FORCING VOTERS TO CHOOSE BY USING DISCRETE CHOICE EXPERIMENTS TO ESTIMATE POLITICAL PREFRENCES

Kasper M. Hansen
Professor
and
Mickael Bech
Professor

Centre for Voting and Parties
Department of Political Science
University of Copenhagen

About the CVAP Working Paper Series

The CVAP Working Paper Series contains finished drafts and preliminary versions of articles and chapters within the field of studies of voting, elections, political parties, parliaments, etc., that are on their way in the publication process.

About the Centre for Voting and Parties

The Centre for Voting and Parties (*Center for Valg og Partier*, CVAP) is a research centre attached to the Department of Political Science at the University of Copenhagen. The Centre was established in 2008 and concerns itself with research within the fields of voting, elections, political parties, parliaments, etc., both at a national and a comparative level.

For more information on the Series or CVAP, visit www.cvap.polsci.ku.dk.

Forcing Voters to Choose by using Discrete Choice Experiments to Estimate Political Preferences

Professor, Ph,.D. Kasper M. Hansen (corresponding author), University of Copenhagen, Department of Political Science, kmh@ifs.ku.dk &Professor, Ph.D. Mickael Bech, University of Southern Denmark, Institute of Public Health, mbe@sam.sdu.dk

Abstract

Discrete choice experiment represents a method allowing for the estimation of the *relative* strength of political preferences, which traditional survey design does not allow for. The respondents are asked in pair-wise comparison to asses a bundle of attributes combined in different scenarios. Discrete choice experiment is used to disentangle strongly correlated political preferences and estimation of their relative importance for voters' choice.

   This study presents a discrete choice experiment which combines salary increases, increasing or decreasing unemployment and the candidate for prime minister. Change in unemployment proves to be a more important attribute than prime ministerial candidate and changes in individual salary. Regardless of predisposition, voters are willing to accept a change of prime minister if unemployment decreases without any compensation in individual salary. The sociotropic frame is thus stronger than the egotropic frame.

Keywords: public opinion, discrete choice experiments, political preferences, economic voting, stated preferences.

Forcing Voters to Choose by using Discrete Choice Experiments to Estimate Political Preferences

1. Introduction

Political preferences are traditionally elicited in surveys using Likert scale types of questions asking respondents to assess the value of each policy item separately. The problem with such survey questions is that they do not capture the trade-off between the policy items, because there is no opportunity cost and all items can be preferred equally.

This article challenges the traditional survey questions by applying a technique not previously used to elicit the political preferences of the electorate. The applied technique is a discrete choice experiment, where respondents are asked to choose between alternative scenarios that vary on the levels of the included attributes. The combination of scenarios presented to the voters is constructed so that the respondents face a trade-off somewhat similar to when casting a vote in the ballot box but in a hypothetical setting where attributes are combined in an orthogonal set of scenarios which enables estimation of preferences. This technique allows an estimation of what voters prefer; most importantly, it indicates the relative importance voters attach to specific policy attributes. Voters may disagree on a specific policy, but this may not make them reject a candidate if this policy is of relatively low importance compared to other policies. Thus, it is not only important to know the voter's opinion on a specific policy attribute; knowing the weight of this policy attribute in the final vote is equally important.

By analyzing the strength of the individual voter's relative preferences regarding personal finances, the national economy and preference between the two candidates for prime minister doing the 2005 Danish parliamentary election allows to simulate a choice close to what the voters faced at the election. The voters' choices are analyzed using a survey experiment applying a discrete choice experiment in which the voters are

forced to trade-off between these three attributes. The use of discrete choice experimentation illustrates the potential of discrete choice experiments as a technique for eliciting political preferences and secondary taps into the controversy whether voters are primarily sociotropic or egotropic in there vote choice.

2. Forcing voters to choose

Surveys traditionally use different forms of Likert scale types of questions, where the voters can declare themselves more or less in agreement with statements or indicate whether more or less money should be spent on certain areas (see e.g. Moshkovich et al., 2002; Ryan et al., 2001; Bowling et al., 1993; Kinnunen et al., 1998). The advantage of these questions is that they are easy for the voter to answer and easy for the researcher to administrate, communicate and analyze. Nonetheless, the problem with this type of questioning is that it is one-dimensional and does not involve opportunity costs, as the design asks the voters to asses the issues separately. The issues are thus assed independently and not in relation to one another. In such a situation, the voter does not need to make any trade-off, and the answer will therefore not necessarily reflect actual behavior or the political preferences of the individual, where different political candidates are weighted against one another and concentrated in a single choice or vote. The non-compensatory decision making in Likert scale type of questions the respondent is not confronted with the direct opportunity costs of ranking one objective higher another objective. Thus it becomes difficult to determine the relative importance of the various objectives. To elicit preferences respondents should be confronted with the opportunity cost of their choices. The respondents should be confronted with trade-offs where more of one objective may be accepted in return for less of another

following compensatory decision making consistent with economic theory of preferences (e.g. Breivik & Supphellen, 2003; Keeney, 1992; Scott, 2002). Compensatory decision-making involves that the respondent is willing to give up a little of one objective in order to receive a little more of another objective.

One suggested solution to this problem is the use of rankings questions rather than the Likert scale rating questions. One type of ranking question simple ask respondent to rank the alternative by asking them to indicate the most important, second most important etc. (Klein et al., 2004; Vanleeuwen & Mandabach 2002; Russell & Gray, 1994; Maio et al., 1996; McCarty & Shrum, 2000). Another suggested solution is the use of different types of experimental vignettes, where descriptions of concrete situations varies across experimental groups providing an ordinal ranking across individual with respect to the experimental condition (e.g. Atzmuller & Steiner, 2010; Alexander & Becker, 1978). Such frameworks provides us with an ordinal rank of the alternatives and has proven very use full in that aspect as it allows for more differentiation and less end-piling (e.g. agreeing with all items). Thus bringing out more variations than traditional Likert scale rating questions (McCarty & Shrum, 2000; Alexander & Becker, 1978; Alwin & Krosnick, 1985). However ranking are often quite difficult and time-consuming for respondents and demand considerable cognitive skills among the respondents (Alwin & Krosnick, 1978:536). Adding certain values (e.g. money or time) to each rank only add to the difficulty of the ranking task, even through such values would allow measuring the relative importance of each item.

