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A SOCIO-SPATIAL ANALYSIS OF VOTING FOR POLITICAL PARTIES AT THE 2007 FEDERAL ELECTION

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The 2007 federal election in Australia saw voters throw out of office the Howard Coalition Government, which had been in power for more than a decade, and elect the Rudd Labor Government. That represents a fundamental change in Australia's socio-political landscape. This paper provides an analysis of voter support for parties focusing on the disaggregated spatial level of local polling booths. Relationships between votes for political parties for the House of Representatives and the demographic and socio-economic characteristics of populations living in polling booth catchments across all the electorates in Australia are modelled to identify key demographic and socio-political dimensions underlying voter support for political parties.

INTRODUCTION

At the November 2007 federal election for the House of Representatives, voters handed the Labor Party, led by Kevin Rudd, a resounding victory, throwing out of office the John Howard-led Coalition (Liberal-National) Government which had been in office since 1996. The two-party preferred vote of 52.6 per cent for Labor as against 47.4 per cent for the Coalition gave the new Rudd Labor Government 83 seats in the House. Between the 2004 and the 2007 elections the swing in voter support from the Coalition to Labor was about five per cent for the primary vote and 5.3 per cent for the two-party preferred vote. The Liberals lost 20 seats, including that of the Prime Minister, and the Nationals lost two seats. Labor had a gain of 22 seats.

This was a decisive victory for Labor which had lost government to the Coalition at the 1996 election with a similarly large swing to the Coalition of 6.17 per cent for the primary vote, a swing which saw the Labor Party consigned to a long period of time in opposition. Between winning government in 1996 and losing it in 2007, the Coalition government had experienced four successive electoral victories, with the 2001 and 2004 election victories being decisive, particularly the 2004 victory in which the Coalition had gained a swing of 3.69 per cent for the primary vote.

Thus the 2007 election outcome represented a fundamental change in Australia's political landscape, ending more than a decade of Liberal-National Party ascendancy as the 'John Howard battlers', the working-class living in the suburbs of the big cities and in the regional centres deserted the Coalition and returned to Labor. It has been said that much of the swing was due to Labor capturing what has been referred to as the 'working families'.

In this paper we discuss some of results of modelling to identify the demographic and socio-economic dimensions that might explain spatial variations in the level of voter support for political parties at the 2007 federal election for the House of Representatives.

METHODOLOGY

Researchers at the University of Queensland[1] have been using Geographic Information Systems (GIS) technology and spatial statistical modelling tools to analyse voter support for political parties at the last three federal elections in Australia. They have done this in order to map the spatial patterns of voter behaviour at the disaggregated level of local polling booths and to develop typologies of socio-political landscapes. This has been done by identifying those demographic and socio-economic characteristics of the populations that live

Table 1: Variables derived from the 2006 census representing the demographic and socio-economic characteristics of polling booth catchments

Age and sex
per cent population males (MALES)
per cent population age 0–17 years children and youth (YOUTH)
per cent population age 18–22 years first voters (FIRST)
per cent population age 23–34 years (GENY)
per cent population age 35–44 years (GENX)
per cent population age 45–59 years boomer (BOOMERS)
per cent population age 60–74 years (Post Depression Wartime Generation) (WW2GEM)
per cent population age 75+ years (Pre Depression Generation) (DEPGEN)

Family and household structure
per cent single person households (SINGLES)
per cent couple without children households (COUPLES)
per cent one parent family households (ONEPARENT)
per cent couples with children households (COUPCHILD)

Housing tenure
per cent households that are home owners (HOMEOWN)
per cent households that are home purchasers (MORTGAGEES)
per cent households that are private renters (RENTERS)
per cent households that are public housing tenants (PUBHOUS)

Ethnicity/race
per cent indigenous persons (INDIG)
per cent born overseas (IMMIG)
per cent born in UK (UK)
per cent born in Southern and Eastern Europe (SEEUROPE)
per cent born in Middle East (MIDEAST)
per cent born in Asia (ASIA)

Religious affiliation
per cent Catholic (CATH)
per cent Anglican (ANG)
per cent Pentecostal (PENT)
per cent other Christian (OTHCHRIST)
per cent Islamic (ISLAM)
per cent other non-Christian religion (ONCHREL)
per cent with no religion (NORELIG)

Residential stability/mobility
 per cent of population not at the same address five years ago (MOBILE)

Digital divide
per cent dwellings (not population) using Internet (INTERNET)

Engagement in work
Labour force participation rate (INWORK)
Unemployment rate (UNEMPLOY)

Industry of work
per cent employed in Extractive Industries (EXTRACT)
per cent employed in Transformative Industries (TRANSFORM)
per cent employed in Distributive Services (DISTRIB)
per cent employed in Producer/Business Services (BUSSERV)
per cent employed in Social Services (SOCSERV)
per cent employed in Administrative & support services (ADSS)
per cent employed in Personal Services (PERSERV)

Occupation[1] (Robert Reich's categories)
per cent employed as routine production workers (ROUTPROD)
per cent employed as in-person service workers (INPERS)
per cent employed as symbolic analyst (SYMBA)

Human capital
per cent persons age 15 years and over with a degree or higher qualification (DEGREE)
per cent persons age 15 and over with a certificate, diploma or advanced diploma (CERTDIP)

