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Identifying the economic determinants of individual voting behaviour in UK general elections

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Abstract

We explore the economic determinants of individual voting behaviour in five UK electoral cycles during 1992–2014. Using the Understanding Society and the British Household Panel Surveys, we investigate the importance of political sentiments and subjective economic evaluations disentangling persistence of party support and unobserved heterogeneity effects. We estimate joint dynamic tripartite models of party support and egocentric perceptions of current and prospective finances, permitting longitudinal simultaneous determination of perceptions of personal finances and political preferences. The results validate the economic voting hypothesis in cycles adjacent to economic downturns: support for the governing political party is positively related to individual perceptions of own financial well-being. Failing to account for simultaneity and not accounting for dynamics and initial political party support inflate the impact of personal financial evaluations.

JEL classifications: C33, C35, D72

1. Introduction

Are individual economic evaluations regarding own finances important in determining voting behaviour? How important are voters' political sentiments in explaining ruling party support? Are economic motives more important during economic downturns? Are they driven by current or by prospective economic evaluations? The underlying process linking ruling party support, political sentiments, and personal economic evaluations is a complex dynamic process hinging on personal circumstances, institutional, and socio-economic factors (see Anderson, 2007). Further, different electoral cycles involving governing parties with distinct political ideologies can affect the nature and amount of governmental spending, which in turn can alter individual voting intentions (see Bove *et al.*, 2017; Magkonis *et al.*, 2021). We use the British Household Panel Survey (BHPS) and the Understanding Society (UK Household Longitudinal Study, UKHLS) datasets to build compact unbalanced panels per each government's term (electoral cycle) over the period 1992–2014. Our study is not an attempt to predict electoral results but to answer the above questions providing estimates about the magnitude and direction of the effect of individual economic evaluations, the degree of partisanship, and the impact of other socio-economic factors on ruling party support. We add to the literature by proposing a tripartite dynamic discrete choice

model linking voting preferences, current and future finances to analyse all possible electoral cycles using the BHPS and UKHLS datasets. We find positive evidence for pocketbook (egocentric) economic voting behaviour in electoral cycles adjacent to economic downturns, whereas the degree of partisanship is one of the most important determinants of incumbent party support in all electoral cycles.

A large body of research indicates presence of economic voting with voters rewarding governments on the state of the aggregate economy, but the micro-level evidence concerning governmental accountability based on individual voters' financial situation is more inconclusive (see reviews in Lewis-Beck and Stegmaier 2000, 2013). Most of this research is based on (cross-sectional) electoral survey data which cannot capture the underlying factors linking changes in voters' socio-economic characteristics and political preferences. The BHPS and UKHLS used in our investigation do not include questions regarding macroeconomic evaluations but, do include a rich battery of questions regarding individual characteristics, socio-economic factors, personal income, and political party preferences. Our work sheds light on the role of accountability based on the voter's individual financial situation, and investigates the relevance of political sentiments and partisanship as drivers of incumbent support during five distinct governmental terms in the UK.

Recent contributions using longitudinal BHPS data by Liberini *et al.* (2017) and Chrysanthou and Guilló (2018) also find positive evidence in favour of pocketbook voting in the UK. Liberini *et al.* (2017) consider retrospective economic evaluations in a static setting focusing on the voting impact of subjective well-being (life satisfaction), using pooled 1996–2008 data and ignoring electoral cycles. Chrysanthou and Guilló (2018) consider retrospective, current and prospective economic evaluations, but focus on the dynamics of the Scottish National Party support during 1999–2006. Both studies estimate reduced form single equation voting determination models. An obvious concern in reduced form studies is the endogeneity of individual economic evaluations due to a correlation between the unobserved determinants underlying economic perceptions and political preferences. Chrysanthou and Guilló (2018) induce a correlation between subjective economic evaluations and unobserved heterogeneity by including individual-specific time averages of economic evaluations: this permits identifying the partial effects of subjective economic evaluations but relies on the assumption of exogenously determined economic evaluations. Subjective personal economic evaluations, however, may be determined by individual experiences and personality attributes which are typically unobserved (see Evans and Andersen, 2006). If these unobservables also determine political preferences, single equation estimation is inappropriate and joint models of subjective economic evaluations and governing party support should be estimated. Liberini *et al.* (2017) do not deal with the potential endogeneity of retrospective economic evaluations and instead account for the endogeneity of life satisfaction to identify its impact on political preferences.

We contribute to the literature by introducing a dynamic random effects tripartite model linking individual political preferences to current and prospective economic perceptions. The recursive tripartite model does not need to rely on arbitrarily chosen instruments that are often unavailable in many datasets: functional identification is achieved since the primary governing political party support equation is a binary choice model and the reduced forms for current and future subjective financial situation are ordered outcome models increasing in financial well-being. The vector of explanatory variables is subjected to a different nonlinear transformation in each equation enabling parameter identification in all three parts of the model (voting preferences, current, and future finances). Quite crucially, structural identification is achieved by using instruments implied by the economic model, temporal ordering, and logical consistency as opposed to relying on questionable exogenous variation sources. Specifically, voting preferences are a function of current and prospective subjective financial evaluations, current subjective financial evaluations are a function of objective income (deflated monthly equivalent household income), and prospective financial

evaluations are a function of current period subjective financial situation evaluations. Our conclusions are robust to alternative functional specifications.

We investigate the relative importance of political sentiments and egocentric economic evaluations by disentangling the effects of state dependence and unobserved heterogeneity. We estimate dynamic tripartite models of incumbent political party support and egocentric economic evaluations, taking into account the persistence of political party support and the degree of partisanship. First, the analysis shows that previous period party support and partisanship are the most important drivers of political party preferences. Secondly, the analysis reveals that voters' individual economic perceptions regarding own finances are better drivers of economic voting than the individual's actual income (similar to Liberini *et al.*, 2017; Chrysanthou and Guilló, 2018), and more importantly, that actual income and other socio-economic factors like the labour status, in general, do not influence ruling party support directly, but only indirectly via their impact on individual perceived finances. Thirdly, our study reveals the importance of modelling the endogeneity of subjective egocentric economic evaluations, as well as, incorporating dynamics and initial voting preferences in the structural model: failing to do so inflates the impact of current and future subjective financial situation on governing party support (particularly in the 1992–6 and the 2010–14 electoral cycles). Fourthly, our investigation reveals the importance of considering distinct periods of the economic cycle: subjective economic evaluations are not important in government terms that are characterized by relative economic stability, but they are during government terms adjacent to recessionary periods. This aligns with the macroeconomic cross-country study of Matakos and Xefteris (2020), finding a positive association between economic insecurity and voter support for systemic parties (incumbent or likely to govern). Further, it aligns with Stiers and Kern (2021) concluding that voters are aware of the state of the economy and adjust perceptions of presidential approval accordingly.

Our results extend the findings and conclusions of Sanders and Brynin (1999), Evans and Andersen (2006), Nadeau *et al.* (2013), Pickup and Evans (2013), and Chrysanthou and Guilló (2018), regarding the relative importance of ideology and economic motives. Sanders and Brynin (1999) find that economic perceptions exert important indirect effects on voters' preferences although ideological change variables outperform changes in economic evaluations. Similarly, Evans and Andersen (2006) conclude that the impact of lagged party support on sociotropic (national aggregate) economic evaluations is consistently stronger than the effects of concurrent and retrospective economic evaluations on party support. In an international comparative study, using instrumentation Nadeau *et al.* (2013) conclude that (sociotropic) economic evaluations are significant, although ideology, past vote recall, and partisanship exert more powerful influences. Chrysanthou and Guilló (2018) also find positive evidence on pocketbook voting, though the impact of egocentric economic evaluations is reduced for partisan voters. Finally, digging into the economic voting hypothesis Healy *et al.* (2017) show that pocketbook evaluations are at least as important as sociotropic ones in economic voting, though they find stronger partisan bias in the latter.

In contrast, studies such as Evans and Pickup (2010) and Johnston *et al.* (2005) provide evidence against economic voting theories and in favour of the endogeneity argument, i.e. that individual economic evaluations are conditioned by political preferences rather than vice-versa. Evans and Pickup (2010) conclude that the incumbent presidential approval and party identification affect egocentric evaluations while the reverse does not hold. Johnston *et al.* (2005) find that upon controlling for prior elections' vote, egocentric evaluations have no effect. Pickup and Evans (2013) conclude that long-term differences in economic evaluations across individuals do influence party support, while short-term economic evaluations do not, underlining the need to employ longitudinal panel data. Therefore, these studies

point to the need of not only using panel datasets but also accounting for endogeneity and the degree of partisanship as we do in the current investigation.[1]

In summary, our work extends and complements the existing evidence on the economic voting behaviour in four important aspects. First, we consider two large panel datasets permitting the analysis of five distinct electoral periods. Secondly, we tackle the endogeneity problem by jointly modelling governing party support and perceptions of current and future personal financial situations by using instruments implied by the model and temporal ordering without relying on arbitrarily chosen exogenous instruments. Third, our results provide robust evidence in favour of the pocketbook economic voting hypothesis. Last but not least, our analysis reveals that economic voting is more important in electoral cycles adjacent to economic downturn periods.

Section 2 discusses the datasets and sample selection, and Section 3 focuses on measuring party support and subjective economic evaluations. Section 4 introduces the model, Section 5 discusses the estimation results, and Section 6 concludes. The Online Appendix contains transition probability matrices, descriptive statistics and robustness checks.

2. Datasets

This investigation analyses electoral cycles in the UK during 1992–2014. For the time frame spanning 1992–2008 we employ the BHPS dataset. The BHPS is a nationally representative longitudinal survey introduced in 1991 and completed in 2008 giving a total of 18 panel waves. The first wave panel consisted of some 5,500 households and 10,300 individual respondents selected from 250 areas of Great Britain.