We suggest another approach a ranking method that allows measuring the *relative* importance of each item without adding to the difficulty of the questions – the discrete choice experiments. The main differences between the discrete choice experiments and

the traditional vignettes format is than one of the attributes in the discrete choice is a value (e.g. money) allowing to calculate the relative strengths of the attributes. In other disciplines, discrete choice experimentation has become a standard applied method. The technique was first applied in psychometrics and marketing (Wittink & Cattin, 1989; Johnson, 2007). More recently, it has been applied in transport, environmental and health economics (Bennett & Blamey, 2001; Louviere et al., 2000; Ryan & Gerard, 2003). One recent study applied the technique to elicit the preferences of regional politicians for the reimbursement of hospitals (Bech, 2003). This study found a difference in the ranking of the importance of the attributes using a simple rating method and a discrete choice experiment. In the simple ranking method, hospital treatment quality had top priority; however, when the regional politicians were confronted with direct trade-offs in the discrete choice experiment, budget constraints became the most important attribute (Ibid).

The experiment in this article confronts voters with a situation in which they must choose one of two possible scenarios. The combinations of scenarios are constructed so that there is a trade-off between future prime ministerial candidates, increased personal income and a decrease/increase in unemployment. Table 1 presents an example of the discrete choice question that the voters were confronted with in the experiment.

Table 1 about here

The three attributes were selected using two criteria. Firstly, the attributes were relevant to the present political discussion at the time of the survey. Secondly, the attributes were selected on the basis of theory of voter behavior. The theory of economic voting is here

used to illustrate the potential of the discrete choice experiment. One of the most challenging controversies in the field of economic voting is determining the extent to which voters rely on sociotropic or egotropic motives when revealing their political preferences. *Economic voting theory* assumes that voters maximize their utility. The theory attempts to explain the political choices made by voters based on their assessment of the national economy and their own personal economic situation (Alvarez et al., 2000; Borre, 1999a; Dorussen & Palmer, 2002; van der Eijk et al., 2006). In this sense economic voting highlights that politics is about trade-offs between various alternatives. When voters decide where to cast their vote, they are trading off between different political accomplishments, future deeds and an assessment of the respective "wrappings" and "messengers". The voters choose the package of political ideas providing the greatest future utility; this is the classic Downsian proximity model of voting (Downs, 1957). *Economic voting* research often assumes that voters hold the government responsibly for the economy. However, there is dispute over whether the national economy or personal finances constitute the most important factor (Dorussen & Palmer, 2002), i.e. are sociotropic motives more important for voters than egotropic motives? From a rational economic approach, voters are egotropically motivated, because they maximize their utility through their personal finances. Nevertheless, numerous studies have revealed that sociotropic motives are more important than egotropic motives (Lewis-Beck & Paldam, 2000; Borre, 1997; 1999).

This article contributes to the discussion of egotropic vs. sociotropic motivation by forcing the respondents to trade-off reduced unemployment for an increase in personal income. The former constitutes an operationalization of the sociotropic motive, whereas the latter is an operationalization of the egotropic motive. In addition to being able to

estimate whether voters are sociotropic or egotropic, we are also able to measure the relative strength of their preferences.

According to rational economic theory, voters focus on prospective rather retrospective judgment, i.e. voters will be more inclined to support their judgment about what optimizes their future utility rather than punishing or rewarding past accomplishments, as the utility of such achievements has already been enjoyed. Judgments supported by retrospective assessments will be of limited use when assessing future utility (Borre, 2003: 322) and are therefore only an imperfect signal for future performance (Lewis-Beck & Paldam, 2000; Alvarez et al., 2000). This analysis implicitly assumes that voters perform prospective assessments. Respondents are asked to assess future scenarios in which different candidates for prime minister are associated with different levels of other attributes

3. Discrete choice experiments

Discrete choice is a stated preference technique in which each respondent, presented with multiple pairs of hypothetical scenarios, is asked to choose the preferred option. The scenarios are composed of a number of attributes, with scenarios differing on at least one of the attribute levels. The technique is different from the revealed preference technique, which monitors actual choices. The benefit of the stated preference method is that the researcher can control the attributes and attribute levels. For revealed choices, the attributes and attributes levels are commonly correlated; often with so high correlation that it becomes difficult to disentangle the effect of each of the attributes to the choice of the voter.

The respondents in a discrete choice experiment must choose between various hypothetical alternatives. These choices allow for estimates of the underlying utility function of the voters. The idea behind the pair-wise comparison in the discrete choice experiment is that the voters can more easily choose between two scenarios than specifying the utility of e.g. the weight attached to each of the attributes. The estimated utility function indicates the specific weight a voter attaches to each of the attributes included in the survey. Furthermore by asking respondents to make binary comparisons regarding bundles of attributes rather than asking a series of distinct questions about each of the individual attributes one not only gains statistical efficiency but it also makes the task cognitively easier for the respondent.

This discrete choice experiment includes three attributes: increasing monthly personal salary (500 DKK (65€), 1,000 DKK (134€) or 5,000 DKK (671€)[1]), a change in unemployment (increasing or decreasing) and who will be prime minister (Lykketoft or Rasmussen[2]). The voter must choose between one of two compared scenarios (scenario A or B), each consisting of a combination of the three attributes. Combinations of the three attributes with the different values for the attribute levels provide a total of 12 different scenarios (3 x 2 x 2 = 12). The 12 scenarios provide 66 possible pair-wise comparisons (11+10+9+8+7+6+5+4+3+2+1 = 66). Since confronting a voter with all 66 pair-wise combinations is unrealistic, the number of combinations has been reduced in the actual survey interview. Applying a fractional-factorial experimental design, the number of comparisons is reduced without losing the possibility to estimate the main effects in the design, i.e. the main effects of the

---

[1] The monthly personal salary (before taxation) among the respondents was approximately 30.000 DKK (app. 4,000€).
[2] Rasmussen (Venstre/Liberals, a right-of-centre party) was the incumbent prime minister, whereas Lykketoft (Social Democrats) was the challenger to the office.

attributes, but some of the interactive effects between attributes may not be estimated as would be the case in a full factorial design. However, these effects often account for very little of the explanatory power, if significant at all (Louviere et al., 2000). The reduction is performed in a manner in which the attributes remain statistically independent, i.e. orthogonal to each other and thus uncorrelated. The design was performed using SAS's 'Choiceeff' macro, which maximizes the geometric mean of the eigenvalues of the matrix (i.e. D-efficiency, see Kuhfeld, 2005). This procedure reduces the 66 comparisons to 12, providing sufficient degrees of freedom to estimate the main effects with as little correlation between attributes as possible. The advantage provided by the fractional-factorial design is that it becomes possible to apply the design in a survey interview without having to confront respondents with unrealistic numbers of comparisons. Finally, it must be noted that the fractional-factorial design compared to a full design does not allow for estimating inconsistent choices, which would have allowed to e.g. identifying "random picking" in the response patterns.

