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## Does votong history matter? Analysing persistence in turnout

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**Does Voting History Matter?  
Analysing Persistence in Turnout**

Kevin Denny and Orla Doyle, University College Dublin

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**UCD SCHOOL OF ECONOMICS  
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# Does Voting History Matter?

## Analysing Persistence in Turnout\*

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### Abstract

Individuals who vote in one election are also more likely to vote in the next. Modelling the causal relationship between past and current voting decisions however is intrinsically difficult, as this positive association can exist due to habit formation or unobserved heterogeneity. This paper overcomes this problem using longitudinal data from the British National Child Development Study (NCDS) to examine voter turnout across three elections. It distinguishes between unobserved heterogeneity caused by fixed individual characteristics and the initial conditions problem, which occurs when voting behaviour in a previous, but unobserved, period influences current voting behaviour. It finds that controlling for fixed effects unobserved heterogeneity has little impact on the estimated degree of habit in voter turnout, however failing to control for initial conditions reduces the estimate by a half. The results imply that voting in one election increases the probability of voting in a subsequent election by 13%.

**Keywords:** Voter turnout, habit formation, dynamic panel models

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# 1 INTRODUCTION

An individual who votes in one election is also likely to vote in the subsequent election. Voter turnout, therefore, is characterised by persistence, whereby repeated behaviour is observed from one election to the next. Analysing voting behaviour as a dynamic rather than a static process allows us to investigate the malleability or rigidity of voters' political actions, which in turn can have important implications for the effectiveness of political party campaigning and policy initiatives to increase electoral participation.

Persistence in voter turnout may be driven by three main factors. First, turning out to vote at election time may be habit forming (see Brody and Sniderman 1977; Gerber, Green and Shachar 2003; Green and Shachar 2000; Milbrath 1965; Miller and Shanks 1996; Plutzer 2002; Verba and Nie 1972). Habit occurs when, other things being equal, the decision to vote is dependent on whether the individual did so in the previous election. Going to the polls may therefore be a self-reinforcing act which becomes stronger over time as voters experience more elections. Alternatively, persistence in turnout may be driven by observed time invariant individual characteristics (such as gender or parental background), so that the same factors that influenced voting decisions in the previous election are also exerted in the current election (see Huckfeldt and Sprague 1992; Wolfinger and Rosenstone 1980). This is called observed heterogeneity. Finally, persistence in voter turnout may arise from unobserved individual characteristics; which is referred to as unobserved heterogeneity. These are unobserved factors that influence voting decisions in each election, for example, personality traits or an intrinsic motivation to vote.

As the bulk of the micro turnout literature relies on cross-sectional survey data, which essentially represents a snapshot of the voter's political life, it cannot address the habitual nature of voting behaviour. If persistence in turnout is driven solely by individual

factors that are constant over time then such analyses are satisfactory. However, if some proportion of persistence is actually habitual, then cross-sectional studies are likely to over-estimate the importance of individual socio-demographic factors.

Few studies to date have investigated the extent to which persistence in voter turnout may be attributed to habit formation, on the one hand, and time invariant observed and unobserved individual characteristics, on the other. The primary reason for this is that empirically distinguishing between the various sources of persistence is fraught with difficulties. Naïve models which attempt to capture the degree of habit in voting behaviour, by using turnout in the previous election to explain turnout in the current election, may exaggerate the importance of habit, as they fail to take the unobserved characteristics into account.

This paper overcomes these problems by introducing a dynamic model of voter turnout which controls for two forms of unobserved heterogeneity - fixed effects and initial conditions. While several papers have addressed the fixed effects unobserved heterogeneity problem (Gerber et al. 2003; Green and Shachar 2000), none to date have dealt with the initial conditions problem, which arises when voting decisions in a previous, but unobserved, election influences voting decisions in the current election. Moreover, we demonstrate that it is the initial conditions problem, rather than the fixed effects problem, which significantly reduces the estimated degree of habit in voter turnout.

As a departure from previous studies of persistence in voter turnout, which have relied on US data, we utilise unique longitudinal cohort data from the British National Child Development Study (NCDS) which tracks respondents from birth to middle age. Using this data we estimate dynamic models of voter turnout over the course of three elections. This allows us to investigate the extent to which persistence in voting behaviour is driven by habit, while controlling for a whole range of childhood and early adulthood

factors, such as cognitive ability, parental social class at birth, personality traits and health status, which are typically not addressed in the turnout literature.<sup>1</sup>

The paper is organised as follows. The second section discusses persistence in voter turnout and outlines the problems encountered when modelling this relationship. The following section introduces the British cohort data used in the analysis. The fourth section presents the dynamic statistical model and discusses the methodology in detail. The fifth section presents the results of a series of dynamic voter turnout models and the final section concludes.

## **2 PERSISTENCE IN VOTING BEHAVIOUR**

### **2.1 Habit Formation and Voter Turnout**

Viewing political behaviour as habitual is widely accepted in the turnout literature. Green and Shachar (2000) refer to such habit formation as *consuetude*.<sup>2</sup> That is, if two individuals have exactly the same characteristics, but one decides to vote on election day and the other does not, then these decisions will affect their probability of voting in future elections. Gerber *et al.* (2003) find that, all things being equal, an individual is 47% more likely to vote in the current election if they participated in the previous election, while Fowler (2005) notes that more than half of potential voters either always vote or always

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<sup>1</sup> Very few birth cohort studies have been utilised in the political science literature to date (the closest study is Jennings-Niemi's Student-Parent Socialization study which tracks students on the verge of graduating high school) despite the vast advantage to be gained from analysing how early childhood factors influence political behaviour in adulthood.

<sup>2</sup> A large number of terms describing the habitual nature of voting behaviour have evolved. While economists refer to it as state dependence, Gerber *et al.* (2003) prefer to call it *consuetude* rather than habit, as they believe habit has unwanted connotations i.e. people generally have bad habits rather than good habits, while Plutzer (2002) refers to it as inertia. In this paper we will refer to cases whereby one's past behaviour directly influences one's current behaviour as "habit formation".

abstain. Using data from the National Child Development Study (NCDS) we find that 89% of British voters who turned out to vote in the 1997 election also voted in the 1987 and the 1979 elections.