Income[2]
Low income category—per cent households in the lowest quintile for household weekly income (less than $650) (LOWINC)
Middle income category—per cent households in the middle three quintiles for household weekly income ($650–$1,999) (MIDINC)
High income category—per cent households in the highest quintile for household weekly income ($2,000+) (HIGHINC)

Notes: [1] The occupation categories relate to those proposed by Robert Reich, *The Work of Nations*, Vintage Books, New York, 1991. Broad occupations in the 2006 Census of Population and Housing are grouped to approximate the Reich categories.
  [2] Uses mean gross household income per week in 2006 dollars (*Household Expenditure Survey, Australia: Summary of Results, 2003–04*, Australian Bureau of Statistics, Catalogue no. 6530.0 as a reference to derive quintile groups).

in polling booth catchments which might explain geographic variations in the level of voter support for political parties at elections for candidates standing for a seat in the House of Representatives. The research uses Australian Electoral Commission data on voting for political parties at the level of polling booths and interfaces those data with Census of Population and Households data at the Census Collectors' District (CCD) level of scale on the demographic and socio-economic characteristics of people living in polling booth catchments. The researchers have developed online GIS-enabled databases[2] (see <www.siss.edu.au>and go to Shared Research Resources) that display patterns of voter support for political parties across local polling booths for the 2001, 2004 and 2007 federal elections for the House of Representatives. These databases are integrated with sets of demographic and socio-economic variables derived from the 2001 and 2006 censuses for aggregations of CCDs that form polling booth catchments. The methodologies used are outlined in previously published work.[3]

The data used for the modelling discussed in this paper are the primary votes cast for candidates standing for the House of Representatives at the 2007 federal election at the highly spatially disaggregated level of 7,439 polling booths across Australia. Those polling booth locations were geocoded, and the voting data were then integrated in a GIS with 48 demographic and socio-economic data variables (see list in Table 1). These were derived from the 2006 census for aggregations of CCDs that form polling booth catchments, thus generating a 7,439 x 48 socio-political spatial data matrix for analysis.

A number of statistical modelling tools have been used to analyse the relationships between the spatial variations in the level of voter support for political parties across polling booths and the demographic and socio-economic characteristics of populations living in polling booth catchments. These tools include simple and multiple regression analysis, multiple discriminant analysis, and cluster analysis. In this way it is possible to identify key social dimensions which differentiate between clusters of groups of polling booths that display specified levels of voter support for a political party and to generate maps that represent socio-political landscapes across the cities, towns and regions of Australia. The modelling results discussed in this paper enable the predictors of spatial variations in voter support for political parties at the 2007 federal election to be identified. They also enable us to plot the position of political parties against two key dimensions in what we term a socio-political space and to show how those positions have changed over the last three federal elections.

PREDICTING LOCAL PATTERNS OF SUPPORT FOR POLITICAL PARTIES
The approach: using discriminant analysis

Discriminant analysis[4] is used to analyse the relationship between the patterns of voter support for political parties at the level of the polling booth and the demographic and socio-economic characteristics of local populations living in polling booth catchment areas across Australia. This statistical tool is specifically designed to detect differences between two or more groups vis-à-vis the groups' scores on a set of variables. It simplifies the interpretation of a large set of variables, such as those listed in Table 1, by combining them into a small number of functions that explain much of the variation in the data set being used. Here we replicate the methodology used in studies of vote at the previous two federal elections in 2001 and 2004.

Voting outcome groups

The voting outcomes at the 2007 election have been classified into nine Voting Groups as measured by the level of the primary vote cast for the various political parties, with each polling booth belonging to one group only (see Table 2 which lists the nine Groups). Across Australia, 41.5 per cent of the polling booths belong to Group 1, the Labor Party; 39.2 per cent belong to Group 2 the Liberal Party; 12.6 per cent to the National Party; and 0.3 per cent to the Country-Liberal Party (Northern Territory only); 2.2 per cent met the criterion of at least 20 per cent of the primary vote for Independents; and 3.7 per cent met the

Table 2: Descriptive statistics and number of polling booths across Australia by favourable voting outcomes for political parties, at the 2004 and 2007 federal elections for the House of Representatives

Polling booth voting Group vis-à-vis level of voter support for a political party	Mean vote (percent) 2007	Standard deviation (percent) 2007	Number of polling booths 2004	Number of polling booths 2007	Change between 2004 and 2007 elections
1. Labor Party —most primary votes	40.34	15.19	2,227	3,076	+849
2. Liberal Party —most primary votes	34.35	20.99	3,879	2,947	-932
3. National Party —most primary votes	9.91	20.30	1,199	932	-267
4. Country Liberal Party[1] —most primary votes	34.54	18.19	32	27	-5
5. Independents —most primary votes	2.60	8.70	—[2]	163	—[2]
6. Australian Greens Party —20 per cent+ primary vote	7.53	5.56	217	274	+57
7. Australian Democrats Party —20% per cent primary vote	0.63	0.80	1	0	-1
8. Family First Party —20% per cent primary vote	1.91	1.83	1	0	-1
9. CDP Christian Party —20% per cent primary vote	0.79	1.27	—[2]	0	—[2]
TOTAL			7,556[3]	7,419[4]	

Notes: [1] The Country Liberal Party only operates in the Northern Territory where its candidates stood for the coalition.

[2] Voting outcomes of Independent and CDP Christian Party were not included in the spatially disaggregated modelling of voting outcomes and socio-economic characteristics at the 2004 Australian federal election.

[3] 19 polling booths at the 2004 federal election could not be allocated to a party on the criteria used here as two parties hold equal percentages of primary votes in those polling booths.