The survey applying the discrete choice experiment was carried out using CATI with 2,000 representative Danish voters who had completed the survey in January and February 2005 with a response rate of 42 (AAPOR response rate 1). See Hansen (2007a; 2007b) for more information on the survey. The experimental design makes it possible to further reduce the numbers of pair-wise comparisons given to each respondent, as the 2,000 respondents in the survey are divided into four random groups of 500 respondents. Each of the four groups is given three pair-wise comparisons. In this manner, the 12 pair-wise comparisons are covered without excessively burdening each respondent.

4. Estimates using discrete choice experiment data

Respondents are assumed to choose the preferred future scenario based on their preferences for the attribute levels specific to each scenario. The choice between the pair-wise set of scenarios is assumed to be determined by the respondents' subjective valuations of the attributes. Each scenario is characterized by three attributes in which $X=(x_1,x_2,x_3)$, where x_1, x_2, x_3 refers to the level of the constituent attributes. It is assumed that the utility $U[X(x_1,x_2,x_3)]$ is additive separable in X. Facing the choice between two scenarios, respondent n chooses scenario i over j if

[1] $$U(X^i, Z_j) > U(X^j, Z_j)$$

Where $U(\ )$ represents the individual's indirect utility function, X^i and X^j are the utility-bearing attributes for each of the scenarios, and Z_n is the nth $(n=1....N)$ respondent's characteristics (tastes) influencing the choice of scenario. Since only the individual knows his/her true preferences, a random component of utility accounts for the inability of the analyst to accurately observe the individual's behavior (McFadden, 1974). Within a random utility model (RUM), the respondents will choose i over j if:

[2] $$V(X^i, Z_n) + \varepsilon_n^i > V(X^j, Z_n) + \varepsilon_n^j$$

where $V(X^i, Z_n)$ is the observable part of the individuals' utility function, whereas ε is a randomly distributed component which is unobservable to the researcher.

Using the discrete choice method, we will be unable to observe the utility directly; we can only observe the scenario preferred by the respondent. The probability that the respondent will choose A over B is therefore given as

[3] $P_{in} = \mathrm{Pr}\,ob\big[U(X^i, Z_n) > U(X^j, Z_n)\big] = \mathrm{Pr}\,ob\big[(\varepsilon_n^j - \varepsilon_n^i) < (V(X^i, Z_n) - V(X^j, Z_n))\big]$

The probability (P_{in}) that respondent n will choose scenario i is the limit of the proportion of times that we would observe a respondent facing the same scenarios as respondent n, and with the same values of observed utility for each scenario, to choose scenario i. The appropriate form for the cumulative distribution of ($\varepsilon_n^j - \varepsilon_n^i$) defines the appropriate estimation technique for the specification of the utility difference (Train, 1986). Assuming an Independent and Identically Distributed (IID) extreme type I distribution, a logit model is used to estimate the respondents' trade-offs between the attributes and the relative importance of each attribute, meaning that the probability for choosing alternative i becomes

[4] $$P_{ni} = \frac{e^{\beta' X_{ni}}}{\sum_j e^{\beta' X_{nj}}}$$

which is the familiar standard logit specification where β is the parameter describing the importance of the X attributes. The logit model is easily estimated because of its closed-form expression of the choice probabilities, which conversely imposes several

restrictions. During the last two decades, more general models capable of avoiding some of these restrictions have been developed, including the random parameter logit (RPL) (McFadden & Train, 2000; Train, 2003). RPL circumvents a number of the limitations of the standard logit model by allowing for random taste variation, correlation within subjects over repeated choice sets, and unrestricted substitution patterns. The key feature of an RPL model is that it allows for variation in the attribute values between individuals. Hence, instead of setting the parameters as fixed, the parameters are allowed to vary between individuals in the population with density $f(\beta|\theta)$. The estimation procedure delivers θ, which represents the distribution chosen to model tastes. Given an RPL specification, the researcher does not know the value of β_n or ε_{in}. If β_n were known to take the value β, the probability that respondent n chooses alternative i would be specified by the standard logit [4]. Since the researcher does not observe the actual tastes of the individuals, the probability becomes the integral of P_{ni} over all possible values of β, as weighted by the density chosen (the standard normal distribution is the most commonly applied distribution in RPL models). The unconditional choice probability that individual n chooses alternative i in choice set t therefore becomes the integral of the logit specification of all the possible values of β

[5]
$$P_{nit}(\theta) = \int L_{nit} f(\beta \mid \theta) d\beta$$

Assuming a linear additive utility function, our RPL model becomes

[6]
$$\begin{aligned}
U_{njt} &= \beta_0 + \beta'_n X_{nit} + \varphi' Z_n X_{nit} + \varepsilon_{nit} \\
&= \beta_0 + (b' + s'\eta_n) X_{nit} + \varphi' Z_n X_{nit} + \varepsilon_{nit}
\end{aligned}$$

where b is the mean parameter for the attributes (X), and s'η_n are the independent random deviates representing the person's taste relative to the average tastes in the population in addition to the person-specific interaction variables (Z_nX_{nit}). η_n represents the preference heterogeneity in the coefficients that is assumed to have some specific distribution. In this study, η is assumed to be standard normal distributed. All three attribute parameters are assumed to be random and normally distributed, implying that $\beta{\sim}N(b, s^2)$.

With the density of β specified to be normal with mean b and covariance W, the choice probability under the density becomes, see Train (2003)

$$[7] \quad P_{nit}(\theta) = \int \left(\frac{e^{\beta'X_{ni}}}{\sum_j e^{\beta'X_{nj}}} \right) \phi(\beta \mid b, W) d\beta$$

The estimations of the standard logit and the RPL model were carried out using STATA version 10.

5. Results

5.1 The trade-off between salary, unemployment and choice of prime minister

Initial analysis of the pair-wise comparisons of the respective scenarios is provided in Table 2. Table 2 shows all of the pair-wise choices which the voters were confronted with in the discrete choice experiment. The percentages show the proportions of voters choosing the one particular scenario over the other.

