

# Mixed Logit Models of Party Choice: Towards Process Heterogeneity

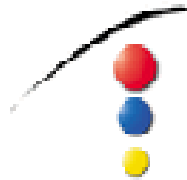
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## Why Mixed Logit (MXL) Models?

- Substitution Patterns & IIA - MNL v. MNP
- Like MNP MXL Handles IIA
- MXL - Several Advantages Over MNP
- (Very) Large Choice Sets
- Varying Choice Sets, e.g., bring in SNP & Plaid Cymru
- Scenarios with Reduced Choice Sets, e.g., what happens if Liberal Democrats Disappear
- Heterogeneity - Random Parameters with varying distributions
- Covariates for Random Parameters

## The MXL Model

$$P(j|v_i) = \frac{\exp(a_{ji} + \Theta_j z_i + \Phi_j f_{ji} + \beta_{ji} x_{ji})}{\sum_{m=1}^j \exp(a_{mi} + \Theta_m z_i + \Phi_m f_{mi} + \beta_{mi} x_{mi})}$$

where:  $U_{ji} = a_{ji} + \Theta_j z_i + \Phi_j f_{ji} + \beta_{ji} x_{ji}$

where:  $a_{ji}$  is an alternative specific constant (fixed or random)

$\Theta_j$  and  $\Phi_j$  are vectors of fixed coefficients

$\beta_{ji}$  is a vector of random coefficients

$z_i$  are individual characteristics

$f_{ji}$  are individual & choice-varying attributes of choices

$x_{ji}$  are individual & choice-varying attributes of choices

## MXL Model Continued

Random Parameters:

$$\beta_{ji} = \rho_{jk} + \delta_{jk} w_i + \sigma_k v_{ki}$$

where:  $\rho_{jk}$  constant term

$\delta_{jk}$  coefficient for an individual-specific mean

$w_i$  set of individual characteristics

$v_{ki}$  individual- and choice-specific random disturbances

$\sigma_k$  standard deviation of marginal distribution of  $\rho_{jki}$

## Analyses of 2005 BES Data

- Face-to-Face Survey Data
- available from [www.essex.ac.uk/bes](http://www.essex.ac.uk/bes)
- composite model of party choice from *Political Choice in Britain*
- estimation with NLOGIT 3.0 (Greene 2002)

### Table 1. Basic MXL Model of Party Choice - Key Findings

#### *Characteristics of Choices*

	<u>B</u>	<u>S.e.</u>
Party Best Handle Most Important Issue	1.66***	0.24
Issue-Party Proximities	0.34***	0.06
Party Leader Affect	0.66***	0.07

#### *Characteristics of Choosers*

	<u>Conservative</u>		<u>Liberal Democrat</u>	
	<u>B</u>	<u>s.e.</u>	<u>B</u>	<u>s.e.</u>
Party Identification:				
Labour	-2.12***	0.49	-2.03***	.52
Conservative	1.98***	0.44	0.43	.58
Liberal Democrat	0.92x	0.63	3.17***	.65
Plaid Cymru, SNP	-0.04	2.26	-0.65	2.65
Economic Evaluations	-0.53***	0.18	-0.09	.18
National Identity	-0.05	0.22	-0.27	.24
Opinions on Iraq War	0.10	0.15	-0.12	.18
Tactical Voting	0.22	0.39	0.87**	.36

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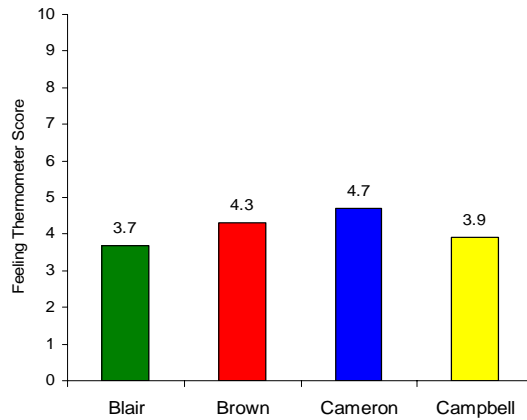
	Conservative		Liberal Democrat	
	B	S.e.	B	S.e.
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Tactical Voting	0.22	0.39	0.87**	.36
Age	0.03**	0.01	0.02**	.01
Ethnicity	1.31*	0.67	1.63**	.65
Gender	0.21	0.32	0.73*	.35
Social Class	1.31***	0.35	0.44	.34
Constant	-3.10***	0.77	-3.87***	.94

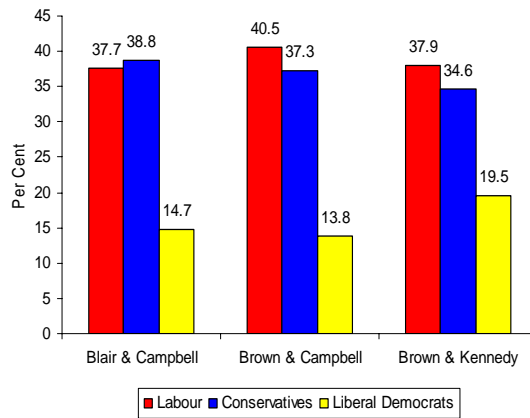
	Plaid Cymru		SNP	
	B	S.e.	B	S.e.
Party Identification:				
Labour	-0.81	2.34	-3.34*	1.98
Conservative	2.44	2.71	-1.50	2.40
Liberal Democrat	2.21	2.76	-1.49	3.22
Plaid Cymru, SNP	6.02x	3.74	6.09*	3.45
Economic Evaluations	-0.67	1.05	-0.32	0.70
National Identity	-0.14	1.20	0.38	0.84
Opinions on Iraq War	0.41	0.80	0.44	0.71
Tactical Voting	0.99	2.07	1.73	1.58
Age	0.05	0.06	0.06x	0.04
Ethnicity	1.18	5.52	3.61	28.59
Gender	0.87	1.79	0.20	1.42
Social Class	0.68	2.00	1.83	1.66
Constant	-6.04	5.88	-8.37	28.90