While evidence of persistence in voter turnout exists, non-experimental research determining the extent to which turnout is habitual has been limited. Lack of adequate panel data has led the majority of the literature to side-step the habitual nature of voter turnout and concentrate on the personal/socio-demographic and institutional/situational determinants instead.<sup>3</sup> Habit formation can readily explain why one of the standard socio-demographic determinants –age– is found to have a positive effect of voter turnout. Turnout may increase with age as habits become reinforcing over time. A study by Franklin (1994), which emphasises the importance of persistence in early voting behaviour, notes that individuals who turn out to vote when they reach eligible voting age are likely to continue this behaviour in subsequent elections, while those who fail to vote in this first election are more likely to become persistent non-voters.

Habit formation in voter turnout may occur due to the high transaction costs of voting. Individuals have to initially face very high costs when they first decide to vote, in regards registering to vote, finding the polling station, learning how to cast a vote and differentiating between political parties (Plutzer 2002). Gerber *et al.* (2003) refer to the positive or negative feelings which potential voters feel towards voting as “conative attitudes”, which are directly derived from these costs of voting. However once this initial investment is made and voters overcome these barriers to voting, the transaction costs are

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<sup>3</sup> Such personal characteristics include age, gender, education, parental background, civic duty, political interest and social networks (see Nie, Junn and Stehlik-Barry 1996; Verba and Nie 1972; Wolfinger and Rosenstone 1980). Situational/institutional determinants include the degree of competitiveness in a given election (Blais 2000; Pattie and Johnson 2001) and the timing of elections (Oppenhuis, 1995).

thus reduced for each subsequent election, which in turn increases the probability of participating in future elections.

Another stream of research proposes that once voters enter the political realm they become targets for party campaigns, therefore, in the political parties attempt to mobilise electoral support they consequently mobilise electoral participation. Individuals who abstain from voting in past elections, on the other hand, are less likely to be canvassed by parties or interest groups in subsequent elections, and are therefore not directly encouraged to participate. Huckfeldt and Sprague (1992) find, using US data, that only 25% of individuals who never voted in a primary were contacted by a political party during an election campaign compared to 40% of those who did participate in previous primaries. In addition, a number of experimental studies find that being contacted prior to an election increases the likelihood of voting (Gerber *et al.* 2003; Kraut and McConahay 1973; Niven 2002; Yalch 1976). Therefore, becoming a voter induces an individual to remain a voter as they become part of the political environment.

There are also several psychological arguments that help explain why habit formation in voting behaviour exists. Electoral participation may become a habit as the act of voting can be self-reinforcing as voters derive psychological benefits from voting. Finkel (1985) notes that participating in an election increases one's familiarity and confidence with the process, which in turn changes one's sense of political efficacy. It also enhances the voter's interest in politics and increases their sense of civic duty, all of which strengthen the positive connotations associated with voting. Indeed, Nickerson (2004) finds that voting is habit forming as the act of voting generates positive thoughts which reinforces its continued behaviour. Using experimental data, he finds that an individual is 29% more likely to vote in the next election if they voted in the previous one. Voters, in a sense, do become "addicted" to voting. Habit formation may also exist as the theory of cognitive dissonance posits that individuals try to maintain consistency in their behaviour,



beliefs and attitudes, as being inconsistent generates psychological discomfort which voters try to minimise (Festinger 1957). Therefore, in order to align their behaviour over time voters may continue turning out to vote in elections. A recent study by Mullainathan and Washington (2006), which tests the cognitive dissonance theory, finds that turning out to vote for a particular US presidential candidate leads to a more favourable approval of that candidate in the future, indicating that the act of voting may influence attitudes.

## **2.2 Fixed Effects Unobserved Heterogeneity and Voter Turnout**

An alternative explanation for persistence in voter turnout is that it may simply be driven by individual characteristics which are relatively constant over time, such as parental background, education etc. The extensive literature on electoral participation is mainly concerned with identifying such underlying socio-economic determinants (see Nie *et al.* 1996; Verba, Lehman Schlozman and Brady 1995; Wolfinger and Rosenstone 1980). While these factors are observable, and can therefore be controlled for, persistence in voter turnout may also be influenced by individual characteristics which are unobserved, such as personality traits. Thus one may detect persistence in voter turnout if these fixed, but unobservable, factors are omitted. This, unobserved heterogeneity, will therefore generate *spurious* state dependence in the data.

Naïve models which try to capture the relationship between past and future turnout decisions by simply including the lagged dependent variable i.e. turnout in the previous election, as an explanatory variable, fail to distinguish between persistence in turnout caused by *true* state dependence and unobserved heterogeneity. Indeed, as such models do

not control for unobserved heterogeneity, they tend to overestimate the extent of state dependence or “habit” in electoral turnout.<sup>4</sup>

Two studies (Green and Shachar 2000; Shachar 2003) have attempted to overcome this fixed effects unobserved heterogeneity problem when using panel data to analyse political behaviour.<sup>5</sup> Green and Shachar (2000) adopt an instrumental variables approach to deal with this issue when examining voter turnout using the American National Election Study. They find that turnout in the past does influence turnout in the future, even when they control for the inclusion of the lagged dependent variable by replacing it with predicted values derived from regressing past turnout on exogenous variables from the same year. In some cases, they find that those who voted in the past were 50% more likely to vote in the future. The technique they employ is an implementation of the method developed by Heckman (1981b), which controls for fixed effects unobserved heterogeneity.

### **2.3 Initial Conditions and Voter Turnout**

Plutzer (2002) presents a developmental theory of voting which maps the evolution of voters’ political behaviour. Two stages are specified - the starting level i.e. the probability that an individual will vote in their first election, and inertia i.e. the probability that they become a consistent voter or non-voter. The developmental model posits that most young

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<sup>4</sup> Achen (2000) highlights the potential dangers of including lagged dependent variables in panel models, such as biasing the coefficients of the other independent variables.