Table 2 about here

The first row (choice 1.1) reveals that 85% of the voters prefer scenario A (500 DKK salary increase, decreasing unemployment and Rasmussen as prime minister) over scenario B (5,000 DKK salary increase, increasing unemployment and Lykketoft as prime minister). The last row (choice 12.3) shows that 25% prefer Scenario B (500 DKK salary increase, increasing employment and Rasmussen as prime minister) over scenario B (5,000 DKK salary increase, decreasing unemployment and Lykketoft as prime minister). The proportion as such does not tell why the respondents choose one scenario over the other. Is it because of the salary, unemployment or choice of prime minister? By comparing the two pair-wise choices (e.g. choice 1.1 and 12.3), one gets an indication of the importance of the attributes. The two pair-wise choices mentioned only deviate on one single value of the attribute: unemployment. Thus, the proportionate difference can be ascribed to the change of unemployment. A change in unemployment – from decreasing to increasing – shifts 60 percentage points (85% minus 25%). Comparing choice 2.2 with 11.2 shows a 58 percentage point reallocation, and comparing choice 5.2 with 7.1 shows a 52 percentage points reallocation caused by the change in unemployment from decreasing to increasing. This provides the preliminary conclusion that unemployment is an important attribute when voters choose between scenarios.

By comparing choice 4.1 with 11.2, the effect of a salary increase can be identified, as the levels of all of the other attributes are constant. This comparison shows that a 4,500 DKK salary increase (change from 500 DKK to 5,000 DKK) only provides

a change of four percentage points (from 14% to 18%); comparing 5.4 with 9.3 shows an effect of 5 percentage points from a 500 DKK salary increase; whereas a comparison of 7.1 and 11.2 provides an effect of -3 percentage points change from a 4,000 DKK salary increase. Thus, the salary plays a much smaller and inconsistent role when the voters decide which scenario to choose compared to the attribute of unemployment.

Finally, comparison can be made to isolate the effect of the choice of prime minister. A comparison of choice 6.3 with 11.2 shows that the Lykketoft scenario is supported by 78% of the voters, whereas the scenario with Rasmussen is supported by 86%. Comparing choice 2.2 with 8.2 shows nine percentage points in favor of Rasmussen. That is a scenario with Rasmussen as prime minister is supported by eight and nine percentage points more compared to a scenario consisting of Lykketoft *ceteris paribus*.

The preliminary conclusion drawn from these bivariat comparisons is that the voters largely attach a high utility weight to reducing unemployment, care somewhat about who will be prime minister, and ascribe very little utility to an increase in their personal salary. In this sense, the voters seem quite sociotropic regarding their utility and much less egotropical. The utility of the sociotropic attribute of decreasing unemployment is also much stronger than the utility of the choice for prime minister.

5.2 Voters' trade-off in a multivariate analysis

The previous analyses only apply bivariate analyses that do not account for the variation across all combinations of attribute levels. To obtain a more comprehensive picture of the various trade-offs and their relative weight, a logistical regression is applied as described in a previous section. The voters' choices for each pair-wise comparison are

entered in the regression as the dependent variable. The dependent variable is coded '0' if scenario A is preferred and '1' if B scenario is preferred. The explanatory variables are the levels of the attributes in the given pair-wise comparison, i.e. the values of the three attributes: salary, unemployment and prime minister. Unemployment is included as a dummy variable with decreasing unemployment as 1, and 0 otherwise. Prime minister is included as a dummy with Rasmussen as 1, and 0 otherwise. Salary is included as a continuous variable with the actual valued presented divided by 1000. Table 3 reports the result of the regression applied to the entire dataset.

Table 3 about here

The coefficients from the logistical regression show whether a change in an attribute has a positive or negative impact on the voters' utility. A positive coefficient indicates that an increase in this attribute increases utility; and negative vice versa. Thus, coefficients also indicate the likelihood of the voter choosing a scenario with certain combinations of attribute levels; the greater the coefficients, the greater the impact of the attribute on the voters' utility. As seen in Table 3, all three attributes have a positive impact on utility, e.g. salary increase improves the voters' utility. With the exception of the coefficient for salary increase, all of the coefficients are statistically significant, i.e. salary does not have a significant impact on the voters' choice of scenario. Thus, the general picture is that an increase in personal salary does not move voters between the scenarios. Political campaigning with a focus on salary – e.g. tax cuts – tend in this case – and compared to the other two attributes – not to influence the voters' choice. Nevertheless, this conclusion only applies in comparison to the two other attributes and

within the interval of a monthly salary increase of 500 and 5,000 DKK. Salary may have had an effect if it was compared to other attributes.

One way to provide a comparable measure is to estimate the *Utility Importance Score* (UIS), which is a regularly applied measure in marketing. UIS is calculated as the relative share of the attributes in the total variance in the utility function. Firstly, the utility for each of the attribute levels is calculated, then the distance between the lowest utility (U_L^i) and the highest utility (U_H^i) for the levels of the attribute *i* is calculated. Secondly, the sum of these distances across attributes is calculated as $\sum_{i=1}^{I}\left(U_H^i - U_L^i\right)$.

Finally, UIS is calculated as $\left(U_H^i - U_L^i\right) \Big/ \sum_{i=1}^{I}\left(U_H^i - U_L^i\right)$. UIS has values between 0 and 1.

By multiplying the UIS by 100, the UIS can be interpreted as a percentage, i.e. the percent of the total variation in utility that can be ascribed to attribute *i*. A high UIS value for attribute *i* indicates that much of the total utility can be accounted for by attribute *i*. In other words, high UIS indicates that the voter places more weight to that attribute in comparison to the other attributes included. The model indicates that 82% of the variation in the utility of the voters can be accounted for by the unemployment attribute, whereas prime minister accounts for 15% and salary only 3%. This once again allows us to conclude that the unemployment factor (i.e. the sociotropic factor) is the important determinant for voters, followed by choice of prime minister, leaving salary (the egotropic factor) almost without influence. The strong sociotropic preference for the general decrease in unemployment could also be interpreted as a strong, risk-adverse choice. In other words, the voters do not want to gamble with the likelihood of being unemployed, despite receiving a considerable salary increase. The combined effect of

risk adverseness and sociotropicalness is likely provides the strong determinant of the unemployment factor when voters choose between scenarios.

5.3 Sub group analysis

It would appear as though an increase in disposable personal income does not affect the choice of the scenario. However, only analyses on the aggregate level have been conducted thus far without controlling for other variables, and it is likely that there will be heterogeneous preferences in the population. To analyze this, the same regression is conducted as above, though this time the model includes interaction variables with a number of sociodemographic, and political predisposition variables, Z_n, is included[3]. Table 4 shows seven regression models, adding more control variables in a stepwise procedure.

