cases extracted are shown in Table A1. All eigenvalues that differ from the subsequent eigenvalue by less than 0.5 are shaded in grey. The number of factors extracted in each case corresponds to the number of cells from the top cell to the last unshaded cell (inclusive).

Figure A1 Scree plots of eigenvalues for factors extracted (see online version for colours)

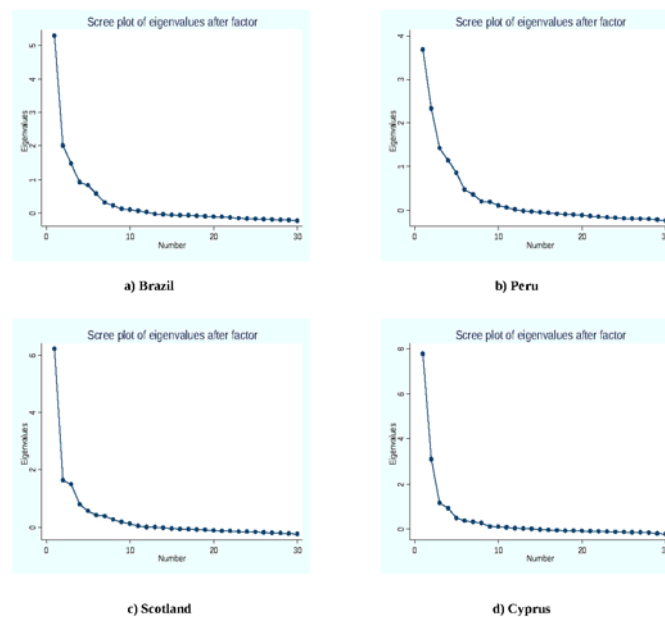


Table A1 Eigenvalues for factors extracted

<i>Brazil</i>	<i>Peru</i>	<i>Scotland</i>	<i>Cyprus</i>
5.29	3.68	6.23	7.78
2.00	2.32	1.65	3.08
1.47	1.41	1.51	1.16
0.92	1.13	0.81	0.92
0.84	0.86	0.57	0.48
0.58	0.47	0.43	0.36

Forming Mokken scales

Mokken scales were formed from response items coded from 0 (completely disagree) to 4 (completely agree) and from reversed response items in which the coding was reversed so that 0 represented the response “Completely Agree” and 4, “Completely Disagree”. Most scales would therefore be formed from a combination of original and reversed items, depending on the “ideological direction” of the item. User scores for each dimension were obtained by summing the response values for each item belonging to the corresponding Mokken scale and was then divided by a factor of 4 times the number of items in the scale to produce a value of between 0 and 1.

Notes

- Both the directional and proximity models of electoral choice assume that voters choose a party or candidate by virtue of their relative positions compared to that party or candidate on certain issues of policy. Typically they are based on a spatial model of voting whereby interrelationships between voter and candidate/party on individual issues are aggregated into a multidimensional policy space. See, for example, Rabinowitz and MacDonald (1989) and Westholm (1997).
- For example, in Germany the Wahl-O-Mat application is believed to have been used by more than 6 million voters prior to the federal elections of 2009, StemWijzer, deployed during elections in the Netherlands, in 2010 generated around 4 million users, Smartvote in Switzerland used about one million times during the electoral campaign before the 2007 national elections, while nearly a million European voters visited the EU Profiler during the run-up to the 2009 European elections. See the websites of Wahl-O-Mat (http://www.bpb.de/methodik/KZ6IKY,0,0,Fakten_zum_WahlOMat.html), StemWijzer (<http://www.stemwijzer.nl/>), Smartvote (<http://smartvote.ch/>) and EU profiler (<http://www.eui.eu/Projects/EUDO/EUProfiler.aspx>).
- All VAAs were developed by the Centre for Research on Direct Democracy, based in Aarau, Switzerland and affiliated with the University of Zurich. In Brazil, the application was called “Meuvoto 2010”, in Peru “Perú Escoge”, in Scotland “Scottish Vote Compass” and in Cyprus “Cyprus Vote Compass”.
- Of course, in the cases of Brazil and Peru, where the elections were presidential rather than parliamentary, voters were asked why they voted for their candidate of choice. Nevertheless, for the purposes of this paper, it was assumed that if a voter supported a candidate because he/she identified with the policies or ideology of that candidate, his/her support for the chosen party was also the result of policy or ideological affiliation. Note also in Cyprus that two out of six options provided in the reason for voting question were considered to indicate proximity to the party in terms of policy or ideology. These options were that the reason for voting was based on: a) the ideological identity of a party, b) the party’s programme. In the other three cases, just one option was available, and this indicated sympathy towards the party or candidate’s policies. Despite the different criteria, the proportion of policy/ideology voters was more or less the same amongst the Cyprus sample as amongst the other three samples.