<sup>5</sup> Shachar (2003) analyses persistence in vote choice in two US presidential elections using panel data. He finds that voting decisions in 1976 are a function of voting decisions in 1972, even when the endogeneity of the lagged dependent variable was controlled for. It is found that the probability that an individual will support the Democrats is 50% if she voted for them in the previous election and only 34.4% if she voted for the Republicans in the previous election. Shachar also observes that the probability of voting for different parties falls with age, suggesting that voting is indeed a self-reinforcing act.

adults start off as habitual non-voters, but over time certain life factors make them become habitual voters. Plutzer employs a latent growth curve analysis to model voting habits over time. He finds that variables which are measured prior to voting age have a greater impact on the starting level i.e. parental socio-economic status, parental involvement, education, and that once voters reach inertia, the influence of these factors diminish. Plutzer however does not directly estimate the extent of persistence in voting behaviour.

Plutzer's (2002) stress on the importance of the first election and his attempts to model both the starting point and subsequent growth highlights another prevalent issue when studying persistence using panel data – the 'initial conditions' problem. This problem occurs when the time at which individuals are observed in the first wave of the panel does not coincide with the start of the stochastic process generating the individual voting experiences (Arulampalam, Booth and Taylor 2000). That is, the data obtained in the first wave may not be the respondents' first experience with the political system. To the best of our knowledge no study to date in the voting literature has dealt with the initial conditions problem. In relation to vote choice, a voter may have certain political orientations in the first period because they voted for that party in a previous, but unobserved, period i.e. the habit formation process had already begun, or alternatively, due to unobserved characteristics that formed those opinions. A similar argument may be made in the case of voter turnout – while the first stage of a panel captures the respondents' turnout decisions within that period, it cannot be determined whether this decision is influenced by turnout decisions in the previous, but unrecorded, period or unobserved individual characteristics. This initial conditions problem can be thought of as another form of unobserved heterogeneity.

## **2.4 Addressing Fixed Effects and Initial Conditions Problems**

This paper incorporates techniques which were developed in the econometrics literature into the voting literature, in order to investigate the extent of habit formation in voter turnout. The fixed effects unobserved heterogeneity problem, discussed above, can be addressed using a technique developed by Chamberlain (1984), who proposes including the averages of the time-varying covariates as regressors in the dynamic panel model. Arulampalam *et al.* (2000), who model unemployment persistence in the UK, argue that the best way to deal with the initial conditions problem is to model the initial outcome explicitly. They implement an estimator developed by Orme (2001), building on work by Heckman (1981a,b), which deals with this issue by adopting a two-step pseudo-maximum likelihood approach that first estimates an initial conditions reduced form equation, from which a probit generalised error term is derived and then included in the dynamic panel estimation. Modelling both the fixed effects unobserved heterogeneity and initial conditions problems explicitly is dealt with the following section. This paper, therefore, develops work initiated by Green and Shachar (2000) and Plutzer (2002) to analyse the habitual nature of voting behaviour by utilising new panel data techniques.

## **3 MODEL**

The statistical analysis involves estimating a binary choice model using longitudinal (panel) data which allows one's previous voting decisions to affect one's current

decisions. This type of data generates several complications which do not occur in conventional cross-sectional data. Consider the following generic model<sup>6</sup>:

$$y_{it}^* = \beta x_{it}' + \gamma y_{it-1} + V_{it} \quad i = 1, 2, \dots, n \text{ and } t = 2, \dots, T_i \quad (1)$$

$y_{it}^*$  is a latent variable representing the unobserved propensity to vote.  $x_{it}$  is a set of independent variables, some of which may not be time varying,  $y_{it-1}$  is a binary variable indicating one's decision to vote or not in the previous election and  $V_{it}$  is an error term. An individual votes if their unobserved propensity to vote is positive:  $y_{it} = 1$  if  $y_{it}^* > 0$  and  $= 0$  otherwise.

Including the lagged dependent variable allows one to measure habit formation, the extent to which current decisions are affected by previous decisions. However as discussed earlier, estimates of the parameter of interest,  $\gamma$ , are sensitive to two problems: fixed effects unobserved heterogeneity and the initial conditions problem. The former may arise if we do not have adequate controls for characteristics that determine voter turnout. Assume there is some characteristic that increases the probability of an individual voting in general. Excluding this variable will generate a spurious positive correlation between past and current turnout decisions. The initial conditions problem arises if the start of the data (when one first records behaviour) does not correspond to the actual start of the underlying activity.

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<sup>6</sup> This exposition draws on Arulampalam *et al.* (2000) which provides more details on the statistical properties of the estimator, see Henley (2000) also.

### 3.1 Fixed Effects Unobserved Heterogeneity

To deal with fixed effects unobserved heterogeneity we decompose the error term into an individual specific term and a random error. The former is treated as a random effect. Unlike linear models, one cannot treat this as a fixed effect because of the incidental parameters problem (Neyman and Scott 1948).

$$V_{it} = \varepsilon_i + u_{it} \quad (2)$$

Unless  $\varepsilon_i$  is independent of the  $x$ 's then maximum likelihood estimates are inconsistent.

Therefore we follow Chamberlain (1984) and assume that the  $\varepsilon_i$  is a linear function of the means of the time varying independent variables with an error term ( $\alpha_i$ ) which is normally distributed and independent of the  $x$ 's and  $u_{it}$ .

$$\varepsilon_i = a_0 + a_1 \bar{x}_i + \alpha_i \quad (3)$$

This generates an underlying model which can be estimated by standard random effects probit methods.

$$y_{it}^* = \beta x_{it}' + \gamma y_{it-1} + a_1 \bar{x}_i + \alpha_i + u_{it} \quad i = 1, 2, \dots, n \text{ and } t = 2, \dots, T_i \quad (4)$$

Therefore, including the means of all the time varying variables addresses the potential fixed effects unobserved heterogeneity problem.

### 3.2 Initial Conditions

The methods used in this paper have typically been applied to labour market data, such as modelling unemployment spells where it is highly unlikely that one will observe all individuals from the start of their labour market history. With respect to the voting data in the NCDS, it is not obvious that an initial condition problem will arise since we observe individuals from the first general election that they could have voted in, i.e. 1979, when all

respondents were 21 years of age. However, thinking of actual voting decisions as representations of underlying propensities ( $y_{it}^*$ ), then it is possible that individuals become politicised at different times so observing them from the same point (and in this case, age) may still generate an initial conditions problem.