Table 4 about here

The interaction variables are to be interpreted as differences from the main effects estimated by the three main coefficients. In Model 1, including the respondents' political predisposition on a scale from 0 (left wing) to 10 (right wing), two of the interaction effects are significant. The more to the right wing a respondent is, the less weight they attach to unemployment, as the interaction term is negative, which must be compared to the positive main effect. The more to the right wing a respondent is, the

---

[3] Since the respondents' characteristics do not vary across scenarios, they can only enter the model if they are specified in ways that create differences in utility over alternatives. The respondents' characteristics therefore interact with the attributes that vary across the alternatives.

more they prefer the right-of-centre prime minister (Rasmussen), e.g. respondents providing a predisposition score equal to 5 on the left-right scale prefer Rasmussen[4].

Model 2 show that females do not have significantly different preferences to males, with the exception of the choice for prime minister, where preference for Rasmussen as prime minister is significant less. Model 3 indicates that respondents with a higher income attach greater value to unemployment and Rasmussen as prime minister than the average respondent. Model 4 reveals that respondents with a high school diploma have a greater preference for increased salary and less preference for Rasmussen as prime minister than the average respondent. Model 5 reveals that age is significant, i.e. as age increases, so does the weight attached to increased salary, whereas less emphasis is placed on reducing unemployment, and support for Rasmussen increases with age. Model 6 shows that respondents employed in the private sector attach greater weight to reducing unemployment and prefer Rasmussen as prime minister. Model 7 includes all of the interaction terms and shows, firstly, that most of the significant variables from the previous six models are also significant in the full model; secondly, that the signs of the significant coefficients are consistent across models; and finally, that all of the coefficients for the main effects are significant.

5.4 Random parameter logit model

Another way of taking preference heterogeneity into account rather than using predefined subgroups is to apply the RPL model, which in addition to the mean will

---

[4] The utility of Rasmussen for an individual responding 5 on the predisposition scale is equal to U(Rasmussen|predisposition=5) = -1.6734 + 5 × 0.3454 = 0.0536. This utility is positive, meaning that Rasmussen is preferred over Lykketoft.

estimate a distribution around the coefficients capturing the preference heterogeneity. The results from the RPL model are presented in Table 5.

Table 5 about here

For the RPL model, we find that the R^2 increases considerably as compared to the standard logistic model. This effect is produced by allowing the parameters to vary over individuals. The likelihood ratio test for significant difference between the RPL and the standard logistic model (corresponding to the model in Table 3) confirms that we must reject preference homogeneity in favor of the RPL model. We find that all three estimated attribute standard deviations (*s*) describing the distribution around the mean preference (*b*) are significant and relatively large (compared with the respective means), suggesting a high level of heterogeneity among respondents. All mean *b* coefficients are significant except for salary, though the salary attribute would be significant on a 10% level in the RPL model. The significant preference heterogeneity captured by the RPL model confirms the findings in the subgroup in which significant differences in political preferences across subgroups are detected. The mean *b* parameters show that reduced unemployment will have even more weight when the preference heterogeneity is accounted for as compared to the initial estimate from Table 3.

6. Discussion: Methodological pro and cons

There are three major reasons for applying a discrete choice experiment when eliciting political preferences in surveys rather than using e.g. simple ranking capturing political attitudes.

The first is that the explanatory variables when estimating the voters' choices between candidates are strongly correlated in a non-experimental setting. This correlation makes it difficult to isolate the unique contribution of each explanatory variable (preference), i.e. it is difficult to explain why a political candidate wins an election based on the candidates' personal characteristics or various political statements, because the explanatory variables are so strongly correlated that it is impossible to disentangle the effects of each of the variables. Candidates' positions on e.g. public benefits are not usually independent of their positions on taxation, environmental issues etc. Thus, statistical analyses applied to these various positions based on traditional survey design have difficulties distinguishing between the explanatory power assigned to each preference, because they are so strongly correlated (nevertheless, see Alvarez et al. (2000) for an attempt at doing so). Observations of actual voting behavior can neither provide much (statistical) information concerning political preferences nor the relative weight of the variables concentrated in a single vote. In traditional survey design, the political positions of the candidates are assessed separately. Thus, the assessments of the various positions are carried out independently of one another, which correspond poorly with the overall assessment being a trade-off between the various candidates and their positions as opposed to an independent assessment of each candidate. Discrete choice experiments can be of special interest when the positions are strongly correlated, as discrete choice experimentation allows pair-wise comparison of the positions, thus allowing estimates of the independent utility of each position to the individual voter.

The second reason for applying discrete choice design is that it forces the voter to make the trade-off between competing positions. Surveys traditionally ask voters to

state their agreement with certain issues using Likert scales. Applying simple Likert scale questions voters are asked to grade the issues independent of one another. Some of these issues are valence issues, most of which all voters are positive towards. The answers can also be affected by social desirability, i.e. the voter agrees with the statement in order to please the interviewer. In other words, the answers will tend to cluster around a few categories on the scale for various reasons. This clustering of responses minimizes the variations, which renders the analysis of the relative utility of each position difficult. *Discrete choice* design forces a trade-off and makes it impossible to respond that you agree with everything or want more of everything. Such a trade-off brings out greater variation, enables estimation of the importance of each issue and replicates the single choice that voters make in the ballot box.

One could argue that the simple ranking best reflects the political preferences since it reflects how discussions are made in public. Political discussion does not (always) encompass the opportunity costs and reflects the politicians' intentions. The political rhetoric may even allow inconsistencies and incoherencies (Baier et al., 1986; Davis & Ferrantino, 1996; Garnett, 1994; Kohler-Koch, 2000). The transparency of the simple ranking makes it possible to provide an ordinal rank of the objectives that reflect political intentions or even political norms for answering. However the respondents are not asked how much more important the different objectives are compared to each other. But even though that the simple ranking question may reflect public discussion, we argue that a methods, as the discrete choice experiment, which encompasses trade-offs and a single choice more closely resemble a real voting situation rather than the simple ranking questions.

Finally as discrete choice experiments groups the policy items in scenarios, which subsequently through experimental randomization allow to keep the number of comparisons confronted the respondent to a minimum, it makes the cognitive task much simpler than if the respondent was confronted with many binary choices on each attributes.

A number of problems are also encountered when applying a discrete choice experiment that is not present to the same degree in traditional survey design.