We subsequently use five waves of the UKHLS to study the electoral period of 2010–14. The UKHLS is the successor of the BHPS introduced in 2009 (a year after the final BHPS wave) and is a longitudinal survey addressed to the members of approximately 40,000 households.

We employ the BHPS original sample and the Great Britain general population UKHLS sample, noting that both exclude Northern Ireland. The Scotland and Wales extension samples added in the BHPS in 1999 and the Ethnic Minority Boost sample in UKHLS are also excluded, since they were obtained using distinct sample selection mechanisms.

Political preferences can display temporal variation, which requires accounting for the dynamics of party support triggered in different phases of the electoral cycle (see Chrysanthou and Guilló, 2018). To study the longitudinal evolution and persistence in political party support, we consider adults eligible to vote that are present in the sample in the first year of each electoral period (enabling inclusion of initial period political support), and that have no missing values in any of the covariates included in the estimations (to account for political party support persistence via the inclusion of lagged support). We construct compact unbalanced panels per electoral cycle for individuals present in the dataset for a minimum of three consecutive panel waves (permitting inclusion of initial conditions and dynamics).

The electoral cycles and the respective incumbent political parties (in brackets) studied using the BHPS are 1992–6 (Conservatives), 1997–2000 (Labour), 2001–4 (Labour), 2005–8 (Labour). The UKHLS permits analysing the political support of the 2010–14 (Conservatives and Liberal Democrats) coalition government elected following the May 2010 general election. The May 2015 general election was followed by the June 2017 snap general election (to enhance incumbent majority ahead of the EU withdrawal negotiations) leaving only 2 years of observations and thus, we disregard the latter electoral cycle.[2]

[1] Pardos-Prado and Sagarzazu (2016) using Spanish data also find evidence supporting the endogeneity argument.

[2] The year 2017 was the final available wave of the UKHLS at the commencement date of the current research and 2019 is the latest available wave. The following general election was also a snap election held in December 2019 due to the prolonged parliamentary deadlock over the UK withdrawal from the EU. Analysing these particular 2-year cycles requires dealing with alternative issues regarding the UK's exit from the EU which are outside the scope of this study.

Note that all general elections were held in either April (1992), May (1997, 2005, 2010), or June (2001) of the respective electoral cycle, which determine each term's initial period. The UKHLS waves' are issued as 24 monthly samples and data collection and interviews span 2 years. We use the interview day, month, and year variables in order to define the appropriate electoral period. Individuals interviewed on or prior to the 6 May 2010 General Election, and on or after the 7 May 2015 General Election, are excluded from the UKHLS 2010–14 electoral period estimation sample. This discards 14,412 out of 151,588 observations prior to omitting missing values, and non-consecutive observations for a minimum of 3 years.[3]

The BHPS fieldwork period ran from 1 September 1 year through the end of April of the next year, though the bulk of the interviews took place by the end of December. Unlike in the UKHLS sample, restricting the BHPS samples such that the interview date falls within the corresponding electoral period does not discard any observations.

Final wave (2008) BHPS participants were asked if they would consider joining the UKHLS, but the first interviews with BHPS participants in the UKHLS were carried out in wave 2 of the UKHLS in 2010–11, causing a degree of discontinuity. As the bulk of the final (wave 18) BHPS interviews took place during September–December 2008, we refer to the corresponding electoral period as 2005–8 instead of 2005–9, although the effective estimation sample includes 260 final wave BHPS participants interviewed during January-April 2009 (next General Election held on the 6 May 2010). The effective estimation samples per electoral cycle are given at the bottom of all estimation Tables.

3. Measuring political party support

Political party supported in the BHPS and UKHLS is a derived variable from a sequence of follow-up questions. These questions are: (1) Generally speaking do you think of yourself as a supporter of any one political party? (2) Do you think of yourself as a little closer to one political party than to the others? (3) If there were to be a general election tomorrow, which political party do you think you would be most likely to support? Respondents are asked question (2) only if they answered 'No' to question (1) and are asked question (3) only if they answered 'No' to question (2). Finally, if the answer to any of the first two questions is 'Yes', respondents are also asked question (4) Which party do you regard yourself as being closer to than the others?

From the above set of questions, over each government term, we define the dependent variable as a binary indicator of party support taking the value of one if the individual's stated party in either question (3) or (4) is the incumbent party and zero otherwise. The corresponding mean governing party support is provided at the bottom of the descriptive statistics for each of the five terms analysed (see Table S20, Supplementary Appendix).

The political party supported variable is directly reported in the BHPS dataset as a separate variable and is derived by summing responses to questions (3) and (4). The only exception is the second BHPS wave (1992) during which political party supported and question (3) were not asked. For this second BHPS wave, we replace political party supported by the answer provided to question (4). In the UKHLS political party supported is not reported as a separate variable and so we sum responses to questions (3) and (4) to construct an identical political party support variable to the BHPS. The longitudinal evolution of party support across the five electoral periods is depicted in the histograms of Figures 1–5, and the corresponding party frequencies are given at the bottom of Tables (S5–S19, Supplementary Appendix). Summing the column totals of party closest to and party that would vote tomorrow provides the respective political party support total per electoral period. This does not

[3] Including individuals interviewed on 7 May 2015 only adds 21 observations but, since the time of voting/interview is unknown, we opted to exclude them. Adding these has very minimal impact on the estimates (available upon request).

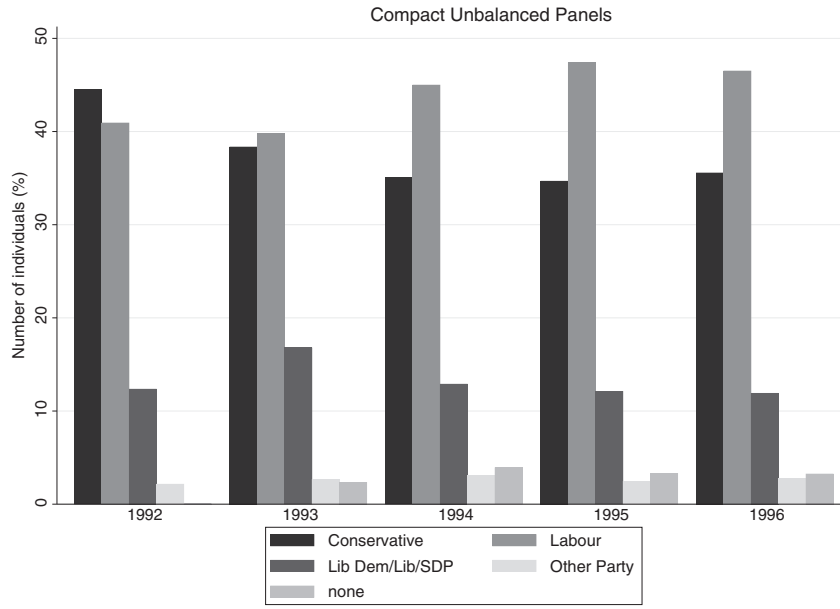

Figure 1. Political party support, 1992–6.

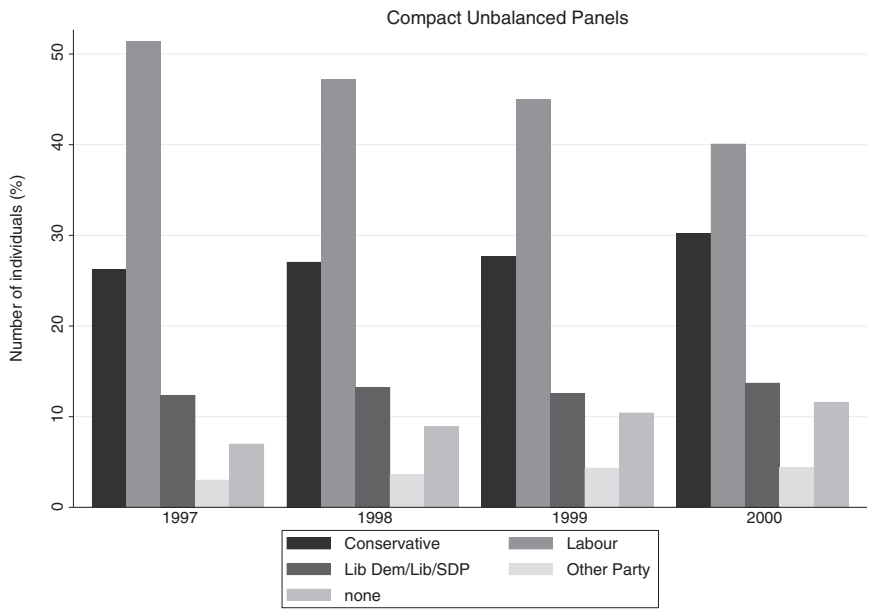

Figure 2. Political party support, 1997–2000.

hold regarding 1992–6 since only political party closest to was reported in 1992. The majority of responses constituting part of the political party support variable come from the party closest to question. On the other hand, most of the 'none' responses stem from the voting intention question (see Tables S5–S19, Supplementary Appendix). Figures 1–5 reveal

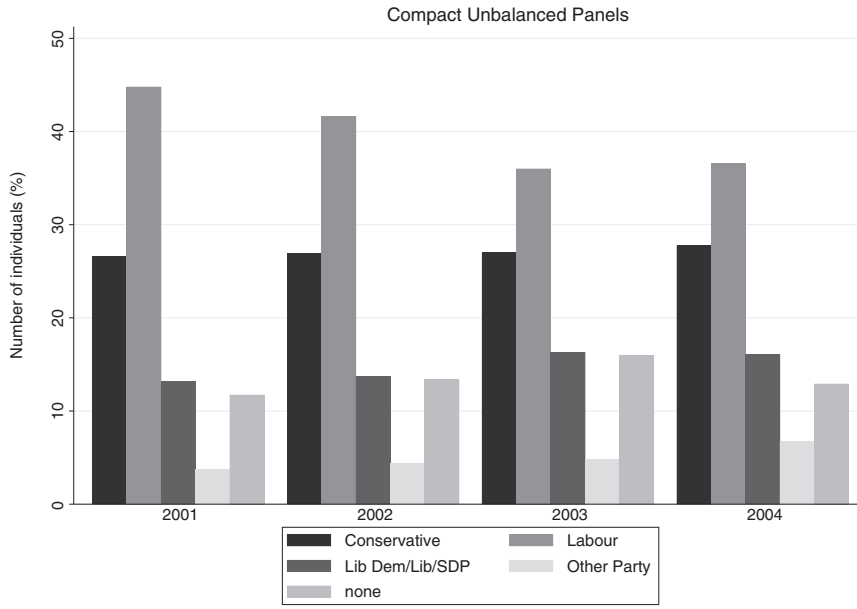

Figure 3. Political party support, 2001–4.