We address the problem by estimating a reduced form equation for the initial voting decision in wave 1 (see Orme 2001). The covariates in the reduced form equation,  $z_i$ , are strictly exogenous and include variables relevant to period 1, some pre-sample information and the means of the time varying covariates in  $x_{it}$ . The pre-sample information variables are the equivalent of “instrumental variables” and are required for identification.

$$y_{i1}^* = \lambda' z_i + \eta_i \quad (5)$$

The correlation of the  $\eta_i$  and  $\alpha_i$  is  $\rho$ . Estimating the initial outcome by probit, one generates the following generalized error term:

$$e_i = \frac{(2y_{i1} - 1)\phi(\lambda' z_i)}{\Phi(\{2y_{i1} - 1\}\lambda' z_i)}$$

where  $\phi, \Phi$  are the normal density and distribution functions respectively, and the functions are evaluated using the estimated values of  $\lambda$ . The generalized error term can simply be added to equation (4) and estimated as a conventional random effects probit.

$$y_{it}^* = x_{it}'\beta + \gamma y_{it-1} + a_1' \bar{x}_i + \delta e_i + w_i + u_{it} \quad i = 1, 2, \dots, n \text{ and } t = 2, \dots, T_i \quad (6)$$

The individual specific random effect is  $w_i$ . The usual t test for the statistical significance of the additional term (i.e.  $\delta=0$ ) is a test for non zero  $\rho$ .

## 4 DATA

The data for the analysis is based on the 1958 National Child Development Study (NCDS). This is a longitudinal study of all persons living in Great Britain who were born between 3<sup>rd</sup> and 9<sup>th</sup> of March 1958. The 1958 perinatal mortality survey has been followed by 6 subsequent waves (NCDS 1-6) at ages 7, 11, 16, 23, 33 and the most recent, at ages 41-42. NCDS 1-3 comprised of interviews with the child, his parent's, his school and the report of a medical examiner. This data is an exceptionally rich source on child development from birth to early adolescence, child care, medical care, health, physical statistics, home environment, educational progress, parental involvement, cognitive and social growth, family relationships, etc. NCDS 4-6 is based largely on interviews with the cohort member and his/her partner. They document economic activity, income, training, housing as well as the development of the cohort member's own family.<sup>7</sup>

The last three waves collected data on the political behaviour of the cohort, including past electoral participation, party alignment, vote choice and voting intentions. The fourth follow-up, conducted in 1981 when the cohort were aged 23, collected information on the 1979 general election; the fifth follow-up conducted in 1991 when the cohorts were 33, collected information on the 1987 general election; and finally the 1999/2000 follow-up, conducted when the cohorts were aged 41/42, collected information on the 1997 general election.<sup>8</sup> While there were five general elections during this period in

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<sup>7</sup> Note that similar to other longitudinal cohort studies the NCDS is subject to attrition. Of the original 17,415 cases observed in wave 1 (at birth) only 10,979 of these remain in wave 6 (age 42). Hawkes and Plewis (2006) find that the dropout rate within the NCDS is higher for males, those with low educational attainment and less stable employment patterns and those living in disadvantaged circumstances. As some of these characteristics also typify non-voters it is possible that the type of people who have dropped out of the survey are also the type of people who do not turn out to vote. Therefore it is possible that our results may be subject to attrition bias.

<sup>8</sup> Note that the time lag between the actual election and the survey response is a potential cause for



Britain, as there were only three NCDS waves conducted during this period, we only have information on the cohorts voting behaviour in the first, third and fifth election. The panel nature of this data allows us to study the respondents' voting behaviour over three elections, at ages 21 (when we observe participation in their first election), 29 and 39. This therefore enables us to test Plutzer's (2002) development theory of voting, which posits that different factors influence voting in the first and subsequent elections.

#### **4.1 Voter Turnout**

The dependent variable is voter turnout in the 1979, 1987 and 1997 election and it is based on responses to the following question: "*Did you vote in the last General Election in XXX?*". As we estimate a balanced panel we restrict our sample to individuals whose turnout activity was recorded for each of the three elections. From our sample of 5,249 respondents, 70.8%, 80.2% and 79.9% stated they did vote in the 1979, 1987 and 1997 elections respectively (see Table 1). While reported turnout for the 1979 election is below the national aggregate turnout rate of 76%, given the relatively young age of the cohort at the time of the first election this is unsurprising. Reported turnout for the 1987 and 1997 elections, on the other hand, is higher than the official turnout rates of 75.3% and 71.6% respectively.<sup>9</sup> These differences are somewhat less than is frequently found in British studies of turnout, where participation is generally overestimated. For example, Swaddle and Heath (1989) find that reported turnout in the 1987 British General Election Study

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measurement error. However, as turnout across our sample tracks the official turnout rates better than other British election studies, this suggests that measurement error may not be a significant problem.

<sup>9</sup> The 1997 British general election experienced the lowest turnout in the post-war period of 71 percent (turnout continued to fall in the 2001 election where only 59.4 percent of the electorate voted). British electoral participation until recent years has been high compared to other advanced democracies. Average turnout in Britain between 1945 until 1997 has been 76 percent (Clarke, Sanders, Stewart and Whiteley 2003).

was 10 percent points higher than the official rate. Turnout may be overstated in survey data for several reasons, for example, respondents may misreport their turnout as they are embarrassed about not fulfilling their civic duty, in addition, abstainers are less likely than voters to participate in surveys (see Heath and Taylor 1999). The low level of misreporting in our samples suggests that the NCDS is a good alternative source of voting data.