Firstly, the respondents must be able to relate to the pair-wise choices even though they are prospective and hypothetical. Otherwise, the trade-off would be arbitrary. This goes for the prospective assessment, the different attributes compared, as well as their level. If scenarios are perceived to be unrealistic, the respondents may not consider the trade-off to be realistic and their answer may be thereafter. This problem relate to the extern validity of the trade-off the voter is confronted with. In our discrete choice experiment we choose the two candidates running for prime minister and an issue (employment) which was much debated during the campaign. Nevertheless our design also shows how difficult it might be to design scenarios which are perceived a true and real. E.g. the increase in salary might only be regarded as "phony money" with no real money at stake. One improvement on the present design would probably have been to substitute increased salary with specified increases and decreases in taxation. First of all, the politicians have direct control of taxation, which would have improve the realism of the scenarios. Secondly, other studies from prospect theory have shown that respondents are more sensitive to having to pay certain amounts than if they are promised an increase in salary (Kahneman & Tversky, 1979).

In order to keep the comparison as few and simple as possible the increase / decrease unemployment is used. Event through it will complicate the design being more specific e.g. 3% increase, 0%, and 3% decrease it would make the interpretation more clear and also allow using the employment attribute as continuous measure in the regression analysis.

The use of the two candidates for prime minister allows tapping directly into the choice of candidate at the election and in this sense makes the choice more realistic. However the challenge with including candidates is that respondents have different expectation to them and these expectations might affect the realism in the promises of more or less unemployment under a center-right government compared a socialist government. Facing the candidates with the trade-off situation will on the one hand bring realism to the experiment, but it also brings many embedded expectations into the choice, making the interpretation more complicated.

An second potential problem to discrete choice modeling, it is important that the values of the attributes are comparable in a manner so that no attribute dominates over all the others, e.g. the size of increases in salary must be at a level so a genuine trade-off exists compared to the other attributes. If one attribute tends to dominate, the dominant attribute will result in a large and highly significant coefficient in the regression model whereas the other attributes will tend to be small and insignificant, leaving the trade-off unrealistic and inconclusive. In other words, determining the values of the attributes is critical in order to have a successful discrete choice study. Moreover, it might not be possible to include some attributes at all, because the preferences are very strong, e.g. moral or ethical issues such as abortion, physician-assisted suicide or human rights issues. Such moral issues with strong preferences would tend to dominate comparisons

of preference strength. One way of obtaining an idea about whether you are about right is carrying out a pilot survey. A pilot survey consisting of 100 interviews was carried out before the final launch, which was completed in December 2004, indicating that all attributes had significant coefficients with the expected sign. The results from these interviews were not included in the analysis.

A third concern is the number of attributes included in the design. This study only includes three attributes, though more could be applied. The only limit with regard to the number of attributes is the number of respondents that are manageable in the comparison. Adamowicz et al. (1998) suggest that 6 to 8 is the limit. In a telephone interview in which the respondents do not have the choices in front of them, the limit must be considered even smaller, but in web-interviews it should be possible to use, up to the suggest 8 attributes.

Fourth the discrete choice experiment estimates the relative weight of the attributes within the scenarios but if another attribute was added the relative weight might change (Bryan et al., 1998). This make the choice of attributes essential for the design.

Finally the problem of response social-desirability is also a problem in discrete choice experiments as in traditionally surveys, but the problem might be intensified by the hypothetical scenarios as it is easy to appear altruistic without having to relate to the real world.

7. Conclusion

There is a potential for the application of discrete choice experiments in estimation political preferences. Instead of separately asking respondents about their agreement with certain issues, where it becomes difficult to asses which preferences are strongest, discrete choice studies allow a trade-off between the various issues at stake.

A discrete choice experiment bears some resemblance to voting in an election. The voter is (usually) only allowed to cast a single vote, and they may not agree with everything the candidate or party stands for, i.e. the vote involves a trade-off between competing ideas and preferences; a discrete choice experiment untangles these preferences and estimates their relative importance.

The challenges to discrete choice experiments are whether respondents see the scenarios as realistic trade-offs, deciding on how to include the attributes, and their level which secure that no attribute dominate over all others.

Economic voting theory was used to illustrate the discrete choice experiment and the analysis showed that the sociotropic and risk adverse preferences play a major role when voters must choose between future scenarios. This finding confirms international as well as Danish research on economic voting. The analysis has shown that the preferences for decreasing unemployment are much stronger than the preferences for prime minister. The study also indicates that the preferences for salary increase are insignificant compared to the preferences regarding decreasing unemployment and prime minister. When controlling for predisposition, gender, personal income, education, age and employment status in the logistical model, the general conclusion remains dominant. Some nuances emerge, however, which seems quite obvious from a traditional political left-right perspective, i.e. the more right-wing a respondent is, the

stronger the effect of liberal prime minister Rasmussen, and the same is the case for those employed in the private sector. The respondents with a minimum high school education have a stronger preference for increase salary and less preference for Rasmussen as prime minister than the average respondent. Finally, the analysis applying the random parameter logit model illustrates that the preference heterogeneity is generally high among voter with regards to all three attributes used in the experiment.

References

Adamowicz, W., Beckley, T., MacDonald, D. H., Just, L., Luckert, M., Murray, E., & Phillips, W. 1998. In search of forest resource values of indigenous peoples: Are nonmarket valuation techniques applicable?. Society & Natural Resources 11 (1), 51-66.

Alexander, C. S., & Becker, H. J. (1978) Use of Vignettes in Survey-Research. *Public Opinion Quarterly* 42 (1): 93-104.

Alvarez, R. M, Nagler, J., & Willette, J. R. (2000) Measuring the relative impact of issues and the economy in democratic elections. Electoral Studies 19 (2-3), 237-253.

Alvarez, R. M. & Nagler, J. (1994) Correlated Disturbances in Discrete Choice Models: A Comparison of Multinomial Probit Models and Logit Models. Working paper from California Institute of Technology, Division of the Humanities and Social Sciences. no. 914.

Alwin, D. F. & Krosnick, J. A. (1985) The Measurement of Values in Surveys: A Comparison of Ratings and Rankings. *Public Opinion Quarterly*, 49 (4): 535-552.

Baier, V. E., March, J. G., & Saetren, H. (1986) Implementation and Ambiguity", *Scandinavian Journal of Management Studies*. 2 (3-4), 197-212.

Bech, M. (2003) County council politicians' choice of hospital payment scheme: a discrete choice study. *Applied Health Economics and Health Policy* 2 (4), 225-232.

Bennett, J. & Blamey, R. (2001) The choice modelling approach to environmental evaluation. Edward Elgar Pub., Cheltenham.

Borre O. (1997) Economic Voting in Danish Electoral Surveys 1987-1994. Scandinavian Political Studies 20 (4), 347-365.