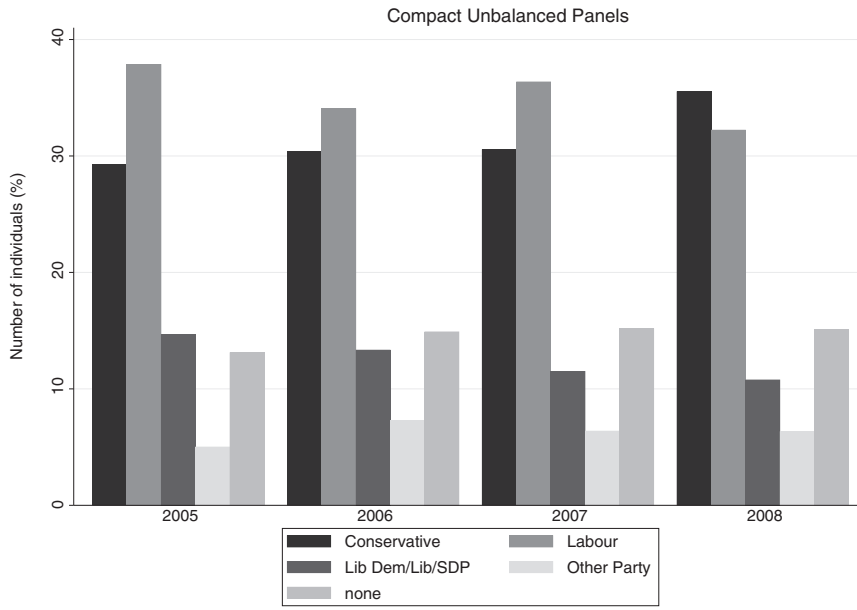

Figure 4. Political party support, 2005–8.

that Conservative support diminishes during 1992–6, remains stable as the leading opposition party during the next two consecutive terms and increases in 2005–8, prior to the formation of the coalition Government with Liberal Democrats during 2010–14 since no party

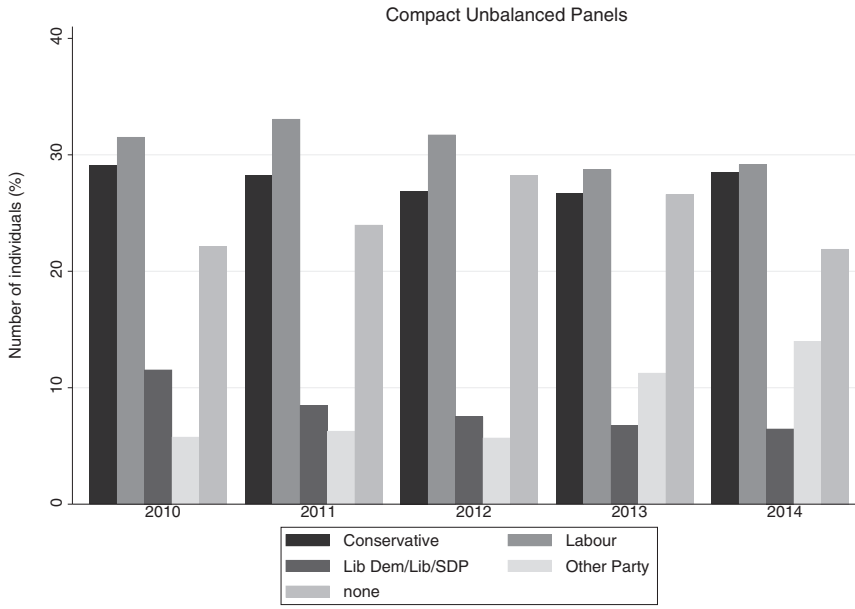

Figure 5. Political party support, 2010–14.

was able to command a majority in the House of Commons (evidenced by the close Labour percentages in Figures 4 and 5).

The determinants of personal political proximity/affiliation are generally unobserved by the investigator and difficult to quantify. An individual can adhere to a specific political ideology and at the same time identify with more than one political party. Actual political party support may change over time. To measure the degree of political party proximity longitudinally, we use an additional question asked to respondents declaring support for a particular political party or being closer to one party than the others (i.e. respondents giving an affirmative reply to either question (1) or question (2)). The respondents are asked whether they consider themselves very strong, fairly strong, or not very strong party supporters. The respective variable, named 'strong party support', indicates either very or fairly strong party support, and aims to capture the strength of partisanship over time.

Initial period party support is a function of unobserved determinants since the beginning of the corresponding term is unlikely to coincide with the initiation of the stochastic process determining political party preferences. State dependence and individual heterogeneity are diametrically opposite rationalizations of habit and preference persistence (Hsiao, 2003, p. 216). Considering otherwise identical voters, if those supporting a particular party in the past amend their voting intentions (swing voters) this would be an entirely behavioural effect that could be attributed to approval/disapproval of party policies.

Alternatively, individuals may differ in specific unobserved determinants of political affiliation, while at the same they are not influenced by past voting behaviour or party performance. If such unobservables are contemporaneously correlated, and are not appropriately accounted for, past party support may turn out to be the overriding determinant of future political party preferences—see Heckman (1981a,b).

Political party preferences are formed by an ideological component and a policy component. Ideology is typically understood as a type of a political worldview and is often operationalized as a position on the left-right scale, while policy-driven voting typically refers to voting in response to party position-taking on specific issues. The preferences of strong

party supporters stem from a mixture of both ideological and policy-related components with the weight of each determinant depending on the strength of individual-specific party bias. Ideologically neutral voters, however, will swing exclusively in response to government policies (see Mayer, 2008; Liberini *et al.*, 2017, p. 46). For each electoral period, we provide transition probability matrices for political party supported, political party closest to, and political party that would vote tomorrow. As indicated by the transition matrices, initial party preferences are strongly persistent regardless of the term considered (see Tables S5–S19, Supplementary Appendix, where rows and columns reflect initial and final values, respectively). A non-negligible degree of longitudinal variation in party preferences is, however, observed in the combined 'political party supported' variable transition matrices in line with the cross-national evidence in Dalton and Wattenberg (2002). Therefore, our estimation methodology has to account for initial conditions and dynamics. The transition matrices reveal two important features: most of the combined political party supported responses come from the political party closest to question and most of the inflows/outflows In the combined responses are due to changes in the voting intention. This is not surprising since the voting intention question was asked to those stating no political party closeness nor support. Voting questions in the BHPS and UKHLS are asked sequentially: individuals are asked the voting intention question only if they have indicated no political party support and no party closeness in the preceding two questions. Hence, the party that would vote tomorrow answer is conditional on a negative party support response. Selecting the estimation sample on the basis of the dependent variable values introduces sample selectivity problems producing biased estimations (see Heckman, 1979). Excluding either the party closeness or the next-day voting intention responses produces a non-random sample that is not representative of the voters' population. Dealing with sample selectivity would add a fourth equation to explicitly model the selection condition to a tripartite model. Despite the sample selectivity bias, we attempted estimating the tripartite models excluding voting intention responses, but parameter identification was not possible due to the high persistence and lack of variation in the restricted dependent variable. Estimating models using the voting intention answers only introduces substantial sample attrition and renders the financial evaluation AMEs insignificant, except in the final period which uses the larger UKHLS dataset (available upon request).

3.1 Subjective egocentric economic evaluations

Economic voting models assert that changes in the relative popularity of the incumbent government party are influenced by voters' individual perceptions of economic conditions. According to the model specification, these perceptions can relate to current, past, or future economic conditions. There are two dimensions of subjective individual economic evaluations: egocentric/egotropic (about the personal economic situation, the so-called 'pocketbook' evaluations) and sociotropic (about national economic conditions). The existing empirical evidence indicates that egocentric and sociotropic financial evaluations are conditioned by party proximity and prior opinions of the incumbent governing party (see Evans and Andersen, 2006; Evans and Pickup, 2010; Healy *et al.*, 2017).

The BHPS and UKHLS include enot only gocentric economic perceptions referring to the respondent's financial situation, but not sociotropic evaluations. Regional gross domestic product growth and other macroeconomic indicators could act as proxies to sociotropic evaluators. However, inclusion of regional macroeconomic variables would only add constants (displaying only some annual variation) per regional grouping of individuals in the estimation sample. This is already captured by the inclusion of regional controls and yearly time dummies in our estimated models. The covariates contained in our analysis do not include sociotropic evaluators (e.g. in the cross-country survey of Dassonneville and Lewis-

Beck, 2019) nor macroeconomic indicators such as the national/regional rate of unemployment, inflation, or GNP (e.g. Lewis-Beck and Stegmaier, 2000; Matakos and Xefteris, 2020), but instead align with the set of individual-specific explanatory variables included in economic studies using BHPS and UKHLS micro-level data (e.g. Oswald and Powdthavee, 2010; Liberini *et al.*, 2017; Chrysanthou and Guilló, 2018; Liberini *et al.*, 2019).[4]

To test the economic voting hypothesis, we employ the available egocentric economic evaluations (Sanders and Brynin, 1999; Johnston *et al.*, 2005; Chrysanthou and Guilló, 2018 follow the same approach). Egocentric (subjective) individual economic evaluations are a significantly better predictor of political preferences than actual (objective) income (see Chrysanthou and Guilló, 2018; Liberini *et al.*, 2019).