As this paper is concerned with persistence in voting behaviour, Figure 1 maps out turnout patterns for all three elections. It shows that 54.9% of the sample voted in all three elections, while only 6.3% consistently abstained. This suggests that there is positive persistence in turnout rates i.e. individuals who vote in one election, especially the first, are likely to continue participating in future elections, while abstainers from all elections is rare. For example, the second largest group (14.9%) are those that did not participate in the first election of 1979 but turned out to vote in the following two elections. In addition a further 4.5% of those who abstained from the first two elections voted in the 1997 election. This suggests that voting is an absorbing state. The term *circumstantial voter* (see Blondel, Sinnott and Svensson 1997) refers to voters who do not consistently abstain from voting, rather than may fail to turn out at one election due to impeding circumstances, such as being out of the country on election day. 38.8% of our sample changed their participation patterns at least once over the observed period and thus may be defined as circumstantial voters. The raw data therefore displays evidence of persistence in voter turnout, however, only by estimating a dynamic structural model can we determine the extent to which this persistence is driven by habit formation or unobserved characteristics.

## **4.2 Covariates**

Our explanatory variables can be divided into time invariant and time varying covariates. The former characteristics are those which remain constant throughout the analysed period

and the majority of them were measured prior to the first election. They include gender, education, cognitive ability and parental social class. Education is one of the primary determinants of turnout (see Nie *et al.*, 1996; Rosenstone and Hansen 1993; Wolfinger and Rosenstone 1980). We include two measures of education. The first is the age at which the respondent left full-time education and the second is a dummy variable indicating whether the respondent stayed on beyond the minimum school leaving age of 16. Table 1 which provides the descriptive statistics for the data, shows that the average school-leaving age was 17 and that only 41% of the sample stayed beyond age 16. In addition to formal education, we also include a measure of cognitive ability. While including ability in voting models is relatively new, several recent studies (e.g. Denny and Doyle 2005a; Hauser 2002) have found that cognitive ability works in a similar manner to education - higher ability individuals are more likely to turn out to vote. Our ability measure is based on the first principal component from four ability measures taken at age 11: mathematics, comprehension, verbal and non-verbal abilities. The ability measure is standardised to have a mean of zero and a standard deviation of one.

As previous research (Crewe 1981; Parry, Moyser and Day 1992) has identified a relationship between turnout and the voter's social background, we include a categorical variable representing parental social class in 1958 (i.e. at birth).<sup>10</sup> Several recent studies have examined the psychological underpinnings of voter turnout and have found that

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<sup>10</sup> The parental class variable is based on seven categories, ranging from Professional, Intermediate, Skilled non-manual, Skilled manual, Semi-skilled non-manual, Semi-skilled manual and Unskilled manual. The original variable was recoded such that higher values represent a higher social class. Note that this scale does not separately report the self-employed. While we could have used this to generate a set of dummy variables, we found that treating it as a continuous variable was satisfactory in that the estimated parameters of interest were invariant to this choice.

certain personality types are more likely to turn out to vote than others.<sup>11</sup> While the NCDS includes six measures of personality<sup>12</sup>, only one is statistically significant in the analysis, therefore we restrict our results to the following personality measure - whether the individual is Lazy or Hardworking. The indicator is measured on a scale of 1 to 5, whereby a value of 5 corresponds to the highest level of the characteristic given. The individual's teacher made these evaluations when the respondent was 16 years old.

While one may expect the time invariant characteristics to have a constant impact on voting behaviour, it is also likely that turnout may be influenced by events that occur throughout the respondent's life. Indeed Plutzer (2002) finds that life events, such as marriage, home ownership, having children of school-going age, all influence the likelihood that individuals will participate in elections and can therefore switch individuals from being habitual non-voters to habitual voters. To capture these time-varying factors we include a number of characteristics measuring whether the respondent is married, has children, is a trade union member, their mental health status and their region of residence at each election period.

The voting behaviour of married individuals may differ from the non-married as being married can reduce the costs of turnout, especially if one partner has more information about the political process than the other. For example, Zuckerman, Kotler-Berkowitz and Swaine (1998) identify the household as being the centre of political discussion. While Zuckerman, Fitzgerald and Dasovic (2005) find that partners influence

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<sup>11</sup> Fowler (2004) identifies a relationship between patience and voter turnout. In addition, Denny and Doyle (2005a) find that certain personality types are more likely to turn out to vote than others i.e. hardworking and even-tempered individuals are more likely to vote than lazy and moody individuals.

<sup>12</sup> These include the extent to which the respondent is Cautious/Impulsive, Moody/Even-tempered, Timid/Aggressive, Flexible/Rigid, Sociable/Withdrawn and Lazy/Hardworking.

each other political preferences. Being married may also affect turnout decisions due to peer effects e.g. if one partner votes this may induce the other partner to vote. While, some studies identify a positive relationship between marriage and turnout (Strate, Parrish, Elder and Ford 1989; Timpone 1998), others find a modest negative effect (Highton and Wolfinger 2001; Stoker and Jennings 1995). To control for marital influences on political behaviour we include a dummy variable indicating whether the respondent is married in 1979, 1987 or 1997. As expected, Table 1 indicates that as the sample ages, the proportion classified as married increases.

Having children may also affect turnout decisions. Plutzer (2002) argues that individuals with young children are less likely to turn out due to the exhaustion and time demands associated with raising young children, while having children of school-going age could actually increase electoral participation as parents get involved in school life which activates the networks that encourage political mobilisation. To capture these effects we include a dummy indicating whether the respondent has children at each election. As with being married, having children increases with the respondent's age, only 23% of the sample have children in the first period, however this rises to 72% in the 1987 and 77% in the subsequent period.

Previous research (e.g. Radcliff 2001) has also found that trade union members are more likely to turn out to vote at election time as they are typically more politicised than non-members and are encouraged to vote by their unions. Therefore, we include a dummy variable indicating union membership in the three election periods. Table 1 shows that the proportion of union members among our sample falls slightly over time.