Borre, O. (1999) Afstanden mellem vælger og parti. In: Andersen, J. Borre, O., Goul Andersen, J. & Nielsen, H. J. (eds) Vælgere med omtanke. Systime, Århus.

Borre, O. (2003) Den utaknemlige vælger. In: Goul Andersen, J. & Borre, O. (eds) Politisk forandring. Værdipolitik og nye skillelinjer ved folketingsvalget 2001. Systime, Århus.

Bowling, A., Jacobson, B., & Southgate, L. (1993) Explorations in consultation of the public and health professionals on priority setting in an inner London health district. *Social Sciencen and Medicine* 37 (7), 851-857.

Breivik, E. & Supphellen, M. (2003) Elicitation of product attributes in an evaluation context: A comparison of three elicitation techniques. *Journal of Economic Psychology*. 24 (1), 77-98.

Bryan, S., Buxton, M., Sheldon, R., & Grant, A. (1998) Magnetic resonance imaging for the investigation of knee injuries: An investigation of preferences. *Health Economics* 7(7), 595-603.

Davis, M. L. & Ferrantino, M. (1996) Towards a positive theory of political rhetoric: Why do politicians lie?. *Public Choice* 88 (1-2), 1-13.

Dorusssen, H. & Palmer, H. A. (2002) The context of economic voting – an introduction. In: Dorussen, H. & Taylor, M. (eds) Economic Voting. Routledge, London.

Garnett, M. A. (1994) An Essay on Inconsistency in Politics. *Government and Opposition* 29 (1), 97-108.

Hansen, K. M. (2007a) The Effects of Incentives, Interview Length, and Interviewer Characteristics on Response Rates in a Cati-Study. *International Journal of Public Opinion Research*. 19 (1), 112-121.

Hansen, K. M. (2007b) The Sophisticated Public - The Effect of Competing Frames on Public Opinion. *Scandinavian Political Studies* 29 (3), 377-396.

Hensher, D. A. & Johnsson, L. W. 1981. Applied discrete choice modelling. John Wiley, London.

Johnson, T. R. (2007) Discrete choice models for ordinal response variables: A generalization of the stereotype model. *Psychometrika* 72 (4): 489-504.

Kahneman, D. & Tversky, A. (1979) Prospect Theory: An Analysis of Decision under Risk. Econometrica, 47 (7), 263-291.

Keeney, R. L. (1992) Value-Focused Thinking Harvard University Press, Cambridge.

Kinnunen, J., Lammintakanen, J., Myllykangas, M., Ryynanen, O. P., & Takala, J. (1998) Health care priorities as a problem of local resource allocation", Inter Journal of Health Planning and Management. 13 (3), 216-229.

Klein, M., Dulmer, H., Ohr, D., Quandt, M. & Rosar, U. (2004) Response sets in the measurement of values: A comparison of rating and ranking procedures. *International Journal of Public Opinion Research 16 (4): 474-483.*

Kohler-Koch, B. (2000) Framing; the bottleneck of constructing legitimate institutions. *Journal of European Public Policy.* 7 (4), 513-531.

Kuhfeld, W. F. (2005) Marketing Research Methods in SAS: Experimental Design, Choice, Conjoint, and Graphical Techniques, SAS Institute, SAS 9.1 Edition, TS-722.

Lewis-Beck, M. S. & Paldam, M. (2000) Economic voting: an introduction. Electoral Studies 19 (2-3), 113-121.

Louviere, J. J., Hensher, D. A. & Swait, J. D. (2000) Stated Choice Methods - Analysis and Application. Cambridge University Press, Cambridge.

Maio, G. R., Roese, N. J., Seligman, C., & Katz, A. (1996) Rankings, ratings, and the measurement of values: Evidence for the superior validity of ratings. *Basic and Applied Social Psychology* 18 (2): 171-181.

McCarty, J.A & Shrum, L. J. (2000) The measurement of personal values in survey research - A test of alternative rating procedures. *Public Opinion Quarterly* 64 (3): 271-298.

McFadden D. & Train, K. E. (2000) Mixed MNL models for discrete response. *Journal of Applied Econometrics* 15 (5), 447-70.

McFadden, D. (1974) Conditional logit analysis of qualitative choice behaviour. In: Zarembka, P. (ed.) Frontiers in Econometrics. Academic Press, New York.

Moshkovich, H. M., Mechitov, A. I., & Olson, D. L. (2002) Ordinal judgments in multiattribute decision analysis. *European Journal of Operational Research* 137 (3), 625-641.

Russell, P.A. & Gray, C. D. (1994) Ranking Or Rating - Some Data And Their Implications For The Measurement Of Evaluative Response. *British Journal of Psychology* 85: 79-92, Part 1.

Ryan, M. & Gerard, K. (2003) Using discrete choice experiments to value health care programmes: current practice and future research reflections. *Applied Health Economics and Health Policy* 2 (1), 55-64.

Ryan, M., Scott, D., Reeves, C., Bate, A., van Teijlingen, E., Russell, E. M., Napper, M., & Robb, C. M. (2001) Eliciting public preferences for healthcare: a systematic review of techniques. *Health Technology Assessment* 5 (5), XXX-YYY

Scott, A. (2002) Identifying and Analysing Dominant Preferences in Discrete Choice Experiments: An Application in Health Care. *Journal of Economic Psychology* 23 (3), 383-398.

Train K. E. (2002). Discrete Choice Methods with Simulation. Cambridge: Cambridge University Press.

Train, K. E. (1986) Qualitative Choice Analysis: Theory, Econometrics, and an Application to Automobile. The MIT Press, Cambridge.

van der Eijk, C., van der Brug, W., Kroh, M. & Franklin, M. (2006) Rethinking the dependent variable in voting behavior: On the measurement and analysis of electoral utilities. *Electoral Studies* 25 (3), 424-447.

Vanleeuwen, D. M. & Mandabach, K. H. (2002) A note on the reliability of ranked items. *Sociological Methods & Research* 31 (1): 87-105.

Wittink, D. R. & Cattin, P. (1989) Commercial Use of Conjoint Analysis: An update. *Journal of Marketing* 53 (3), 91-96.

Table 1. Example from the discrete choice experiment

Image that you must choose between two different alternatives, which will govern the country in the future. It is up to you to weigh the pros and cons. Which alternative do you prefer?