Retrospective egocentric evaluations (improvement or deterioration of the personal financial situation relative to the previous year situation) are not contained in the UKHLS and are only available in the BHPS. Pudney (2011) analysing the BHPS variables on financial management and material well-being, concludes that retrospective evaluations of the past are heavily contaminated by present perceptions. This produces significant bias in level and change measures of individual financial well-being. Taking the above into consideration and, since a four-part dynamic discrete-choice equation system would be computationally difficult to fit, we do not model retrospective economic evaluations.

In our data, egocentric economic evaluations are captured by the perception of the current financial situation (very difficult, quite difficult, just getting by/don't know, doing alright, living comfortably) and by the next year expected change in the financial situation (worse off than now, about the same, better off). Current evaluations control for individual feelings' about their income (see Liberini *et al.*, 2019) and expected financial evaluations account for economic insecurity (see Chrysanthou and Guilló, 2018; Matakos and Xefteris, 2020). Egocentric economic evaluations may be influenced by personal circumstances and other socio-economic factors, which influence the evolution of political party preferences. The pocketbook economic voting hypothesis establishes that incumbent party support is positively related to voters' economic evaluations. To explore the validity of this hypothesis we need to separate the effects of individual circumstances and other socio-economic factors on economic evaluations. This calls for the development of a joint model of voting preferences and economic evaluations. The next section describes our modelling approach.

4. A joint model of party support and egocentric evaluations

Governing political party support is modelled as a function of initial period party attachment, past period support, strength of party support, socio-economic characteristics, and egocentric evaluations of the current and future financial situations. To explicitly account for simultaneous determination of political party support and subjective individual economic evaluations we introduce a tripartite model linking current evaluations, expected future evaluations and political support. Using joint maximum likelihood estimation (MLE) we estimate a tripartite recursive model formed by a system of three latent responses, where for the i-th individual in the t-th time period y_{it}^* is a latent binary response variable for the governing party support and (c_{it}^*, f_{it}^*) are the latent ordered response variables (increasing in financial well-being) for the current and expected future subjective financial situations, respectively:

[4] We do not include social class and occupational classification (e.g. in Evans and Andersen, 2006; Sanders and Brynin, 1999) as these are only reported for individuals that are active in the labour market. To maximize the number of observations we include 'Unemployed/Economically Inactive' similar to e.g. Chrysanthou and Guilló (2018); Oswald and Powdthavee (2010).

$$y_{it}^{*} = \mathbf{c_{it}}\boldsymbol{\gamma} + \mathbf{f_{it}}\boldsymbol{\delta} + \mathbf{x_{it}}\boldsymbol{\beta} + \vartheta_1 y_{it-1} + \vartheta_2 y_{i1} + \alpha_0 + \zeta_{i,1} + \eta_{it};\ i = 1,\ldots,N;\ t = 2,\ldots,T_i;$$
$$y_{it} = 1[y_{it}^{*} > 0];\ i = 1,\ldots,N;\ t = 2,\ldots,T_i \quad (1)$$

$$c_{it}^{*} = \mathbf{z_{it}}\boldsymbol{\pi} + \zeta_{i,2} + \omega_{it};\ i = 1,\ldots,N;\ t = 2,\ldots,T_i$$
$$c_{it} = j \quad if \quad \mu_{j-1} < c_{it}^{*} \leq \mu_j, \mu_0 = -\infty, \mu_j \leq \mu_{j+1}, \mu_J = \infty, \forall j \in \{1,\ldots,J\}, J = 5. \quad (2)$$

$$f_{it}^{*} = \mathbf{c_{it}}\boldsymbol{\tau} + \mathbf{g_{it}}\boldsymbol{\psi} + \zeta_{i,3} + \xi_{it};\ i = 1,\ldots,N;\ t = 2,\ldots,T_i$$
$$f_{it} = j \quad if \quad \kappa_{j-1} < f_{it}^{*} \leq \kappa_j, \kappa_0 = -\infty, \kappa_j \leq \kappa_{j+1}, \kappa_J = \infty, \forall j \in \{1,\ldots,J\}, J = 3. \quad (3)$$

Equation (1) incorporates dynamics (previous period governing political party support, y_{it-1}) and employs Wooldridge's (2005) initial conditions specification, modelling the distribution of the unobserved effect conditional on the initial period of governing party support (y_{i1}). The set of contemporaneous covariates in equations (1)–(3) are given by the vectors ($\mathbf{x_{it}}$, $\mathbf{z_{it}}$, $\mathbf{g_{it}}$) and vectors ($\boldsymbol{\beta}, \boldsymbol{\pi}, \boldsymbol{\psi}$) denote their accompanying parameters, respectively. A trivariate normal distribution is assumed for the composite error terms ($u_{1it}, u_{2it}, u_{3it}$) in the three equations, where $u_{1it} = \zeta_{i,1} + \eta_{it}$, $u_{2it} = \zeta_{i,2} + \omega_{it}$ and $u_{3it} = \zeta_{i,3} + \xi_{it}$. The joint log-likelihood function to be maximized corresponds to

$$lnL = \sum_{i=1}^{N}\sum_{t=2}^{T} ln[Pr(c_{it} = j|\boldsymbol{\mu}, \mathbf{z_{it}}, \zeta_{i,2})] + \sum_{i=1}^{N}\sum_{t=2}^{T} ln[Pr(f_{it} = j|\boldsymbol{\kappa}, \mathbf{c_{it}}, \mathbf{g_{it}}, \zeta_{i,3})]$$
$$+ \sum_{i=1}^{N}\sum_{t=2}^{T} ln[\Phi\{(2y_{it} - 1)(\mathbf{c_{it}}\boldsymbol{\gamma} + \mathbf{f_{it}}\boldsymbol{\delta} + \mathbf{x_{it}}\boldsymbol{\beta} + \vartheta_1 y_{it-1} + \vartheta_2 y_{i1} + \alpha_0 + \zeta_{i,1})\}], \quad (4)$$

and $Pr(c_{it} = j|\boldsymbol{\mu}, \mathbf{z_{it}}, \zeta_{i,2})$, $Pr(f_{it} = j|\boldsymbol{\kappa}, \mathbf{c_{it}}, \mathbf{g_{it}}, \zeta_{i,3})$ denote the probabilities of observing outcome j for responses c_{it}, f_{it} conditional on $[\boldsymbol{\mu} = \{\mu_1, \mu_2, \ldots, \mu_{J-1}\}, (\mathbf{z_{it}}, \zeta_{i,2})]$, $[\boldsymbol{\kappa} = \{\kappa_1, \kappa_{J-1}\}, (\mathbf{c_{it}}, \mathbf{g_{it}}, \zeta_{i,3})]$, correspondingly:

$$Pr(c_{it} = j|\boldsymbol{\mu}, \mathbf{z_{it}}, \zeta_{i,2}) = \Phi(\mu_j - \mathbf{z_{it}}\boldsymbol{\pi} - \zeta_{i,2}) - \Phi(\mu_{j-1} - \mathbf{z_{it}}\boldsymbol{\pi} - \zeta_{i,2}), \quad (5)$$

$$Pr(f_{it} = j|\boldsymbol{\kappa}, \mathbf{c_{it}}, \mathbf{g_{it}}, \zeta_{i,3}) = \Phi(\kappa_j - \mathbf{c_{it}}\boldsymbol{\tau} - \mathbf{g_{it}}\boldsymbol{\psi} - \zeta_{i,3}) - \Phi(\kappa_{j-1} - \mathbf{c_{it}}\boldsymbol{\tau} - \mathbf{g_{it}}\boldsymbol{\psi} - \zeta_{i,3}), \quad (6)$$

where Φ is the standard normal cumulative distribution function (*cdf*), assuming normally distributed reduced form idiosyncratic errors (ω_{it}, ξ_{it}). Under the assumption that ($\eta_{it}, \omega_{it}, \xi_{it}$) are normally distributed, the structural equation for political support in equation (1) is a dynamic binary random effects (RE) probit and the reduced form current and expected future subjective financial situations, equations (2) and (3), are RE ordered probit models.