[4] 20 polling booths at the 2007 federal election could not be allocated to a party on the criteria used here as two parties hold equal percentages of primary votes in those polling booths. Note: 2004 election results are from Stimson et al., 2007, endnote 1.

criterion of 20 per cent of the primary vote for the Australian Greens Party.

On the basis of the criteria used to form the polling booth Voting Groups, the data in Table 2 indicate that, when compared with the primary vote at the 2004 federal election, the following changes had occurred at the level of local polling booths in voter support for political parties at the 2007 election:

- the Labor Party had won most-primary-votes status in an extra 849 polling booths (representing 11.4 per cent of the booths across Australia)
- the Liberal Party had lost most-primary-votes status in 932 polling booths (representing 12.5 per cent of the booths)
- the National Party had lost most-primary-votes status in 267 polling booths (representing 3.6 per cent of the booths)—some of these being lost to the Liberal Party
- the Country-Liberal Party (in the Northern Territory) had lost five polling booths
- the Australian Greens Party had won an extra 57 polling booths where its primary vote exceeded 20 percent (representing 0.8 per cent of booths).

Identifying the discriminant functions

The 48 variables listed in Table 1 measure a wide range of demographic and socio-economic characteristics of the populations living in the polling booth catchment. They were used as predictors of voting behaviour in the discriminant analysis model. A small number of statistically significant discriminant functions were derived which help explain the differences between the six main Voting Groups of polling booths (as listed in Table 2) which voted strongly for a political party at the 2007 election. The modelling revealed that three discriminant functions are significant and when combined they explain 94.3 per cent of the between-group variance across the Voting Groups. Table

Table 3: Functional loadings of predictor variables loading on discriminant functions 1, 2 and 3

Predictors	Function 1	Function 2	Function 3
EXTRACT	**-.550**	+.277	-.216
ONEPARENT	**+.543**	**+.323**	+.029
IMMIG	**+.494**	-.232	+.133
HOMEOWN	**-.481**	+.040	+.015
GENY	**+.458**	-.052	-.215
SYMBA	**-.437**	**-.358**	**-.364**
ANG	**-.414**	+.229	-.069
ADSS	**+.387**	-.151	+.144
DISTRIB	**+.358**	-.029	**+.329**
BOOMERS	**-.356**	-.133	-.170
PUBHOUS	**+.353**	+.213	+.040
ASIA	**+.348**	-.035	+.143
ONCHREL	**+.346**	-.101	-.036
INPERS	**+.320**	-.030	+.169
ISLAM	**+.309**	+.120	+.118
WW2GEN	**-.300**	+.094	+.046
NORELIG	+.136	**-.582**	**-.325**
INTERNET	-.085	**-.548**	+.048
UK	+.024	**-.541**	+.163
HIGHINC	+.017	**-.509**	+.137
BUSSERV	+.186	**-.497**	+.020
DEGREE	+.104	**-.496**	-.200
LOWINC	-.022	**+.432**	-.204
ROUTPROD	**+.347**	**+.423**	**+.339**
UNEMPLOY	**+.308**	**+.357**	-.162
TRANSFORM	**+.282**	+.021	**+.423**
COUPLES	**-.319**	-.097	**-.355**

Note: The table includes only those variables with a loading of ≥+/ -.300 on at least one of the first three discriminant functions.

3 shows which of the 48 demographic and socio-economic characteristic of polling booth catchments have a significant loading on those three most important discriminant functions.

The information shown in Table 3 may be interpreted as follows:

- The figures in bold type indicate where a variable is significant for a discriminant function.
- Where it is significant, a variable is judged as being an important predictor of voting behaviour in discriminating between the polling booth Voting Groups listed in Table 2.
- The combination of those variables with significant loadings on a discriminant function in Table 3 are then used to develop a descriptive interpretation of what a function means.

Discriminant Function 1: an asset poorer-multicultural-younger/asset richer-monocultural-older dimension

This function explains 50 per cent of the variance, with 19 variables having significant loadings. Variables with the highest positive loadings on this first function are: ONEPARENT, IMMIG and GENY; while variables with the highest negative loadings are EXTRACT, HOMEOWN, SYMBA and ANG.

Polling booth catchments with high positive scores on Function 1 might be described generally as being asset poorer-multicultural-younger and represent places at one end of this dimension, while those with high negative scores might generally be described as polling booth catchments that are asset richer-monocultural-older and represent places at the other end of this dimension.

The asset poorer aspect of the dimension tends to identify places with a greater incidence of households that are public housing tenants and with a lower rate of outright home ownership. These places are likely to have a higher rate of unemployment, and they are likely to have a greater incidence of workers in in-person service occupations and in the routine production occupations and of workers in administrative and support services industries. In contrast, the asset richer aspect of the dimension identifies places with a higher rate of outright home ownership, and which also tend to have a higher proportion of workers who are in the symbolic analyst occupations and of workers in the extractive industries.

The multicultural aspect of the dimension identifies places with a greater incidence of persons born overseas, and especially from Asian countries of origin, and of people identifying themselves as Islamic and/or having another non-Christian religion. In contrast, the monocultural aspect of the dimension identifies places with a lower proportion of persons born overseas and a higher proportion of Anglicans.