Log-Likelihood = -3090.30  
Pseudo R2 = .74, Percentage Correctly Classified = 74.1, Lambda = .63  
\*\*\* - p ≤ .001, \*\* - p ≤ .01, \* - p ≤ .05, x - p ≤ .10

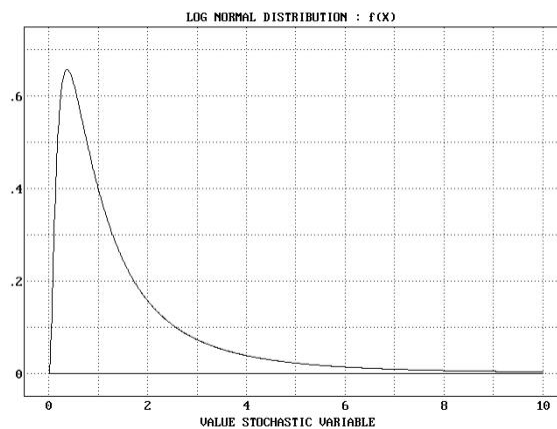
**Figure 1. Party Leader Affect - June 2006  
YouGov Valence Politics Survey**



**Figure 2. Alternative Party Leaders - Three Voting Scenarios**



**Lognormal Distribution,  $X > 0$ ,  
where  $\mu = 0$ ,  $\sigma = 1$  for the log of  $X$**



**Table 2 - Rival Random Parameter MXL Models of Party Choice**

**A. Three Normal Distributions**

	<u>B</u>	<u>s.e.</u>	<u>t</u>	<u>s.d.</u>	<u>s.e.</u>	<u>t</u>
Party Leader Affect	1.12	.19	6.02***	.60	.27	2.27*
Issue-Party Priorities	.52	.12	4.30***	.17	.38	.44
Party Best Most Impt Issue	2.52	.46	5.47***	2.30	1.64	1.40x

R2 = .75  
LogLikelihood = -767.78

**B. Two Normal Distributions with Political Knowledge Index as Covariate**

	<u>B</u>	<u>s.e.</u>	<u>t</u>	<u>s.d.</u>	<u>s.e.</u>	<u>t</u>
Party Leader Affect	1.35	.35	3.87***	.66	.14	4.67***
Issue-Party Priorities	.46	.09	5.06***	aa	aa	aa
Party Best Most Impt Issue	2.54	1.02	2.50***	2.50	1.41	1.77*

Political Knowledge Effect on:  
Party Leader Affect -.04 .05 -.91  
Party Best Most Impt Issue -.03 .16 -.21

R2 = .75  
LogLikelihood = -767.21

**C. Two Lognormal Distributions with Political Knowledge Index as Covariate**

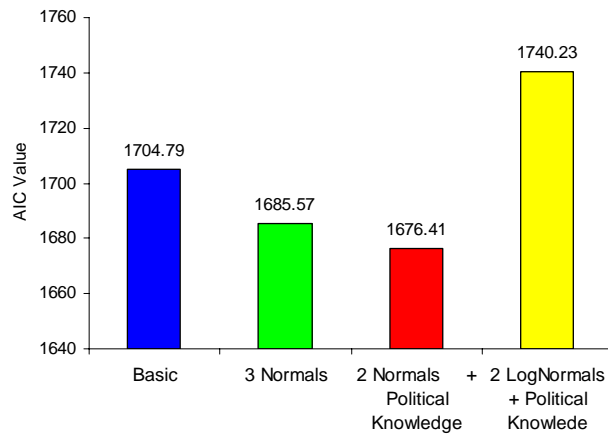
	<u>B</u>	<u>s.e.</u>	<u>t</u>	<u>s.d.</u>	<u>s.e.</u>	<u>t</u>
Party Leader Affect	.17	.28	.60	1.07	.07	15.37***
Issue-Party Priorities	.23	.05	5.05***	aa	aa	aa
Party Best Most Impt Issue	.23	.55	.41	1.28	.36	3.57***

Political Knowledge Effect on:  
Party Leader Affect -.14 .05 -3.05\*\*\*  
Party Best Most Impt Issue -.01 .09 -.15

R2 = .74  
LogLikelihood = -799.11

\*\*\* -  $p \leq .0001$ ; \*\* -  $p \leq .01$ ; \* -  $p \leq .05$ ; x-  $p \leq .10$ ; one-tailed test.  
aa - parameter not specified as random variable.

**Figure 3. MXL Model Comparisons - Akaike Information Criterion Values**



## Conclusions

- **MXL Models Confirm Earlier MNL (& MNP) Analyses of Party Choice in 2005**
- **Party Leader Images, Party Best on Most Important Issue, Partisanship & Issue-Party Proximities are the "Great Beasts"**
- **Evidence of Random Parameters**
- **Political Knowledge as Covariate**
- **Are Random Parameters Worth the Cost?**
- **"Stopping Rules" for RPL Models**

## References

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