Calculating the log-likelihood requires numerical integration. We use the mean-variance adaptive Gauss-Hermite quadrature method (see Rabe-Hesketh *et al.*, 2005). The joint-likelihood models were estimated using generalized structural equation modelling (gsem) in Stata providing estimates of the covariances between the unobserved heterogeneity terms in the three equations *i.e.*:

$$cov(\zeta_{i,1}, \zeta_{i,2}), cov(\zeta_{i,1}, \zeta_{i,3}), cov(\zeta_{i,2}, \zeta_{i,3}).$$

Given the estimates for the covariances between the unobserved heterogeneity terms and their corresponding variances, the three correlations are computed as:

$$\rho(\zeta_{i,1},\zeta_{i,2}) = \frac{cov(\zeta_{i,1},\zeta_{i,2})}{\sqrt{\left(var(\zeta_{i,1}).var(\zeta_{i,2})\right)}}, \rho(\zeta_{i,1},\zeta_{i,3}) = \frac{cov(\zeta_{i,1},\zeta_{i,3})}{\sqrt{\left(var(\zeta_{i,1}).var(\zeta_{i,3})\right)}}, \rho(\zeta_{i,2},\zeta_{i,3}) = \frac{cov(\zeta_{i,2},\zeta_{i,3})}{\sqrt{\left(var(\zeta_{i,2}).var(\zeta_{i,3})\right)}}. \quad (7)$$

A simple t-test can be used to unilaterally test the null hypotheses that $\rho(\zeta_{i,1},\zeta_{i,2}) = 0$, $\rho(\zeta_{i,1},\zeta_{i,3}) = 0$ and $\rho(\zeta_{i,2},\zeta_{i,3}) = 0$.[5]

Current (c_{it}) and future (f_{it}) subjective financial situations are exogenous in the structural form (equation 1) if the corresponding estimated $cov(\zeta_{i,1},\zeta_{i,2})$ and $cov(\zeta_{i,1},\zeta_{i,3})$ are statistically insignificant and local to zero. In this case, consistent parameter estimates can be obtained by fitting a single equation model for political party support (y_{it}). If $cov(\zeta_{i,1},\zeta_{i,2})$ and $cov(\zeta_{i,1},\zeta_{i,3})$ are non-zero and statistically significant, then the unobserved heterogeneity underlying the current ($\zeta_{i,2}$) and future ($\zeta_{i,3}$) subjective financial situations is correlated to the unobserved heterogeneity underlying political support ($\zeta_{i,1}$), producing inconsistent parameter estimates in the case of estimating a single equation model for y_{it}, (see Miranda and Rabe-Hesketh, 2006).

4.1 Identification

No exclusion restrictions are needed for parameter identification since the system is recursive and it is not a simultaneous equation model: party support is a function of current and expected financial evaluations, but financial evaluations cannot be a function of party support nor can both current and expected financial evaluations be a function of each other. Crucially, expected financial evaluations are a function of current evaluations but the reverse cannot hold and hence, the recursive nature of the model is actually implied by logical consistency and temporal ordering—see (Maddala, 1983). The recursive tripartite equation system is identified by functional form: the structural form (1) is a binary probit and the reduced forms (2) and (3) are a five-threshold and a three-threshold ordered probit, respectively (see Heckman, 1978; Maddala, 1983; Wilde, 2000; Miranda and Rabe-Hesketh, 2006). The covariate vectors ($\mathbf{x_{it}}$, $\mathbf{z_{it}}$, $\mathbf{g_{it}}$) can contain the same elements since they are subjected to a distinct nonlinear transformation (by the normal *cdf)* per estimated equation in the log-likelihood function (equation 4).[6]

Consider the tripartite model specified by equations (8–10), introduced to illustrate Wilde's (2000) functional identification proof for multiple equation probit models with endogenous dummy regressors. To demonstrate non-reliance on exclusion restrictions, consider a simplified version of our model by assuming ($\mathbf{x}_{1it}, \mathbf{x}_{2it}, \mathbf{x}_{3it}$) are vectors containing the same set of explanatory variables, and ($y^*_{it}, c^*_{it}, f^*_{it}$) are defined in (equations 1–3):

$$y^*_{it} = \mathbf{c_{it}}\boldsymbol{\gamma}_{11} + \mathbf{f_{it}}\boldsymbol{\gamma}_{12} + \mathbf{x}_{1it}\boldsymbol{\beta}_1 + \zeta_{i,1} + \eta_{it};\ i = 1,\ldots,N;\ t = 2,\ldots,T_i \quad (8)$$

$$c^*_{it} = \mathbf{x}_{2it}\boldsymbol{\beta}_2 + \zeta_{i,2} + \omega_{it} \quad (9)$$

$$f^*_{it} = \mathbf{c_{it}}\boldsymbol{\gamma}_{31} + \mathbf{x}_{3it}\boldsymbol{\beta}_3 + \zeta_{i,3} + \xi_{it} \quad (10)$$

Multiplying equations by the non-zero constants ($\lambda_1, \lambda_2, \lambda_3$) and adding up gives:

[5] We use the nlcom command in Stata providing standard errors, test statistics and significance levels for non-linear combinations of parameter estimates (using the delta method).

[6] A fully simultaneous, i.e. non-recursive, system is not estimable using gsem in Stata as the parameters of the tripartite simultaneous equation model cannot be identified.

$$
\begin{aligned}
\lambda_1 y_{it}^* + \lambda_2 c_{it}^* + \lambda_3 f_{it}^* &= \lambda_1(\mathbf{c_{it}}\boldsymbol{\gamma}_{11} + \mathbf{f_{it}}\boldsymbol{\gamma}_{12} + \mathbf{x}_{1it}\boldsymbol{\beta}_1 + \zeta_{i,1} + \eta_{it}) \\
&\quad + \lambda_2(\mathbf{x}_{2it}\boldsymbol{\beta}_2 + \zeta_{i,2} + \omega_{it}) + \lambda_3(\mathbf{c}_{it}\boldsymbol{\gamma}_{31} + \mathbf{x}_{3it}\boldsymbol{\beta}_3 + \zeta_{i,3} + \xi_{it}) \\
y_{it}^* &= -\left(\frac{\lambda_2}{\lambda_1}c_{it}^* + \frac{\lambda_3}{\lambda_1}f_{it}^*\right) + (\mathbf{c_{it}}\boldsymbol{\gamma}_{11} + \mathbf{f_{it}}\boldsymbol{\gamma}_{12} + \mathbf{x}_{1it}\boldsymbol{\beta}_1 + \zeta_{i,1} + \eta_{it}) \\
&\quad + \frac{\lambda_2}{\lambda_1}(\mathbf{x}_{2it}\boldsymbol{\beta}_2 + \zeta_{i,2} + \omega_{it}) + \frac{\lambda_3}{\lambda_1}(\mathbf{c_{it}}\boldsymbol{\gamma}_{31} + \mathbf{x}_{3it}\boldsymbol{\beta}_3 + \zeta_{i,3} + \xi_{it})
\end{aligned} \tag{11}
$$

Even if $(\mathbf{x}_{1it}, \mathbf{x}_{2it}, \mathbf{x}_{3it})$ in equations (8–10) contain the same explanatory variables, equation (11) is structurally different from equation (8) due to the inclusion of the terms $\left(\frac{\lambda_2}{\lambda_1}c_{it}^*, \frac{\lambda_3}{\lambda_1}f_{it}^*\right)$, since (c_{it}^*, f_{it}^*), respectively, correspond to

$$
\begin{aligned}
&[\Phi(\mu_j - \mathbf{x}_{2it}\boldsymbol{\beta}_2 - \zeta_{i,2}) - \Phi(\mu_{j-1} - \mathbf{x}_{2it}\boldsymbol{\beta}_2 - \zeta_{i,2})], \\
&[\Phi(\kappa_j - \mathbf{c_{it}}\boldsymbol{\gamma}_{31} - \mathbf{x}_{3it}\boldsymbol{\beta}_3 - \zeta_{i,3}) - \Phi(\kappa_{j-1} - \mathbf{c_{it}}\boldsymbol{\gamma}_{31} - \mathbf{x}_{3it}\boldsymbol{\beta}_3 - \zeta_{i,3})].
\end{aligned}
$$

If $(\eta_{it}, \omega_{it}, \xi_{it})$ are instead assumed to be logistically distributed, $\Phi(.)$ for the latent variable outcome probabilities in equation (11) is replaced by the logistic *cdf* $\Lambda(.)$ and the same argument holds.

Hence, the tripartite recursive system is identified without reliance on any exclusion restrictions. Identification problems can arise due to insufficient data variation but, as long as the models contain varying explanatory variables, the full rank condition is sufficient for parameter identification (see Heckman, 1978; Wilde, 2000).

Returning to the estimated tripartite recursive system in equations (1–3), the structural equation (1) contains lagged party support and initial period party support thus, including two additional parameters denoted by scalars $(\vartheta_1, \vartheta_2)$, correspondingly. A third additional parameter is estimated only in the structural model due to the inclusion of strong party support in $\mathbf{x_{it}}$. Further, unlike the structural binary probit model that includes an intercept (α_0), the reduced form ordered probit equations do not contain an intercept term in the linear index because its effect is absorbed into the cutpoints. The four cutpoints included in the reduced form for the current financial situation, $\boldsymbol{\mu} = \{\mu_1, \mu_2, \mu_3, \mu_4\}$, and the two cutpoints included in the reduced form for the expected financial situation, $\boldsymbol{\kappa} = \{\kappa_1, \kappa_2\}$, aid structural identification further since they determine the level of the perceived egocentric economic evaluation reported. This is because the threshold parameters denote the estimated average sample levels of the subjective financial state above which a given level of the individual's financial situation is reported.[7]

The reduced form for the current financial situation (equation 2) contains an additional element in $\mathbf{z_{it}}$, the log of deflated equivalent income, an objective income measure which is not included in the other two equations (equations 1 and 3). Testing for this exclusion restriction reveals that the equivalent income variable is generally statistically insignificant in equations 1 and 3 – see Table S28, Supplementary Appendix.[8] Note that our objective and subjective economic situation measures differ from related contributions such as Chrysanthou and Guilló (2018), and Liberini *et al.* (2017). The former use subjective retrospective, current and future evaluations (finding equivalent income collinear with current evaluations), while the latter only use equivalent income and subjective retrospective evaluations. Sanders and Brynin (1999) include changes in egocentric evaluations and net personal annual income, getting near zero coefficients on income, whereas Oswald and Powdthavee (2010) only use annual deflated household income per capita.

[7] The reduced form threshold parameters are jointly statistically significant across all estimations, see Table S27, Supplementary Appendix.

[8] The log of deflated equivalent income is monthly household income divided by the square root of household members, to account for differences in household size and composition, and subsequently divided by the CPI before applying the log transformation. We use the CPI index (all items, 2015=100) from the ONS.