Alternative A	**Alternative B**
• You will receive 1,000 DKK more in salary each month (134€)	• You will receive 5,000 DKK more in salary each month (671€)
• Increasing unemployment	• Decreasing unemployment
• Anders Fogh Rasmussen as prime minister	• Mogens Lykketoft as prime minister

Note: The respondents were confronted with three pair-wise comparisons in which the values of the attributes varied.

Table 2. The voters' choices between different pair-wise comparison of scenarios

Split	Choice set	Scenario	Salary increase (DKK)	Unemployment	Prime minister	Percentage choosing A or B (%)
Group 1	1.1	A	500	Decreasing	Rasmussen	85
		B	5,000	Increasing	Lykketoft	15
	2.2	A	1,000	Increasing	Rasmussen	28
		B	500	Decreasing	Lykketoft	72
	3.3	A	5,000	Decreasing	Lykketoft	77
		B	1,000	Increasing	Rasmussen	23
Group 2	4.1	A	1,000	Decreasing	Rasmussen	82
		B	5,000	Increasing	Lykketoft	18
	5.2	A	5,000	Increasing	Rasmussen	31
		B	500	Decreasing	Lykketoft	69
	6.3	A	1,000	Decreasing	Lykketoft	78
		B	500	Increasing	Rasmussen	22
Group 3	7.1	A	5,000	Decreasing	Rasmussen	83
		B	500	Increasing	Lykketoft	17
	8.2	A	1,000	Increasing	Lykketoft	19
		B	500	Decreasing	Rasmussen	81
	9.3	A	5,000	Increasing	Rasmussen	26
		B	1,000	Decreasing	Lykketoft	74
Group 4	10.1	A	1,000	Increasing	Lykketoft	18
		B	5,000	Decreasing	Rasmussen	82
	11.2	A	1,000	Decreasing	Rasmussen	86
		B	500	Increasing	Lykketoft	14
	12.3	A	500	Increasing	Rasmussen	25
		B	5,000	Decreasing	Lykketoft	75

N (total respondents / number of observations)   2,000/5,732

N varies between 472-490 persons in each comparison providing between 1,393-1,457 observations per comparison

Note: All differences between scenario A and B are statistically significant (p<0.001) from 0. The statistical confidence limits for each of the percentages is between 3.07 to 4.17 percentage points (p<0.05) to each side. The respondents were probed for a choice. If the respondent initially gave a 'don't know' answer, the follow-up was: "If you have to choose?" leaving very few missing respondents.

Table 3. The isolated effects of the attributes: salary, unemployment and prime minister

	β	t-value	UIS
Increase in monthly salary (× 1000 DKK)	0.011	(1.15)	3
Decreasing unemployment	1.327***	(40.33)	82
Anders Fogh Rasmussen as prime minister	0.238***	(6.83)	15
Constant	-0.103**	(-2.96)	
N (observation /respondents)		5732/1941	
McFaddens' R^2 (%) $^¥$		25.96	

Note: Significance level: *** p<0.001, ** p<0.01, * p<0.05

¥ $R^2 = 1 - \dfrac{LogL(R)}{LogL(0)}$ where *LogL(R)* is the loglikelihood of the final restricted model and *LogL(0)* is the loglikelihood of a constant only model.

Table 4. Sub-group analyses

	Model 1		Model 2		Model 3		Model 4		Model 5	
	β	t-value	β	t-value	β	t-value	β	t-value	β	t-value
Increasing salary	-0.0207	(-0.75)	0.0066	(0.48)	-0.0007	(-0.04)	-0.014	(-1.15)	-0.0900**	(-2.76)
Decreasing unempl.	1.7756***	(17.62)	1.3468***	(27.58)	1.1236***	(15.85)	1.2830***	(29.77)	0.8508***	(7.36)
Anders Fogh Rasmussen	-1.6734***	(-16.45)	0.3200***	(6.39)	-0.0655	(-0.91)	0.3132***	(7.06)	0.6342***	(5.47)
Increasing salary × predisposition	0.0058	(1.23)								
Decreasing unempl. × predisposition	-0.0557**	(-3.22)								
Rasmussen × predisposition	0.3454***	(19.97)								
Increasing salary × female			0.0079	(0.42)						
Decreasing unempl. × female			-0.0332	(-0.5)						
Rasmussen × female			-0.1523*	(-2.3)						
Increasing salary × salary					0.0000	(0.51)				
Decreasing unempl. × salary					0.0008***	(3.30)				
Rasmussen × salary					0.0010***	(4.19)				
Increasing salary × high school							0.0620**	(3.25)		
Decreasing unempl. × high school							0.1209	(1.80)		
Rasmussen × high school							-0.1925**	(-2.87)		
Increasing salary × age									0.0018**	(3.23)
Decreasing unempl. × age									0.0088***	(4.33)
Rasmussen × age									-0.0073***	(-3.64)
Increasing salary × private employed										
Decreasing unempl. × private employed										
Rasmussen × private employed										
Constant	-0.1114**	(-3.04)	-0.1028**	(-2.96)	-0.0961**	(-2.66)	-0.1062**	(-3.05)	-0.1090**	(-3.12)
N (observation /respondents)	5732/1941		5732/1941		5310/1797		5732/1941		5732/1941	
McFaddens' R² (%) ¥	32.00		26.03		26.31		26.25		26.56	

Note: Significance level: *** p<0.001, ** p<0.01, * p<0.05. The variable 'high school' indicates high school diploma and higher. The variable 'private' employment indicates employed in the private sector. Both variables are entered as dummies.

¥ $R^2 = 1 - \dfrac{LogL(R)}{LogL(0)}$ where *LogL(R)* is the loglikelihood of the final restricted model and *LogL(0)* is the loglikelihood of a constant only model

Table 5. The RPL model

		Coefficients	(t-value)
Increase in monthly salary (in 1000 DKK)	Mean (*b*)	0.0579	(1.86)
	Standard deviation (*s*)	0.3906***	(4.21)
Decreasing unemployment	Mean (*b*)	5.3043***	(11.96)
	Standard deviation (*s*)	2.9783***	(11.88)
Anders Fogh Rasmussen as prime minister	Mean (*b*)	0.8251***	(4.81)
	Standard deviation (*s*)	5.3453***	(11.55)
Constant		-0.4287***	(-4.61)
N (observation /respondents)	5732/1941		
McFaddens' R^2 (%) ¥	37.12		
Likelighood ratio test vs. standard logistic regression: Chi^2=884.23 (df=3)			

Note: Significance level: *** $p<0.001$, ** $p<0.01$, * $p<0.05$
             The parameters estimated are mean *b* and standard deviation *s* which refer to the parameters in equation

6