- 5 In Peru it was not possible to identify the share of the vote won by each party, because most parties stood in the elections as part of an alliance with other parties. For this reason the leading party in each electorally significant alliance was considered, together with those historic parties that stood as part of an alliance and that are still believed to be influential (for example, the Partido Popular Cristiano or Christian People's Party). In Brazil, it was not possible to include the Brazilian Democratic Movement Party (Portuguese: Partido do Movimento Democrático Brasileiro, PMDB) because an insufficient number of users expressed affinity with this party.
- 6 53.1% of Brazilian users who declared their educational level (88.7% of the total) claimed to have higher education. The median date of birth was 1983.
- 7 In fact the dataset on which the earlier study draws (n=12,053) is slightly smaller than the dataset used in this paper (n=14,864), because it excludes all those users that do not answer questions about their age, gender, vote intention and party identification. However, this should make the data less representative, rather than more so, strengthening our conclusions.
- 8 This was not possible for the Brazil VAA, as the software for identifying the time taken to complete every individual question had not yet been installed.
- 9 A cookie was installed in the user web browser which identified multiple entries from the same machine and IP numbers were transformed into unique identifiers that could not be traced back to the user. Data from a user using the same computer as a previous user was retained *only* if personal data had been entered demonstrating that he/she was a different user.
- 10 For details of how to perform this analysis, see the answer to the FAQ "How can I perform a factor analysis with categorical (or categorical and continuous) variables?" UCLA Academic Technology Services, http://www.ats.ucla.edu/stat/stata/faq/efa_categorical.htm (accessed on 13 June 2012).

Glossary: Abbreviations for parties

Brazil

DEM: Democratas, Democrats (centre-right)

PSDB: Partido da Social Democracia Brasileira, Brazilian Social Democracy Party (centrist)

PT: Partido dos Trabalhadores, Workers' Party (centre-left)

PV: Partido Verde, Green Party (centrist, ecologist)

Peru

ALPROG: Alianza Para el Progreso, Alliance for Progress

F2011: Fuerza 2011, Force 2011

PAP: Partido Aprista Peruano, American Popular Revolutionary Alliance

PNP: Partido Nacionalista Peruano, Peruvian Nationalist Party

PPC: Partido Popular Cristiano, Christian People's Party

PPos: Perú Posible, Possible Peru

SolNac: Solidaridad Nacional, National Solidarity

Scotland

CONS: Scottish Conservative Party

GREEN: Scottish Green Party

LAB: Scottish Labour Party

LIBDEM: Scottish Liberal Democrats

SNP: Scottish National Party

Cyprus

AKEL: Anorthotikon Komma Ergazomenou Laou, Progressive Party of Working People

DIKO: Dimokratikon Komma, Democratic Party

DISY: Dimokratikos Sinagermos, Democratic Rally

EDEK: Kinima Sosialdimokraton, Movement for Social Democracy

EVROKO: Evropaiko Komma, European Party