5. Results

This section analyses the estimation results and the respective computed average marginal effects (AMEs) of the key variables of interest.

Table 1 contains the joint-model coefficient estimates of the structural form for governing party support in each term (equation 1). The corresponding reduced form coefficient estimates for the individual's perceived current financial situation (equation 2) and next period expected change in his/her financial situation (equation 3) are in Table S26, Supplementary Appendix.

The 2010–14 period is the only government term where the unobserved determinants of both the current and future economic evaluations have statistically significant positive correlations with the latent determinants underlying political support. Thus, the unobserved time-invariant individual attributes that increase party support also tend to increase current and future economic evaluations, rendering both evaluations endogenous in the (2010–14) structural model estimations in Table 1.

Regarding the 1992–6 government term, only the current economic evaluations are endogenous since $cov(\zeta_{i,1}, \zeta_{i,2})$ is positive and statistically significant in the estimations reported in Table 1. Therefore, in the 1992–6 estimates the latent determinants of current subjective finances are positively correlated to the unobserved determinants increasing governing party support thus, rendering the current financial situation endogenous in the structural equation (equation 1). Note that, $cov(\zeta_{i,1}, \zeta_{i,3})$ has a p-value of 0.106 and is not far from being statistically significant at the non-stringent 10% level. To the extent that statistical significance is a function of the number of observations and given that the sample sizes in the BHPS are inherently lower than those of UKHLS, it would not be a net distortion of facts to state that the exogeneity of future subjective financial situation cannot be ascertained in the 1992–6 estimations either.

Concerning both the first (1992–6) and last (2010–14) government terms, the endogeneity of the subjective financial situation implies that single equation estimation of the structural equation (ignoring the endogeneity of personal perceived finances) yields biased and inconsistent parameter estimates of the impact of economic evaluations on governing party support. However, given the latent nature of the time-invariant characteristics that we fail to observe, it would be unwise to speculate about the sources of endogeneity.

Non-surprisingly, the latent determinants of the two reduced form equations of the perceived current and future financial situations are positively and statistically significantly related across all estimates—see $\text{cov}(\zeta_{i,2}, \zeta_{i,3})$ in Table 1. Note that this correlation indicates that if either of the current or future perceived financial situations is omitted, the effect of the included type of financial situation will be biased as it will be correlated with the omitted financial situation type.

Inspecting Table 1 reveals that the controls for political preferences (Previous Period Political Party Support, Initial Period Political Party Support, and Strong Party Support) are powerful determinants of Governing Political Party Support, in all five electoral periods. While initial support and strength of support gauge the intensity of political beliefs, lagged party support captures swing voting intention. Initial Period Political Party Support enters with the highest coefficient magnitudes (notably greater than past support) implying that there is substantial correlation between the unobserved individual heterogeneity and the initial condition (see Wooldridge, 2005). The prominence of initial conditions is expected given the persistence of initial political party preferences revealed by the transition probability matrices (Tables S5–S19, Supplementary Appendix; Chrysanthou and Guilló (2018) conclude similarly. Notwithstanding, the individual egocentric economic evaluation controls are also important drivers of the incumbent party support in the two government terms that are adjacent to economic recession years (1992–6 and 2010–14)

Table 1 Tripartite joint-MLE estimated parameters, structural form: governing political party support

	(1) 1992–6, BHPS Conservatives	(2) 1997–2000, BHPS Labour	(3) 2001–4, BHPS Labour	(4) 2005–8, BHPS Labour	(5) 2010–14, UKHLS Conservatives and L.Democrats
Structural form: governing party support, dynamic random effects probits					
Previous Period Political Party Support (t−1)	0.7403***	0.5244***	0.7135***	0.4209***	0.6225***
	(0.0884)	(0.0831)	(0.0864)	(0.0985)	(0.0356)
Initial Period Political Party Support (t = 1)	5.0406***	3.6225***	3.3621***	4.0475***	2.5270***
	(0.2894)	(0.2016)	(0.2086)	(0.2480)	(0.0708)
Strong Party Support	0.5451***	0.6037***	0.5711***	0.4987***	0.3432***
	(0.0660)	(0.0531)	(0.0580)	(0.0665)	(0.0287)
Current subjective financial situation					
Finding it quite difficult	0.0579	0.1402	0.0705	0.3304	0.1087
	(0.1978)	(0.1621)	(0.1951)	(0.2190)	(0.0833)
Just about getting by/don't know	0.0847	0.0423	0.0421	0.1653	0.0709
	(0.1868)	(0.1498)	(0.1818)	(0.2057)	(0.0790)
Doing alright	0.3311*	0.0662	0.1207	0.3844*	0.1403*
	(0.1941)	(0.1564)	(0.1885)	(0.2141)	(0.0827)
Living comfortably	0.3655*	0.0074	0.0411	0.3855*	0.1949**
	(0.2056)	(0.1695)	(0.2025)	(0.2320)	(0.0896)
Expected future subjective financial situation					
About the same	0.1280*	0.0670	0.0549	0.0972	0.0591*
	(0.0721)	(0.0656)	(0.0714)	(0.0733)	(0.0306)
Better off	0.2250**	0.1032	0.0510	0.1197	0.1167***
	(0.0932)	(0.0837)	(0.0925)	(0.0982)	(0.0416)
House owned outright/mortgage	0.2500***	0.0571	−0.1406**	−0.1454*	0.2783***
	(0.0902)	(0.0611)	(0.0668)	(0.0781)	(0.0346)
Female	0.0832	−0.0950*	−0.1009*	0.0537	−0.0762***
	(0.0758)	(0.0538)	(0.0565)	(0.0663)	(0.0281)
Age	0.0150***	0.0014	0.0029	0.0058**	0.0090***
	(0.0028)	(0.0019)	(0.0021)	(0.0024)	(0.0011)
Married/civil partnership	0.0379	0.0890	0.0764	−0.1003	0.1012***
	(0.0785)	(0.0570)	(0.0591)	(0.0687)	(0.0291)
Unemployed/economically inactive	−0.0168	0.0324	0.0508	0.0180	−0.0353
	(0.0787)	(0.0585)	(0.0632)	(0.0737)	(0.0298)
First degree/higher degree	−0.0077	0.3443***	0.1608**	0.4083***	0.1397***
	(0.1254)	(0.0834)	(0.0803)	(0.0920)	(0.0323)
Number of own children in household	0.0695	−0.0241	0.0039	−0.0053	−0.0292*
	(0.0435)	(0.0296)	(0.0319)	(0.0392)	(0.0170)
SWB(GHQ):Caseness>=3	−0.1279**	0.1028**	−0.0396	0.0809	−0.0365
	(0.0616)	(0.0490)	(0.0524)	(0.0612)	(0.0274)
North West	0.5451***	−0.2928**	−0.3585***	0.1075	0.3483***
	(0.2055)	(0.1366)	(0.1374)	(0.1696)	(0.0813)
Yorkshire and the Humber	0.6697***	−0.2432*	−0.2198	−0.0749	0.2838***
	(0.2147)	(0.1418)	(0.1422)	(0.1735)	(0.0848)
East Midlands	0.8474***	−0.5544***	−0.4182***	−0.4515**	0.4638***
	(0.2156)	(0.1456)	(0.1466)	(0.1868)	(0.0840)
West Midlands	0.8468***	−0.6130***	−0.3393**	−0.3742**	0.4259***
	(0.2165)	(0.1470)	(0.1465)	(0.1834)	(0.0845)
East of England	0.7813***	−0.6705***	−0.6576***	−0.2195	0.6073***
	(0.2117)	(0.1478)	(0.1497)	(0.1797)	(0.0821)
London	0.5882***	−0.3086**	−0.3760**	−0.1913	0.4878***
	(0.2096)	(0.1453)	(0.1494)	(0.1875)	(0.0867)

(continued)

Table 1. (continued)

	(1) 1992–6, BHPS Conservatives	(2) 1997–2000, BHPS Labour	(3) 2001–4, BHPS Labour	(4) 2005–8, BHPS Labour	(5) 2010–14, UKHLS Conservatives and L.Democrats
South East	0.5888***	−0.6044***	−0.6404***	−0.4032**	0.6693***
	(0.1978)	(0.1397)	(0.1420)	(0.1726)	(0.0795)
South West	0.4602**	−0.6046***	−0.4401***	−0.0576	0.6177***
	(0.2068)	(0.1481)	(0.1509)	(0.1824)	(0.0820)
Wales	0.4092	−0.3836**	0.0594	0.0332	0.0966
	(0.2611)	(0.1567)	(0.1575)	(0.1922)	(0.0927)
Scotland	0.7157***	−0.4955***	−0.0401	−0.1009	−0.0379
	(0.2306)	(0.1503)	(0.1518)	(0.1876)	(0.0892)
Constant	−6.0704***	−2.4174***	−2.3983***	−3.6740***	−3.4076***
	(0.3737)	(0.2366)	(0.2623)	(0.3183)	(0.1304)
var($\zeta_{i,2}$)	1.4384***	1.4370***	1.4647***	1.6023***	1.6932***
	(0.0482)	(0.0493)	(0.0536)	(0.0606)	(0.0328)
var($\zeta_{i,3}$)	0.5059***	0.5135***	0.4901***	0.4051***	0.5631***
	(0.0228)	(0.0253)	(0.0266)	(0.0244)	(0.0146)
var($\zeta_{i,1}$)	2.0764***	1.6074***	1.3901***	1.7693***	1.2727***
	(0.2687)	(0.1944)	(0.1901)	(0.2461)	(0.0769)
cov($\zeta_{i,2}$, $\zeta_{i,3}$)	0.1623***	0.1707***	0.2277***	0.1503***	0.2103***
	(0.0248)	(0.0264)	(0.0286)	(0.0300)	(0.0164)
cov($\zeta_{i,1}$, $\zeta_{i,2}$)	0.1542**	−0.0034	0.0192	−0.0244	0.1494***
	(0.0660)	(0.0512)	(0.0547)	(0.0678)	(0.0286)
cov($\zeta_{i,1}$, $\zeta_{i,3}$)	0.0672	−0.0198	0.0424	−0.0146	0.0683***
	(0.0416)	(0.0324)	(0.0343)	(0.0372)	(0.0167)
$\rho(\zeta_{i,2}, \zeta_{i,3})$	0.190***	0.199***	0.269***	0.187***	0.215***
$\rho(\zeta_{i,1}, \zeta_{i,2})$	0.089**	−0.002	0.013	−0.014	0.102***
$\rho(\zeta_{i,1}, \zeta_{i,3})$	0.066	−0.022	0.051	−0.017	0.081***
Log-likelihood	−40977.518	−39668.421	−33827.535	−31356.943	−124016.238
Number of observations	18,804	17,867	15,682	14,255	55,347