The age component of the dimension is such that the young aspect of the dimension identifies places with a greater incidence of one-parent families and a higher proportion of generation Yers, while in contrast the older aspect of the dimension identifies places with a greater incidence of the post-depression and World War II generation and the baby boomers. Places which have older populations also tend to have a higher incidence of couple households.

Discriminant Function 2: a lower income-lower socioeconomic status/higher income-higher socioeconomic status dimension

This function explains a further 28 per cent of the variance, with 11 variables having a significant loading. Variables with the highest positive loadings are LOWINC, ROUTPROD; while variables with the highest negative loadings are NORELIG, HIGHINC, BUSSERV, DEGREE, UK, INTERNET.

Polling booth catchments with high positive scores on Function 2 might generally be described as having a *lower income-lower socio economic status* and represent places at one end of this dimension, while polling booth catchments scoring high negative scores have a *higher income-higher socio economic status* and represent places at the other end of this dimension.

The *lower income-lower socio economic status* aspect of the dimension tends to identify places characterised by a greater incidence of lowest income quintile households. They also have a higher proportion of workers in routine production occupations, a higher rate of unemployment, and a greater incidence of one-parent families.

The *higher income-higher socio economic status* aspect of the dimension identifies places characterised by a greater incidence of highest income quintile households, have a higher proportion of workers with a university level qualification, and a greater incidence of workers in the producer/business services industries and of workers in the symbolic analyst occupations. They have a higher proportion of people born in the UK, a greater incidence of people with no religion and a higher proportion of households connected to the internet.

Discriminant Function 3
This function accounts for a further 16 per cent of the variance, with six variables having a significant loading, namely TRANSFORM, ROUTPROD, DISTRIB (positive); and COUPLES, NORELIG, SYMBA (negative).

This function is thus difficult to interpret. It might be differentiating on the one hand between places at one end of the dimension that are characterised by having a greater incidence of people working in the transformative industries and in the distributive industries sectors, and by a higher proportion of workers in the routine production occupations. On the other hand it might be differentiating between places with a greater incidence of couples without children, of people with no religion and higher proportions of workers in the symbolic analyst occupations at the other end of the dimension.

To some extent this third function overlaps with both the first and the second discriminant functions, with just a very small number of variables having a significant loading on this third function also having a significant loading on either the first or the second functions. Because of the smaller amount of the total variance accounted for by this discriminant function, and the imprecise nature of what it represents, it is disregarded in further analysis, and our focus is on the first two functions that explain 78 per cent of the differentiation between the polling booth groups relating to voting support for the political parties.

Comparison with the analysis of the 2001 and 2004 elections
The above results may be compared with the analyses of voting for House of Representatives candidates at the 2001 and the 2004 federal elections. There were some minor differences in the set of demographic and socio-economic variables used, and there were differences in the voting booth Voting Groups identified vis-à-vis the minor political parties.

Without going into details, the discriminant analyses for the vote at the 2001 and 2004 elections both derived two dominant functions that were described in similar terms to those derived from the analysis of the 2007 election. In 2004, function 1 was a monocultural-older/multicultural-younger dimension, explaining 54.7 per cent of the variance, and function 2 was a disadvantage/advantage dimension, accounting for 28.9 per cent of the variance. In 2001, func-

tion 1 was an asset rich-monocultural/ asset poor-multicultural dimension, accounting for 42.5 per cent of the variance, and function 2 was a low income-low education/ high income-high education dimension, accounting for 30.8 per cent of the variance.

At the 2007 election, the differences between the polling booth Voting Groups identifying support for the various political parties that were being explained by a first discriminant function were due to a somewhat more complex set of variables than was the case at the previous election in 2004 and also in 2001. Moreover the percentage of the variance being accounted for by the still very dominant first discriminant function was down by four percentage points at the 2007 election compared with the 2004 election. Nevertheless it was up by more than seven percentage points compared with the 2001 election. By the 2007 election this first discriminant function seemed to be representing a dimension that was not just a multicultural-young/monocultural-old dimension but also a dimension that had now incorporated an asset poorer/asset richer dimension as a discriminator. In some ways, by the 2007 election this dominant first discriminant function had started to resemble more closely the structure that it had for the 2001 election except that, by the 2007 election, the dimension was also more clearly incorporating an age-related component.

At the 2007 election the nature of the second discriminant function had become defined by a slightly greater number of variables in differentiating between the Voting Groups on the basis of the income and socio-economic status of a polling booth catchment. Also, by the 2007 election there were some variables measuring religious affiliation that were now loading in a significant way on this second discriminant function. But at all three elections essentially this second discriminant function remained a socio-economic status or an advantage-disadvantage type of differentiating dimension.

An interesting and perhaps important difference between the 2004 election and both the 2001 and 2007 elections is that in both 2001 and 2007 the variable measuring households that were owner occupiers but carrying a mortgage (MORTGAGEES) was significant on the second discriminant function. It is also interesting that at the 2001 and 2007 elections the PUBHOUS variable joined the HOMEOWN variable in having a significant loading on the first discriminant function, thus giving this function an asset poorer/asset richer aspect. What this means is that at the 2001 and 2007 elections there was less differentiation of the vote for the major political parties being explained by the incidence of households that had or did not have a mortgage, whereas this was a significant discriminating variable at the 2004 election, which had been described as the election the Coalition won with the support of the 'John Howard battlers' in the outer suburbs.