An additional, but often unexplored, factor that may influence political behaviour is the voters' physical and mental health. As voting requires a physical, and to some extent, a mental effort, having adverse health conditions may reduce the probability of voting. Several studies (Davey Smith and Dorling 1996; Denny and Doyle 2005b; Reitan

2003; Schur and Douglas 2000) have found a negative relationship between health and voter turnout. Therefore, we included a self-assessed measure of general health and an index of mental health in the model. As the measure of general health is not statistically significant we exclude it from our final model. Our measure of mental health is called the “malaise inventory score”, developed by Rutter *et al.* (1970), and is based on the Cornell medical index. This self-completion scale is derived from summing 24 psychological and somatic items, such as anxiety, problems sleeping, and irritability. High scores represent those with poor mental health, while scores above 7 are classified as having a high risk of psychiatric morbidity i.e. depression.<sup>13</sup> Table 1 indicates that the malaise score of our sample is quite low (averaging 2.6 in the 1979 period, then falling to 2.3 in the 1987 period) however it increases to 3.4 in the 1997 period, which suggest that mental health become worse as respondents’ age.<sup>14</sup>

As explained in the above methodology section, we include the averages of the time varying covariates to control for unobserved heterogeneity.

### **4.3 Identifying Variable in the Reduced Form Equation**

Estimating the reduced form initial conditions equation requires us to specify one or more variables that influence the turnout decision in the first election, but has no impact on voting decisions in later elections. Residential mobility is one such variable. Squire, Wolfinger and Glass (1987) and Highton (2000b) note that residential mobility is

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<sup>13</sup> See Rodgers *et al.* (1999) for the validity of the malaise score.

<sup>14</sup> Another potential determinant of the propensity to vote is economic status, in particular, unemployment status. Being unemployed may increase electoral participation as it reduces the costs of voting as such respondents have more time available, however the unemployed may also be less likely to vote if they are apathetic about the political system. As our empirical results indicated that unemployment has no statistical effect on turnout we exclude it from our model.

associated with lower turnout due to the high transaction costs involved in re-registering each time one moves, and due to the fact that such people may have less attachment to their local environment. We therefore include a variable capturing the number of places the respondent lived between the age 16 and 23. As the first election took place when the respondents were 21 years of age, this is a period which is usually associated with a high degree of mobility i.e. moving out of the family home, going to university, getting married. We argue that respondents who displayed a high degree of mobility during this period were less like to turn out to vote than more settled respondents. Those who moved frequently during this period may not have remained in any one place long enough to register. Indeed Squire *et al.* (1987) finds that the low turnout rates associated with residential movers in the US is due to the administrative burden of registering rather than differences in civic virtues. They estimate that turnout could be increased by as much as 9% if the burden of registration was eased. Table 1 indicates that respondents in our sample moved 3 times on average between the ages 16 and 23. In addition, to ensure that our identifying variable is not merely capturing some underlying propensity to move i.e. the people who move frequently between the ages 16 and 23, may also move frequently in subsequent years, we include an additional control variable indicating the number of places the respondent lived between ages 23 and 33 in each of the dynamic panel models.

## **5 RESULTS**

Table 2 presents five models of voter turnout. Model 1 estimates the static probit model. Model 2 estimates the naïve random effects probit model where the lagged dependent variable is included alongside the time invariant and time varying characteristics. Model 3 extends model 2 by including the averages of all the time varying covariates in order to control for fixed effects unobserved heterogeneity. Model 4 estimates the initial conditions probit model of the 1979 election. From this the generalised probit error term is calculated

and finally model 5 re-estimates model 3, but includes the generalised probit error term in order to control for initial conditions.

Model 1, which includes both time varying and time invariant factors, but excludes voter turnout in the previous election, is estimated in order to compare the magnitude of the explanatory variables in the static and dynamic models i.e. to examine whether failing to account for persistence artificially inflates the socio-demographic determinants. It shows that the characteristics that make one economically successful i.e. having high levels of education, being hardworking as opposed to lazy, and having high cognitive ability, are also likely to induce turnout. Several of the personal characteristics also influence turnout - being married, having children, being a trade union member and having parents from a high social class are all associated with a higher probability of voting, while being male, having poor mental health and a high level of residential mobility between the age 23 and 33 have the opposite effect. Trade union membership, followed by being married, has the largest substantive impact on turnout, such that it increases the probability of voting by 5.4% and 4% respectively. This static model assumes that turnout can only be influenced by individual characteristics and that past voting behaviour is essentially irrelevant for current voting decisions. In order to test the strength of this assumption the next model allows for a relationship between past and current voting behaviour.

Model 2 estimates a dynamic random effects probit model, which controls for persistence in voter turnout by including the lagged dependent variable. Lagged turnout exerts a positive and highly significant influence on current turnout: individuals who turned out to vote in the previous election are 26.1% more likely to turn out in the current election. This suggests a substantial amount of voting behaviour is driven by persistence, and indeed its effect dwarfs all the other covariates. Surprisingly however, its inclusion leaves the additional covariates largely unchanged from model 1. While the substantive



impact of several of the variables have fallen slightly, and staying on beyond the minimum school leaving age and residential mobility between the age 23 and 33 are no longer significant, the changes are modest given the inclusion of lagged turnout.

As discussed earlier one of the main problems with this dynamic model is that it fails to take account of unobserved heterogeneity. Therefore, the apparently high level of persistence in voter turnout may be driven by factors which are not included in the model. By failing to control for these unobserved characteristics we cannot determine whether the high level of persistence is really habit formation. We overcome this problem in model 3 by controlling for fixed effects unobserved heterogeneity by including the means of the time varying covariates as discussed earlier. The results indicate that unobserved heterogeneity is not substantially driving the apparent persistence in turnout. If it were an issue, then controlling for it by including the averages should reduce the magnitude of the coefficient on the lagged dependent variable. While this parameter does fall, it is by a very modest amount: 26.1% to 25.6%. As the averages are only included as controls for heterogeneity the coefficients themselves are of no direct interest. The time varying and time invariant covariates remain largely unchanged, with the exception of poor mental health which is no longer statistically significant. The marginal effect of turning out to vote if the respondent has children however, has actually increased.

While model 3 suggests that the extent of habit formation is quite large and that estimating the model in a dynamic form is appropriate, it does not address the initial conditions problem. As discussed earlier this can arise when the first wave of the panel does not coincide with the respondent's first experience with the electoral system. One can overcome this problem by modelling the first observed period i.e. 1979 election, within a static framework and using the predicted values from this model to generate a generalised error term which can then be included in the dynamic model. Including one (or more) variables that influences the first election, but not the rest, allows us to identify the model.