Sources: University of Essex, ISER, BHPS, and Understanding Society.
Notes: GSEM: generalized structural equation modelling. Standard errors in parentheses. (T−2) time dummies per model time period length (T), not shown.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Base categories in parentheses: Current subjective financial situation (Finding it very difficult); Expected future subjective financial situation (Worse off than now/don't know); Government Office Region (North East).

and the 2005–8 term including the commencement of the UK recession (Q2-2008) during the global 'great recession'. The estimated signs of the subjective financial situation coefficients are in line with the predictions of the economic voting hypothesis. A detailed analysis of the subjective financial situation effects is undertaken below employing the more informative AMEs.

It is worth mentioning the role of some other covariates. Notice that the unemployed/inactive labour force status is never statistically significant in the structural equation, but it is significant in both of the reduced forms excluding the 2010–14 period (see Table S26, Supplementary Appendix). This indicates that labour force status indirectly affects political party support via its impact on individual economic evaluations, but the direct determinant of party support is the individual's perception about his/her financial situation. Other interesting control variables are House Owned and the Subjective Well-being mental distress indicator (General Health Questionnaire: 0 'least distressed' to 12 'most distressed') that, in general, show statistically significant coefficients with opposite signs in the structural equation, switching sign when the governing party changes. Considering the reduced forms,

mental distress has a negative effect on individual perceptions of own finances in all electoral cycles.

The AMEs of current and prospective economic evaluations, persistence, and strength of political party support are reported in Table 2. Table 2 shows that the two political sentiment indicators namely, previous period support and the strength of party support are the most influential determinants of incumbent party support across all electoral cycles analysed. The lagged party support AME estimates range from approximately 7.6% in 2010–14 to 2.2% in the 2005–8 period, and the strength of support AME estimates range from 2.6% in 2005–8 to 5% in 1997–2000. Ceteris paribus, across all electoral cycles an individual that has indicated support for the corresponding governing party in the previous period is on average 4.9% likely to report support for the same political party in the current period. Similarly, strong political party supporters are, ceteris paribus, 3.9% more likely to support the governing party.

Subjective economic evaluations produce statistically significant AMEs in the 1992–6, 2005–8 and 2010–14 government terms. The 1992–6 Conservative and the 2010–14 Conservative and Liberal Democratic coalition terms are periods of economic expansion preceded by years of economic downturn. In contrast, the three consecutive Labour government terms (1997–2000, 2001–4, 2005–8) are preceded by periods of economic expansion (with relatively steady high growth rates of GDP per capita, real wages and productivity until 2007), and conclude with the beginning of the recessionary period in the second quarter of 2008.[9] Therefore, the estimated coefficients and the corresponding AMEs indicate that subjective financial evaluations are significantly related to incumbent political party support only for government terms that are either preceded by recessionary periods or include recessionary periods (see Tables 1 and 2). A plausible explanation of this outcome is that economic downturns usually exacerbate inequalities, forcing some workers to face lower earnings, enter unemployment or exit the labour market. More importantly, under the tightening of credit conditions, especially in the 2008 recession, many families felt threatened by the loss of living standards. Thus, financial recessions may arguably lead to higher variation in the individual financial situation which is likely to affect evaluations in proximal periods.

The pocketbook voting hypothesis implies that incumbent political party support is positively related to the individual's financial situation. Within the context of categorical subjective perceptions of the individual financial situation, better evaluations should increase the probability of governing party support if pocketbook voting holds. The signs of the estimated AMEs for the economic evaluations align with the theoretical predictions of economic voting models (see Table 2).

Regarding the current subjective financial situation, statistically significant AMEs in Table 2 are generally estimated for the 1992–6, 2005–8, and 2010–14 government terms for the highest two financial evaluations (Doing Alright and Living Comfortably): an individual reporting doing alright financially or living comfortably is approximately 2% more likely to support the corresponding governing party as opposed to an individual reporting a very difficult financial situation (the base category). Note that regarding the 2005–8 term, while the estimated coefficient for Living Comfortably is statistically significant (p-value = 0.097), the respective AME marginally fails to be significant (p-value = 0.104; see Tables 1 and 2).

Concerning the expected future individual's financial situation, Table 2 indicates statistically significant AMEs in the two Conservative ruling periods (1992–6 and 2010–14). In line with economic voting theoretical expectations, better prospective evaluations increase the political support for the incumbent party. Conservative and Conservative/Liberal Democrat support over the 1992–6 and 2010–14 terms is, respectively, around 1.3 and

[9] See Office of National Statistics (ONS) for GDP data and OECD for wages and productivity data.

Table 2 Tripartite joint-MLE, AMEs for the structural form for governing political party support

	(1) 1992–6, BHPS Conservatives	(2) 1997–2000, BHPS Labour	(3) 2001–4, BHPS Labour	(4) 2005–8, BHPS Labour	(5) 2010–14, UKHLS Conservatives and L.Democrats
Previous Period Political Party Support (t−1)	0.0421*** (0.00739)	0.0431*** (0.00939)	0.0601*** (0.0105)	0.0218*** (0.00704)	0.0759*** (0.00560)
Strong Party Support	0.0310*** (0.00429)	0.0496*** (0.00524)	0.0481*** (0.00548)	0.0258*** (0.00420)	0.0418*** (0.00356)
Current subjective financial situation					
Finding it quite difficult	0.00329 (0.0112)	0.0115 (0.0133)	0.00594 (0.0164)	0.0171 (0.0115)	0.0132 (0.0102)
Just about getting by/ don't know	0.00481 (0.0106)	0.00348 (0.0123)	0.00354 (0.0153)	0.00856 (0.0107)	0.00864 (0.00962)
Doing alright	0.0188* (0.0110)	0.00544 (0.0128)	0.0102 (0.0159)	0.0199* (0.0113)	0.0171* (0.0101)
Living comfortably	0.0208* (0.0117)	0.000606 (0.0139)	0.00346 (0.0171)	0.0200 (0.0123)	0.0238** (0.0109)
Expected future subjective financial situation					
About the same	0.00728* (0.00410)	0.00550 (0.00541)	0.00462 (0.00603)	0.00503 (0.00383)	0.00721* (0.00373)
Better off	0.0128** (0.00531)	0.00848 (0.00689)	0.00430 (0.00779)	0.00619 (0.00510)	0.0142*** (0.00507)
Number of observations	18,804	17,867	15,682	14,255	55,347

Sources: University of Essex, ISER, BHPS, and Understanding Society.
Note: Base categories in parentheses: Current subjective financial situation (Finding it very difficult); Expected future subjective financial situation (Worse off than now/don't know).
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

1.4% more probable among those expecting an improved financial situation than among those expecting a worse situation (the base category). Individuals expecting no change in their personal finances are approximately 0.1% more likely to support the incumbent in 1992–6 and 2010–14 compared to those expecting worse finances.

Robustness of the joint-model results is established via conditional ML-fixed effects (CML-FE) to eliminate ζ_i, noting that this discards observations for which individual governing party support is the same during an electoral cycle (see Table S29, Supplementary Appendix). CML-FE sample attrition is substantial due to the inherent invariance of political preferences (see transition probability matrices Tables S5–S19, Supplementary Appendix).

Two alternative sets of AMEs relaxing the model assumptions are reported in Tables 3 and 4. Table 3 reports the AMEs computed by estimating single equations for governing party support ignoring the potential endogeneity of the perceived financial status, and Table 4 reports the AMEs obtained via the estimation of static single equation models ignoring endogeneity and excluding Previous Period Political Party Support (t−1) and Initial Period Political Party Support (t = 1). Inspection of Table 3 reveals that not accounting for the simultaneous determination of party support and subjective financial evaluations inflates the marginal effects of current and prospective evaluations compared to the respective AMEs from the tripartite model in Table 2. What is more, Table 4 reveals that failing to model simultaneity and additionally omitting dynamics and initial conditions further inflates the marginal effects of current and future financial evaluations, which are greater compared to the AMEs in both Tables 2 and 3. The two higher current financial categories in Table 3 and the highest prospective evaluation in Table 4 have statistically significant