POSITIONING THE POLITICAL PARTIES IN A SOCIO-POLITICAL SPACE
The method
For the analysis of the vote at the 2007 federal election for the House of Representatives—as was also the case with the analyses of the previous elections in 2001 and 2004—it is the first two dominant discriminant functions discussed above that are of most interest. This is because when combined they accounted for 78 per cent of the total variance.

It is possible to compile a diagram showing the position of each polling booth according to the political party Voting Group to which it belongs, plotted on a graph in which the orthogonal axes (that is, that the axes are at right angles) represent the first two functions derived from the discriminant analysis. But doing that results in more than

7,400 points (that is, polling booths) being plotted on the graph, which makes it visually difficult to comprehend.

Thus, for the sake of simplicity, in Figure 1 we only show the centroid position from the plot on the graph of the scores for all of the polling booths forming a Voting Group. The Voting Groups CDP Christian Party, the Family First Party and the Australian Democrats Party are dropped out of this analysis because they did not have a sufficient number of booths gaining over the 20 per cent of the primary vote. Therefore, Figure 1 shows only the positions of the major party Voting Groups plus the Greens and Independents.

In Figure 1 the horizontal axis on the graph is the asset poorer-multicultural-younger/ asset richer-monocultural-older discriminant function, and the vertical axis is the lower income-lower socio economic status/higher income-higher socio economic status discriminant function. Thus the figure provides a visual representation of the degree of separation between the centroids of the distribution of the polling booth Voting Groups. It gives an indication of the differentiation between the political parties in this two-dimensional socio-political space.

The results
From Figure 1 we may draw the following general conclusions about the 2007 vote for the House of Representatives:
1. Labor is clearly separated from the other political parties, being located within the asset poorer-multiculticultural-younger/ lower income-lower socio economic status quadrant of the graph.
2. In contrast, the Liberals are located within the opposite asset richer-monoculture-older/higher income-higher socio economic status quadrant, and the party's position is nearest the centre of the axes formed by the two discriminant functions.

Figure 1: A socio-political space—the position of political parties on discriminant functions 1 and 2 using z scores between -2.0 and 2.0—the centroid position of polling booths by party voting group at the 2007 federal election
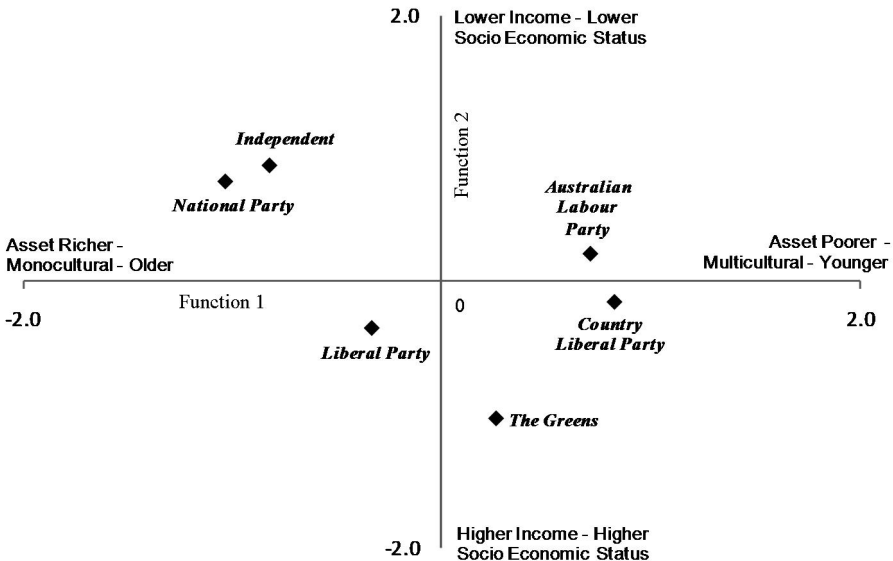
3. The Nationals and the Independents are located in the asset richer-monocultural-older/lower income-lower socio economic status quadrant of the graph.
4. The Greens and the County Liberal Party (Northern Territory only) are both located in the asset poorer-multicultural-younger/higher income-higher socio economic status quadrant of the graph.
5. Within the Coalition there is a wide separation between the Nationals and the Liberals, with the results from the discriminant analysis modelling demonstrating the extent to which the voting constituencies for the Coalition partners are differentiated.

When the locations of the polling booths belonging to each of the Voting Groups are mapped it is evident that there are quite clear geographies underlying the vote for the political parties across Australia's cities, regional towns and rural areas.

For example, there are high concentrations of voter support for Labor across the inner city regions of the capital cities, and there are also strong concentrations of voter support for the Greens in the inner city regions. There are also high concentrations of voter support for the Coalition parties across much of the middle suburbs of the big cities and across much of rural and regional Australia.