Model 4 therefore presents the estimates for the initial conditions probit regression of the 1979 election, and includes the time varying covariates, time invariants covariates, the averages of the time varying covariates and the identifying variable - the number of places the respondent lived between the ages 16 and 23.

The determinants of the initial election differ somewhat from those in the dynamic models. Being male, married, a union member, having a high level of education or poor mental health exerts no influence on the probability of voting in the first election. The impact of all the remaining variables increase in magnitude (with the exception of having children). Being hardworking as opposed to lazy, having high ability and staying in education beyond 16 all increase the probability of voting in the 1979 election by 3.3%, 3.4% and 7.0% respectively. They all have a greater impact on voting in the first election than in subsequent elections, which somewhat confirms Plutzer's (2002) hypothesis that there are certain characteristics that influence voters' decisions in their first election, but yet these factors diminish in importance over time. Finally, the identifying variable exerts a negative and significant impact on turnout, such that a respondent who lived in 5 places around the time of the election was 13.2% less likely to have voted in the first election compared to someone who lived in one place throughout the period ( $4 \times 0.033$ ).

Using equation (11) outlined in the modelling section, a generalised probit error term was calculated using the predicted values from model 4. Model 5 then replicates model 3 but also includes this term. While all the other covariates remain largely unchanged from model 3, controlling for initial conditions has a major impact on the lagged dependent variable. The probability that a respondent will vote in the current election if they voted in the previous one has roughly halved-from 25.6% to 13.1%. This suggests that a large part of the correlation over time between persistence in voter turnout can be accounted for by initial conditions. However there is still a significant portion of persistence which can be attributed to habit formation. Controlling for all other factors,

both observed and unobserved, simply turning out to vote in one election, increases ones probability of voting in a future election by 13%. This is substantially lower than the approximately 50% figure which has been found in both experimental (Gerber *et al.*, 2003) and panel (Green and Shachar, 2000) studies. However, as we observe voting behaviour in the cohort's first, third and fifth election, rather than consecutive elections, the degree of habit in is likely to be greater than our estimate of 13%.

The validity of our identifying variable is reinforced by including residential mobility between the first and second election as a control variable in the dynamic models. We find that while residential mobility between the age of 16 and 23 has a significant impact on turnout in the first election, future mobility in the period after this election (between the age 23 and 33) has little impact on turnout in subsequent elections (significant at the 10% level).

The  $r$  coefficient, and its corresponding likelihood test, which are reported at the end of Table 2, show the proportion of the total variance accounted for by the panel-level variance component. An  $r$  of zero would indicate that the panel estimator is no different from the pooled estimator. The likelihood test reported at the end of model 2 and model 3 rejects the null hypothesis that  $r$  is zero, albeit only significant at the 10% level, while the corresponding test for model 5 is significant at the 1% level suggesting that estimating the model as a panel is appropriate once unobserved heterogeneity is taken into account.

In additional analysis we also investigated whether the degree of persistence varies among different populations.<sup>15</sup> For example, one may hypothesis that the degree of habit may be lower for individuals with higher levels of education. By interacting lagged

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<sup>15</sup> Results available upon request from the authors.

turnout with gender, education and cognitive ability for example, we found that persistence does not differ between males and females or individuals with different levels of education and ability.

## **6 CONCLUSIONS**

In voting, history matters, however not as much as previous studies have suggested. While much of the literature on voter turnout is concerned with identifying why people turn out to vote, this paper addresses whether people consistently turn out to vote. Analysing the extent of persistence in voter turnout is important, especially given recent concerns about declining turnout rates among young adults (see Highton and Wolfinger 2001; Plutzer 2002; Russell 2004). Persistence in voter turnout can have significant implications for policies designed to increase electoral participation. For example, if individuals are consistently likely to either vote or abstain from elections it is important for them to enter a voting state early in life (Franklin 1994). Political education in childhood may therefore help to prevent the habit of non-voting before it actually begins. Hence, investments made to policies targeting young adults should yield the greatest return.

However, to successfully implement these policies it is first necessary to know the extent to which persistence in voter turnout can be attributed to habit. It is likely that campaigns to increase voter turnout will be more effective if persistence is driven by habit formation rather than unobserved individual characteristics. While evidence of persistence in turnout exists, few studies have distinguished between these two drivers of persistence, as doing so is empirically difficult. Only one study to date (Green and Shachar 2000) has dealt with the fixed effects unobserved heterogeneity problem when using panel data to explain voter turnout, while the initial conditions problem has gone unnoticed within the literature.

This paper therefore draws from the econometrics literature to apply suitable techniques to deal with both issues. It finds that the impact of fixed effects unobserved heterogeneity is the lesser of the two problems. Our naïve model of turnout i.e. failing to control for fixed effects or initial conditions, suggests that an individual who voted in the previous election is 26.1% more likely to vote in the current election. While controlling for fixed effects does little to change this result (only reducing it by 0.5%), taking account of initial conditions reduces the impact of previous turnout decisions on current turnout decisions by a half.

A priori, one may question why we have an initial conditions problem at all in this study, as we observe voting behaviour from the first election onwards, i.e. the cohort have never voted before. This suggests that political socialisation before prior to voting age and that young adults do not come to their first election as ‘political virgins’. Rather, similar to the political socialization literature which emphasises the importance of family background in influencing political orientations, it appears that young adults are also socialised with respect to electoral participation. Certain factors, such as education, which encourages political mobilisation by fostering democratic values and beliefs, and indeed parental encouragement, creates civic minded citizens long before such citizens enter the polling booth. Indeed Verba, Schlozman and Burns (2005) note that there is an intergenerational transmission of political participation, whereby politically active parents generate political active children, while Horwitt (1999) finds that non-voters are more likely to come from families of non-voters.

This implies that the initial conditions problem may even be greater in studies where the first wave of the panel does not correspond with the voters first experience of elections i.e. they may have voted in previous, but unobserved, elections. Therefore, the initial conditions problem may be even more pronounced when using standard panel data.