Table 3 Single equation estimation for governing political party support, AMEs

	(1) 1992–6, BHPS Conservatives	(2) 1997–2000, BHPS Labour	(3) 2001–4, BHPS Labour	(4) 2005–8, BHPS Labour	(5) 2010–14, UKHLS Conservatives and L.Democrats
Previous Period Political Party Support (t−1)	0.0555***	0.0603***	0.0785***	0.0394***	0.0902***
	(0.00823)	(0.0109)	(0.0115)	(0.0100)	(0.00566)
Strong Party Support	0.0396***	0.0687***	0.0626***	0.0457***	0.0474***
	(0.00478)	(0.00587)	(0.00623)	(0.00596)	(0.00391)
Current subjective financial situation					
Finding it quite difficult	0.00592	0.0161	0.00856	0.0297	0.0205*
	(0.0144)	(0.0184)	(0.0213)	(0.0200)	(0.0114)
Just about getting by/don't know	0.0105	0.00483	0.00617	0.0139	0.0219**
	(0.0134)	(0.0168)	(0.0195)	(0.0185)	(0.0106)
Doing alright	0.0324**	0.00729	0.0160	0.0330*	0.0399***
	(0.0136)	(0.0169)	(0.0196)	(0.0186)	(0.0106)
Living comfortably	0.0397***	0.000457	0.00840	0.0319*	0.0574***
	(0.0138)	(0.0172)	(0.0199)	(0.0189)	(0.0108)
Expected future subjective financial situation					
About the same	0.0116**	0.00626	0.00907	0.00807	0.0141***
	(0.00504)	(0.00713)	(0.00742)	(0.00634)	(0.00394)
Better off	0.0210***	0.00863	0.0124	0.00917	0.0273***
	(0.00601)	(0.00805)	(0.00846)	(0.00763)	(0.00486)
Number of observations	18,804	17,867	15,682	14,255	55,347

Sources: University of Essex, ISER, BHPS, and Understanding Society.
Note: Base categories in parentheses: Current subjective financial situation (Finding it very difficult); Expected future subjective financial situation (Worse off than now/don't know).
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

AMEs in the 2005–8 electoral cycle. Regarding the first and last electoral periods, for which exogeneity of subjective finances is rejected (see bottom of Table 1), the magnitude and statistical significance of current subjective finances' AMEs are particularly impacted by ignoring endogeneity and dynamics. Of note, the AMEs for all current financial categories become statistically significant in the 2010–14 term (see Tables 3 and 4). The fact that the highest marginal effects for the subjective financial situations are obtained in Table 4 underlines the importance of modelling both the endogeneity of perceived egocentric economic evaluations, as well as, the dynamics and initial conditions of political preferences: failing to model the distribution of the unobserved effect, by excluding from the set of covariates initial party support, increases the set of unobserved variables and biases the impact of subjective financial evaluations upwards, particularly in the first and last electoral cycles whereby their latent determinants are significantly positively correlated with the unobserved heterogeneity underlying party support.

Additional checks establishing the robustness of the selected model AMEs (in Table 2) are reported in the Appendix. Since identification of the recursive nonlinear model can be achieved without exclusion restrictions, we test robustness to alternative functional forms. The upper threshold parameters in the reduced forms for the Expected Future Subjective Financial Situation in the last two electoral periods are statistically insignificant (see Supplementary Appendix, Table S27). Considering a binary (as opposed to ordinal) probit for the reduced form for financial expectations does not produce a notable change other than the statistical significance of 'Doing Alright' in 1992–6, which has a *p*-value of 0.101,

Table 4 Static model, single equation estimation for governing political party support, AMEs

	(1) 1992–6, BHPS Conservatives	(2) 1997–2000, BHPS Labour	(3) 2001–4, BHPS Labour	(4) 2005–8, BHPS Labour	(5) 2010–14, UKHLS Conservatives and L.Democrats
Strong Party Support	0.00307	0.0682***	0.0550***	0.0497***	0.0446***
	(0.00582)	(0.00691)	(0.00710)	(0.00660)	(0.00429)
Current subjective financial situation					
Finding it quite difficult	0.0120	0.0147	−0.000068	0.0224	0.0212*
	(0.0172)	(0.0187)	(0.0216)	(0.0198)	(0.0111)
Just about getting by/don't know	0.0180	0.00112	−0.000123	0.00692	0.0298***
	(0.0161)	(0.0175)	(0.0204)	(0.0185)	(0.0106)
Doing alright	0.0579***	−0.00582	0.00127	0.0281	0.0576***
	(0.0164)	(0.0179)	(0.0207)	(0.0188)	(0.0108)
Living comfortably	0.0741***	−0.0224	−0.00973	0.0244	0.0822***
	(0.0168)	(0.0184)	(0.0211)	(0.0192)	(0.0111)
Expected future subjective financial situation					
About the same	0.0209***	0.00783	0.00164	0.00733	0.0130***
	(0.00634)	(0.00730)	(0.00741)	(0.00627)	(0.00396)
Better off	0.0374***	0.00985	0.00710	0.0134*	0.0291***
	(0.00760)	(0.00838)	(0.00867)	(0.00759)	(0.00495)
Number of observations	18,804	17,867	15,682	14,255	55,347

Sources: University of Essex, ISER, BHPS, and Understanding Society.
Notes: Base categories in parentheses: Current subjective financial situation (Finding it very difficult); Expected future subjective financial situation (Worse off than now/don't know). Estimated models exclude Previous Period Political Party Support (t−1) and Previous Period Political Party Support (t = 1).
*** and * indicate statistical significance at the 1% and 10% levels, respectively.

and the numerical value of the AME for 'About the same/Better off'(see Supplementary Appendix, Table S30).[10] Additionally, we consider the logistic as opposed to the normal cumulative distribution function. Assuming logistically distributed idiosyncratic errors and estimating a tripartite system of logits (as opposed to probits) provides similar AMEs(see Supplementary Appendix, Table S31).

As structural identification partly relies on the inclusion of equivalent income in the reduced form for current finances, we report estimated AMEs for the models excluding equivalent income from the current finances' reduced form, and estimates including equivalent income in all equations of the tripartite model (Tables S32 and S33 Supplementary Appendix, respectively). Excluding equivalent income from the current financial state equation only affects the statistical significance of the upper two current situation AMEs in the last electoral period, and otherwise has minimal impact on the remaining AMEs. Including equivalent income in all three equations, slightly deflates the current financial situation AMEs and inflates the expected financial situation AMEs, rendering the current evaluations statistically insignificant in the first and final electoral periods.

The 'don't know' responses in the current and future economic evaluations were added to the 'Just about Getting by' and the 'Worse off than now' categories, correspondingly, to account for economic insecurity (see Chrysanthou and Guilló, 2018; Matakos and Xefteris, 2020). Estimating the models excluding 'don't know' responses does not affect the expected finances' AMEs in 2010–14 but, restricts the significance of the current financial situation AMEs to the top category in 2010–14 and the significance of the expected financial situation AMEs to the top category in 1992–6 (see Table S34, Supplementary Appendix).

[10] In the binary reduced form for expected finances, $cov(\zeta_{i,1}, \zeta_{i,3})$ is statistically significant in 2001–4, rendering expected financial situation endogenous, but financial evaluations remain insignificant.

We further estimate the models for English regions only to test whether including the devolved administrations of Scotland and Wales affects the conclusions. The England sample estimates and AMEs (in Table S35, Supplementary Appendix) are similar to the full sample estimates (in Table 2) and there is no discernible pattern identified. Finally, we estimate a bivariate probit model of Labour and Conservative party support across the five electoral periods (since the two correspond to the governing and opposition parties interchangeably). The bivariate estimations reveal no discernible differences in support persistence and in general, the variables increasing one party's support decrease the opposition's notably regarding current and expected financial evaluations (see Tables S36 and S37, Supplementary Appendix). Hence, the initial specification containing governing party support, as opposed to adding a fourth equation for opposition support, is adequate.

6. Conclusions

We analyse individual voting behaviour and political party support for governing parties in the UK over five electoral cycles spanning 1992–2014. We attempt to answer fundamental questions that give support to economic voting theories. We explore the relative importance of economic motives and political sentiments in the dynamics of incumbent party support using the BHPS and the UKHLS datasets. We contribute to the literature by proposing a flexible dynamic tripartite model linking voters' political preferences to personal perceptions of own current and future financial situations. No exclusion restrictions are required to identify the model parameters due to the nonlinearity of the model. Structural identification of the recursive tripartite model is achieved by using instruments implied by the economic model, temporal ordering, and logical consistency instead of relying on exogenous variation sources that are often unavailable in many datasets.

For each of the five government terms, we investigate the relative importance of current and prospective egocentric economic evaluations, the persistence of political preferences, and the strength of partisanship by disentangling the effects of state dependence and unobserved heterogeneity. The potential endogeneity of individual economic evaluations is explicitly modelled via joint estimation of dynamic random effects tripartite models. The impact of relaxing the model assumptions is examined by estimating static and single-equation random effects models.

The estimates from the dynamic joint-tripartite models reveal that, in all electoral cycles, the most important drivers of governing party support other than initial period support are previous period support and the strength of partisanship. The prominence of Initial Period Political Party Support confirms the strong persistence of political preferences, and the importance of past period support and strength of partisanship reveal the importance of political sentiments and attachment. Quite importantly, government support increases with the perceived level of the individual's financial situation in periods adjacent to economic recessions, 1992–6 and 2010–14, and the 2005–8 term including the 2008 recessionary period commencement. Subjective financial evaluations are statistically insignificant in periods of relative economic stability and growth. Moreover, voters' economic perceptions are better drivers of economic voting than actual income. Thus, our estimation results validate the pocketbook voting hypothesis during transitioning times of the economic cycle. Failing to account for the simultaneous determination of political support and personal financial evaluations, as well as not incorporating dynamics and initial conditions in the political support structural model, inflate the impact of the perceived current and future personal financial situations. Our conclusions are robust to alternative functional specifications, single equation FE estimation, including objective actual observed income in addition to subjective income perceptions in all equations, excluding objective actual observed income from the reduced form for current finances, using an England-only sample, and excluding don't know responses of financial evaluations.

Supplementary material

Supplementary material is available on the OUP website. These are the replication files and the Online Appendix. The data used in this article are available from https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=5151 and https://beta.ukdataservice.ac.uk/datacatalogue/doi?id=6614.

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