Changes over the three elections 2001, 2004 and 2007
In Figure 2 we attempt to demonstrate how, over the last three federal elections for the House of Representatives, the position of the polling booth Voting Groups representing strong support for political parties have shifted within the type of socio-political space described above. What is represented in the figure is a stylisation of how the centroid position of the Voting Groups has trended vis-à-vis the polling booth scores on

Figure 2: The changing positions of political parties in a socio-political space over the last three federal elections 2001, 2004 and 2007
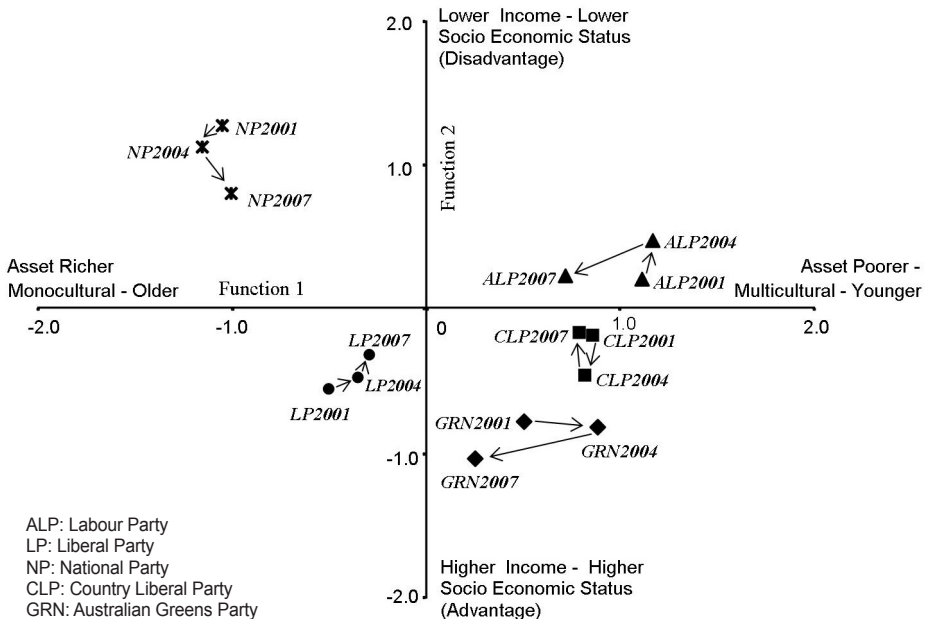
the first two discriminant functions that are represent the axes on the graph and which, as discussed previously, are remarkably similar across the three elections.

Across all three elections the position of the Labor Party remains in the asset poorer-multicultural-younger/lower income-lower socio economic (disadvantage) quadrant of the socio-political space. However, there has been a distinct move from the 2004 election to the 2007 election more towards the centre of that space, which indicates Labor was less dependent on the votes of people living in polling booth catchments characterised as being asset poorer and multicultural. And between the 2004 election and the 2007 election Labor was less dependent on voters in lower income and lower socio economic status areas, with the party basically returning to where it was at the 2001 election. The shift towards the centre of the graph indicates that at the 2007 election Labor captured votes across a wider spread of the electorate having gained voters in places that were less multicultural, less young, and not as asset poor. In effect, that reflects the significant gains Labor has made at the 2007 election in the outer suburban areas of the big cities and in some of the larger regional urban centres.

The position of the Liberals in the socio-political space, while rather more marginally remaining within the asset richer-monocultural-older/higher income-higher socio economic status quadrant of the graph, is the most centrally placed of all the political parties. But its position has progressively shifted more towards the centre from the 2001 election to the 2004 election and finally to the 2007 election. Thus the Liberals seemingly have surrendered some voter support in areas characterised by higher income and higher educated populations as well as possibly foregoing support in some of the asset rich, monocultural and older areas. In effect the trajectory of the Liberal's path in the socio-political space

from 2001 to 2004 has been the mirror-image of the trajectory of the Labor Party in that space from 2004 to 2007.

The Nationals have remained firmly embedded within the asset richer-monocultural-older/lower income-lower socio economic status quadrant of the socio-political space, with the relatively small movement between 2001 and 2007 being more towards the middle of the income-socio economic status dimension.

The Country-Liberal Party (Northern Territory only) has remained in the asset poorer-multicultural-younger/higher income-higher socio economic status quadrant of the graph and more to the middle of the income-socio economic status (advantage/disadvantage) dimension.

The position of the Greens remains within the asset poorer-multicultural-younger/higher income-higher socio economic status quadrant. They are also further out than any of the other political parties along the higher income-higher socio economic status end of what is essentially an advantage/disadvantage dimension. Over time the Greens' position has moved marginally out towards the higher end of this dimension. However, its position on the asset poorer-multicultural-younger end of the horizontal dimension moved further out along that end of the dimension between 2001 and 2004 before then moving back more towards the middle of that dimension in 2007.

ACCURACY OF THE PREDICTIVE MODEL

The overall predictive accuracy of the discriminant analysis model used in the study of the 2007 federal election vote for House of Representatives candidates is relatively high at 69.7 per cent (see Table 4). That level of predictive accuracy was up almost three percentage points compared with the modelling conducted for the 2004 election. But the predictive accuracy of the modelling for the vote at the 2007 election was

slightly more than two percentage points lower than it had been for the modelling of voting at the 2001 election.

However, the predictive accuracy of the model for the 2007 vote varies for each of the Voting Groups. The final column of Table 4 shows the actual voting outcomes for polling booths at the 2007 federal election. The data in each row indicate the number (and percentage) of polling booths where the model correctly predicts the level of the voter support for a political party.

The highest level of accuracy of the model in predicting the primary vote outcome at the polling booth level was for the Country-Liberal Party (Northern Territory only) at 88.9 percent. For Labor is was 74.6 per cent and for the Liberals 73.5 per cent, followed by the Greens 61.7 per cent and the Nationals 54.5. However, the model had a very low predictive accuracy for the Independents at only 6.1 per cent.