This study finds that once one controls for socio-economic, demographic and psychological factors, unobserved additional characteristics and initial conditions, an individual who voted in the previous election is 13% more likely to vote in the current election. The results in this paper shed some light on the common finding in the literature that turnout increases as the respondent get older. Moreover, Rosenstone and Hansen's (1993, 137) explanation of "life experiences" or Highton and Wolfinger's explanation of "pure learning" (2001, 208), could actually be a result of habit, such that the more an individual engages in an act, the more that act becomes self-reinforcing, and hence it becomes a habit.

While the degree of persistence in voter turnout is large, this paper shows that the amount which can be attributed to habit formation is relatively small. However it is still a multiple of any of the other common determinants of turnout which are cited in the literature. For example, education only increases the probability of voting by 0.09% for each additional year, while union membership only increases it by 2.9%. Therefore, while this study shows that the extent of habit formation in voter turnout is smaller than previous studies have identified, once suitable procedures have been taken into account, the fact that one voted in a previous election, is still by far the largest determinant of turnout in the future.

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## Tables

**Table 1 Descriptive Statistics**

	<b>1979</b>	<b>1987</b>	<b>1997</b>
<b>Dependent Variable</b>			
NCDS- Turnout	70.8%	80.22%	79.86%
Official Turnout	75.98%	75.34%	71.60%
<b>Time Varying Covariates</b>			
Married	0.459 (0.498)	0.736 (0.441)	0.735 (0.441)
Has Children	0.232 (0.422)	0.715 (0.451)	0.772 (0.419)
Union member	0.360 (0.480)	0.307 (0.461)	0.299 (0.458)
Poor mental health	2.569 (2.834)	2.276 (2.832)	3.384 (3.419)
<b>Time Invariant Covariates</b>			
	<b>1979-1997</b>		
Male	0.467 (0.499)		
Age left education	17.19 (1.903)		
Stayed in education after 16	0.409 (0.492)		
Hardworking personality	3.400 (1.195)		
Cognitive ability	0.000 (1.000)		
Parental social class	3.093 (1.234)		
No. of places lived between ages 23-33	3.054 (2.059)		
No. of places lived between ages 16-23	3.187 (2.158)		
N	5249		

**Note:** Means and standard deviations (in parenthesis) reported. Data comes from the National Child Development Study.

**Table 2 Random-Effects Probit Model of Persistence and Voter Turnout**

<b>Dependent variable:</b> Voter turnout	<b>Model 1</b> Static Probit	<b>Model 2</b> RE Probit	<b>Model 3</b> RE Probit	<b>Model 4</b> Initial Probit	<b>Model 5</b> RE Probit
<b>Lagged dependent variable:</b> Voted in previous election	~	0.261*** (0.014)	0.256*** (0.015)	~	0.131*** (0.015)
<b>Time invariant covariates</b>					
Male	-0.021*** (0.008)	-0.021** (0.008)	-0.029*** (0.009)	0.006 (0.014)	-0.030*** (0.009)
Age left education	0.009** (0.004)	0.010*** (0.004)	0.010*** (0.004)	-0.007 (0.005)	0.009** (0.004)
Stayed in education after 16	0.025* (0.013)	0.015 (0.013)	0.011 (0.013)	0.070*** (0.020)	0.016 (0.013)
Hardworking personality	0.017*** (0.004)	0.011*** (0.004)	0.010*** (0.004)	0.033*** (0.006)	0.013*** (0.004)
Cognitive ability	0.031*** (0.005)	0.024*** (0.005)	0.022*** (0.005)	0.034*** (0.008)	0.025*** (0.005)
Parental social class	0.009*** (0.003)	0.007** (0.003)	0.007** (0.003)	0.015*** (0.005)	0.008** (0.003)
No. places lived b/w ages 23-33	-0.004** (0.002)	-0.003 (0.002)	-0.003 (0.002)	~	-0.004* (0.002)
<b>Time varying covariates</b>					
Married	0.040*** (0.010)	0.034*** (0.010)	0.037** (0.015)	0.004 (0.019)	0.038** (0.015)
Has Children	0.017* (0.010)	0.022** (0.010)	0.051*** (0.017)	-0.039* (0.022)	0.051*** (0.016)
Union member	0.054*** (0.008)	0.046*** (0.008)	0.031** (0.013)	0.027 (0.019)	0.029** (0.013)
Poor mental health	-0.004*** (0.001)	-0.004*** (0.001)	-0.001 (0.002)	-0.004 (0.004)	-0.001 (0.002)
<b>Averages of time varying covariates from 1979-1997</b>					
Average married	~	~	-0.006 (0.020)	0.040 (0.028)	-0.000 (0.020)
Average of having children	~	~	-0.047** (0.022)	-0.024 (0.030)	-0.051** (0.022)
Average union status	~	~	0.028 (0.018)	0.040 (0.026)	0.038** (0.018)
Average poor mental health	~	~	-0.004 (0.003)	0.001 (0.004)	-0.005* (0.003)
<b>Identifying variable for initial (1979) probit</b>					
No. places lived b/w ages 16-23	~	~	~	-0.033*** (0.003)	
<b>Probit generalised error</b>					
	~	~	~	~	0.060*** (0.007)
r (proportion of total variance contributed by panel-level variance component)	~	0.058 (0.040)	0.066 (0.040)	~	0.246 (0.021)
Likelihood ratio test of r=0	~	2.06*	2.68*	~	47.61***
No. of observations	10498	10498	10498	5249	10498
No. of individuals	5249	5249	5249	5249	5249

**Note:** The dependent variable in Models 1, 2, 3 and 5 is voter turnout in the 1987 and 1997 British general elections. Model 1 estimates a static probit regression. Models 2, 3 and 5 estimate dynamic models using Random-Effects Probit regressions covering 2 waves (1987 and 1997 election). Model 4 estimates the initial conditions model i.e. voter turnout in the 1979 election, using a probit regression. Marginal effects are reported with standard errors in parenthesis. Regional and year dummies are included but not reported for Model 1 and 2. Average regions, regional and year dummies are included but not reported for Model 3, 4 and 5. Models 3, 4 and 5 allow for correlation between the time-varying covariates and the unobservable heterogeneity by including the time means of these variables. Model 5 allows for endogenous initial conditions and is estimated due to Orme (2001).

**Figure 1 Turnout 1979-1997**