WHAT FACTORS MIGHT BE ASSOCIATED WITH THE SWING TO LABOR

The approach

Multiple regression modelling was used to try to gain an indication of the demographic and socio-economic factors that might have been associated with the swing in voter support from the Coalition parties to the Labor Party that occurred at the 2007 election for the House of Representatives:

1. First we investigated what demographic and socio-economic characteristics of polling booth catchments might be associated with the actual percentage change between the 2004 election and the 2007 election in the level of the primary vote for Labor at polling booths across Australia. This was the dependent variable in the model. A total of 7,407 polling booths were included in the modelling, which is fewer than the

Table 4: Predicted and actual polling booth voting outcomes: number of polling booths and percentage of booths correctly predicted by the model, 2007 federal election

Political party	Model predicted voting outcome Number of polling booths and percent correctly predicted						
	Liberal	National	CLP	Labor	Indep-endents	Greens	*Actual voting outcome*
Liberal Party—	**2,167**	262	16	450	4	48	*2,947*
most primary votes (per cent)	**73.5**	8.9	0.5	15.3	0.1	1.6	
National Party—	250	**508**	4	143	22	5	*932*
most primary votes (per cent)	26.8	**54.5**	0.4	15.3	2.4	0.5	
Country-Liberal Party—	2	0	**24**	1	0	0	*27*
most primary votes (per cent)	7.4	0	**88.9**	3.7	0	0	
Labor Party—	521	79	57	**2,294**	20	105	*3,076*
most primary votes (per cent)	16.6	8.0	4.6	**74.6**	0.7	3.4	
Independents—	26	95	0	32	**10**	0	*163*
most primary votes (per cent)	16.0	58.3	0	19.6	**6.1**	0	
Australian Greens Party—	61	2	2	39	1	**169**	*274*
20 per cent+ primary vote	22.3	0.7	0.7	14.2	0.4	**61.7**	

number of polling booths across Australia because we could only include those booths which were the same for the 2004 and the 2007 elections.

2. Second we focused only on those polling booths that met two criteria: there was a larger primary vote for the Labor Party than for the Coalition parties at the 2007 election and at those same polling booths there had been a larger primary vote for the Coalition parties than for Labor in 2004. Arguably it is those polling booths where the vote would have had quite a crucial influence on the outcome of the 2007 federal election and the resultant change from a Coalition to a Labor government. A total of only 1,094 polling booths met these criteria. The difference in the level of the primary vote for Labor in those polling booths is thus the dependent variable in this model.

In both models we used a step-wise multiple regression method which successively identifies which of the 48 variables listed in Table 1 (that is, the independent variables) are statistically significant in explaining the variation in the dependent variable, with the first variable identified having the largest contribution to the total variance (it having the largest R^2), and with successive variables identified adding a declining contribution to the total variance.

Explaining the actual percentage change in the primary vote for Labor, 2004-2007

The step-wise regression analysis resulted in a 30 model solution in which 24 variables are statistically significant (see Table 5), with an adjusted R^2=0.16. Thus those variables account for only 16 per cent of the

Table 5: **Results of a step-wise regression model investigating the relationship between the magnitude of the swing in the primary vote to the Labor Party between the 2004 and 2007 federal elections and the characteristics of the population living in polling booth catchments**

	30th model solution		
Polling booth catchment demographic and socio-economic variable	Standardised Beta coefficient	t	Significance
(constant)	-9.177	-2.247	.025
NORELIG	-.208	-11.887	.000
DEGREE	-.144	-4.949	.000
IMMIG	-.274	-10.521	.000
SYMBA	-.138	-6.226	.000
ASIA	.285	9.282	.000
MALES	.051	3.520	.000
UNEMPLOY	.091	6.244	.000
ISLAM	-.026	-1.806	.071
MORTGAGEES	.115	4.885	.000
SINGLES	.191	8.651	.000
YOUTH	.089	3.747	.000
INTERNET	.147	5.664	.000
COUPLES	.068	3.325	.001
CATH	.124	8.227	.000
DEPGEN	-.087	-4.410	.000
ADSS	.045	3.395	.001
ANG	.066	4.346	.000
CERTDIP	-.090	-3.581	.000
PERSERV	.027	2.155	.031
RENTERS	.106	4.912	.000
GENY	-.090	-4.249	.000
GENX	-.056	-3.332	.000
FIRST	-.039	-2.645	.008
INWORK	.042	2.196	.028

Adjusted R^2=0.160

variation across the 7,407 polling booths in the magnitude of the swing in the primary vote to Labor between the 2004 and the 2007 federal elections.

Variables which seem to have a positive relationship and help explain a greater swing to Labor tend to be in those polling booth catchments in 2007 where the local population is characterised by a relatively greater incidence of people born in an Asian country, males, unemployed workers, households with a mortgage, renters, single-parent households, couples households, children and youths, households connected to the internet, Catholics, Anglicans, symbolic analysts, workers in administrative and support industries, and personal service industry workers. However, variables which seem to have a negative relationship and help explain a lower magnitude of swing to Labor tend to be places where the local population is characterised by a greater incidence of people without a religion, workers with a degree, places where there are a lot of workers with a trade qualification or diploma, places where there is a higher incidence of people born overseas, and places with a higher concentration of the pre-war and depression generations, generation Xers and Yers and first-time voters.

It may be, however, that some of the places with relatively higher concentrations of local populations with those characteristics are in fact polling booth catchments where there had been a relatively high primary vote for Labor at the 2004 federal election and that the swing to Labor at the 2007 election was not all that much.

Overall this multiple-regression modelling does not provide us with a great deal of explanation for the magnitude of spatial variability in the swing to Labor at the local level of the polling booth across Australia, with more than 84 per cent of the variability in the swing remaining unex-

plained. But what these results do suggest is that there is not a set of demographic and socio-economic variables relating to the characteristic of polling booth catchments that are particularly powerful as explanatory factors underlying the spatial variability in the swing in the primary vote to Labor. That might suggest that the swing was in fact on quite widely across Australia, and that the swing to Labor was not particularly confined to local areas that had marked concentrations of specific demographic and socio-economic groups. The implication is thus that the swing occurred across a wide variety of demographic and socio-economic populations.

Explaining the shift from a Coalition-dominant to a Labor-dominant primary vote, 2004 to 2007

The analysis focusing only on those 1,094 polling booths where voters had switched from giving more primary votes to the Coalition at the 2004 federal election to giving more primary votes to Labor at the 2007 election might be expected to provide a somewhat more meaningful insight into the nature of the swing that occurred at the 2007 election. After all it is those polling booths where the voters switched their allegiance from the Coalition to Labor.

The step-wise regression analysis resulted in a 10 model solution in which 10 variables are statistically significant with an adjusted R^2=0.22 (see Table 6). Thus those variables account for 22 per cent of the variation of the magnitude of the swing in the primary vote from the Coalition to the Labor Party between 2004 and 2007 in those polling booths where the voters have switched their voting dominance from the Coalition to Labor. But, this model outcome still provides a low level of explanation.

The switch in voting allegiance seems to be related to places where the local populations are characterised by a greater

incidence of Anglicans, Catholics and people with other Christian religions, Indigenous people, people born in Asia, workers in the extractive industries, single-parent households, and households connected to the internet. All of those variables had a positive relationship to the magnitude of the voting switch. In contrast, it seems that there was a negative relationship with places characterised by populations with a greater incidence of migrants from the UK and of workers in the producer services and business services industries.

CONCLUSION

The research discussed in this paper builds on previous analyses of voting at the 2004 and the 2001 federal elections by modelling the vote for the 2007 House of Representatives election where Labor decisively defeated the Coalition Government. The analysis of the primary vote was conducted at the highly spatially disaggregated level of local polling booths across Australia, and the spatial variability of the level of the vote for political parties has been related to a wide set of demographic and socio-economic variables of polling booth catchments. This shows that two dominant discriminant functions account for 78 percent of the between-group variance in the Voting Groups into which polling booths were classified according to the level of support voters gave to political parties. Those functions were derived from an analysis of 48 demographic and

socio-economic characteristic of the populations living in polling booth catchments, and have been described as an asset poorer-multicultural-younger/asset richer-monocultural-older dimension and a lower income-lower socioeconomic status/higher income-higher socioeconomic status dimension. The overall accuracy of the modelling to predict the actual outcome of voting support for the political parties in polling booths across Australia was relatively high at almost 70 per cent, although there was a degree of variation in the predictive accuracy of the model for each political party.

The degree to which there has been stability and the nature of the changes that have occurred across the 2001, 2004 and 2007 federal elections in respect of those dimensions which discriminate between

Table 6: **Results of a step-wise regression model investigating the relationship between the magnitude of the swing in the primary vote to the Labor Party at those polling booths which switched allegiance from the Coalition to the Labor Party between the 2004 and 2007 and the characteristics of the population living in polling booth catchments**

Polling booth catchment demographic and socio-economic variable	10th model solution		
	Standardised Beta coefficient	t	Significance
(constant)	-31.358	-4.520	.000
ANG	.308	8.928	.000
UK	-.097	-3.134	.002
EXTRACT	.156	4.908	.000
CATH	.239	7.281	.000
INDIG	.163	5.213	.000
BUSSERV	-.307	-6.577	.000
ASIA	.151	4.233	.000
ONEPARENT	.261	5.444	.000
INTERNET	.250	4.292	.000
OTHCHRIST	.069	2.223	.026

Adjusted R^2=0.223

voting groups supporting the various political parties has been discussed. The shifts in the position of a political party in that socio-political space have been highlighted. In particular, we found that at the 2007 election there had been a shift in the position of the Labor Party towards the middle of that space which is defined by the axes describing an asset poorer-multicultural-younger/asset richer-monocultural-older discriminant function and a lower income-lower socio economic status/higher income-higher socio economic status discriminant function.

An attempt has been made—but with relatively limited success—to identify the demographic and socio-economic characteristics of the local populations living in polling booth catchments that might explain the magnitude of the shift in the level of the primary vote for the Labor party between the 2004 and the 2007 federal elections which led to a change in government. Our limited success might be indicative of how widespread across demographic and socio-economic groups—as well as across geographic space—the shift was in voter support from the Coalition parties to the Labor Party at the 2007 election.

Of course it needs to be emphasised that the analyses conducted and reported in this paper actually reflect the type of ecological spatial relationships that exist in the level of voter support for political parties and the characteristics of the local populations that live in the catchments of local polling booths across Australia. These are not direct cause-effect relationships at the level of individuals. Nonetheless, the detailed multi-variate statistical modelling conducted in this research is significant. This is because it represents a rare occurrence whereby election outcomes are analysed at a very detailed level of spatial disaggregation. Thus the findings provide a quite powerful set of statistically validated results that add to our understanding of, and which might help provide potential explanations for the demographic and socio-economic factors that might be important in differentiating between levels of voter support for political parties at a federal election for the House of Representatives.

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