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POLITICAL OUTCOMES BETWEEN
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Shuay-Tsyr Ho, Olivier Gergaud,
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Eat, Drink, and Vote: Purchase behavior and U.S. political outcomes between 2004 and 2020*

Shuay-Tsyr Ho^a, Olivier Gergaud^b, Florine Livat^b, Bradley Rickard^{*c}

Abstract

Vote outcomes in elections are expected to be influenced by factors beyond simple economic and political considerations. For example, personality traits have been found to be associated with a voter's political affiliation. Here we explore the role that curiosity may have in voting outcomes in recent U.S. elections. Using a pooled cross-sectional dataset on household-level purchases, we characterize curiosity through variety-seeking tendencies and then extend earlier voting models to examine how our curiosity variable affects election outcomes at both county and state levels. The results suggest that voting outcomes for liberal-leaning candidates are associated with greater purchase diversity patterns for food and alcoholic beverages.

Keywords: Political affiliation, vote outcome, variety-seeking tendencies, personality traits, food and alcohol

* Our analyses were calculated (or derived) based in part on data from Nielsen Consumer LLC and marketing databases provided through the NielsenIQ Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. The conclusions drawn from the NielsenIQ data are those of the authors and do not reflect the views of NielsenIQ. NielsenIQ is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.

^a National Taiwan University, Taipei, Taiwan. Email: shuaytsyrho@ntu.edu.tw

^b KEDGE Business School, Talence, France. Olivier GERGAUD. Email: olivier.gergaud@kedgebs.com. Florine LIVAT. Email: florine.livat@kedgebs.com

^{*c} Corresponding Author. Cornell University, New York, U.S.A. Email: b.rickard@cornell.edu

Introduction

Understanding and predicting voting outcomes in local or national elections has been the subject of many studies in various disciplines including economics (Blinder and Watson, 2016), psychology (Abe, 2018), sociology (Knoke and Hout, 1974) and, of course, political science (e.g., see Blais and St-Vincent, 2011; Lewis-Beck and Rice, 1983; Wattenberg, 2005). Overall, research has shown that the determinants of voting behavior are complex. Voters are obviously influenced by the state of the economy (Kramer, 1971) but also by the personality traits of the candidates (Markus, 1988) and by their own personality traits (Gerber et al., 2011b). Even though we have seen a significant amount of work in this arena, there is not a consensus on the most important factors influencing voters and voting outcomes.

In this paper, we are interested in assessing the role that the trait of *curiosity* has in political preferences and ultimately voting outcomes. Curiosity is a concept used in the marketing literature (Van trijp et al., 1996). It is clearly related to *openness to experience*, the fifth dimension of the Big Five Personality Traits Framework that is used widely in psychology. Here we merge ideas from the economics literature as well as key concepts from research that has studied the role of voters' personality traits on election outcomes. We propose to consider the role of "curiosity" on vote outcomes, where this is measured using an index that calculates the breadth in household purchases of food and alcoholic beverage products. Here we pay special attention to household demand for alcoholic beverages, particularly wine, as it is a highly differentiated good – both horizontally and vertically – for which brands stimulate relatively low levels of customer loyalty (Rossetto and Gastaldello, 2018).

Political orientation has been found to be associated with food choices (Onyango et al., 2017). The relationship between political opinion and alcohol consumption has been examined by

others, but not at the household level. Previous empirical research has investigated the link between the level of liberal ideology (using the Berry index) and state-level rates of alcohol consumption (Yakovlev and Guessford, 2013). Research in psychology, however, highlighted a positive effect between alcohol consumption and political conservatism (Eidelman et al., 2012).

We propose that curiosity is a trait that can be measured by observing consumers' purchasing patterns of food and beverages. Food and beverages represent a category where consumers are allowed to exhibit their range of preferences, and consumers make choices about food and beverages often and regularly. Furthermore, data are available to describe household purchase patterns for food and beverages over time. Following this idea, we use detailed data describing food and beverage purchases across households and calculate a purchase diversity score to serve as a proxy of consumers' level of *curiosity*. In our empirical work we assess the impact of the purchase diversity measure on observed political outcomes in the context of five successive U.S. presidential elections from 2004 to 2020¹. In particular, we use the NielsenIQ Consumer Panel Data, a representative panel of between 40,000 and 60,000 active households that continually provide information about their purchases in a longitudinal study, to build this measure. The data contained in various food and alcohol (beer, wine and spirits) categories are used to calculate entropy indices that parameterize household-level purchase diversity patterns. We conduct our analyses at both the county and state level.

Our approach departs from the standard way of exploring how personality traits impact political outcomes, but we offer a useful extension to this body of work. Indeed, most of the previous studies are based on declarative survey or poll data. There are merits and deficiencies in using declarative data (collected based on what subjects declare they did) or behavioral data (based

¹ The NielsenIQ data are available since 2004, so our dataset starts from the election year 2004.

on how one behaves or what they actually purchase). Available measures based on individual survey data and interviews suffer from unavoidable methodological limitations that prevent them from capturing this complex notion in a convincing way. The well-documented phenomenon of social desirability bias explains why we observe significant discrepancies between voter opinion polls and election outcomes in several elections (Payne, 2010; Edelman and Mitofsky, 1990; Blakely, 2020).

Behavioral studies are therefore useful to cross-verify the results obtained from surveys and declarative approaches. Such studies are less common as purchase and consumption data are more costly to compile and acquire. However, by combining purchase data at a large scale with voting outcomes and other pertinent variables allows for a more nuanced assessment for how the personality trait of curiosity influences voting outcomes. One drawback of our approach is that the analysis needs to aggregate data about voting outcomes at a relatively large geographical scale. We expect that aggregating consumption data at the state level might be problematic, and therefore we focus primarily on our results estimated using county-level data.

Overall, this paper contributes to the political economy literature in three ways. First, other papers have used aggregate state-level data to describe alcohol consumption and voting outcomes (Yakovlev and Guessford, 2013), and we use county-level data. Second, while other work has used the volume of alcohol consumed as a measure of openness, we use an entropy measure built from a basket of purchased food and beverage products. Third, and more generally, existing studies have focused on purchase diversity of food or of alcohol only, and we consider purchase diversity for both in the empirical analysis. Our main result shows that a county (state) with a larger share of households showing greater “curiosity” in their food and alcohol purchases (those that purchase a wider range of products), on average, show more support for the Democratic presidential candidate

than the for Republican candidate. In the subsequent sections, we provide a survey of the literature that examines voting behavior, curiosity, personality traits and political orientation. Section 3 presents our data and section 4 introduces the empirical strategy. Section 5 describes the results and we conclude in section 6.

Voting outcomes and personality traits

Economic considerations

Economists estimate vote functions (V-functions)² that explain voting outcomes by economic and political variables, in a rational decision-making framework (for a nice overview, see Nannestad and Paldam, 1994; Lewis-Beck and Stegmaier, 2013). Most of the work in the economics literature that estimates voting outcomes includes variables describing macroeconomic performance over a specified period prior to the election, considering that voters hold the elected party responsible for the state of the economy (Fair, 1996; Lewis-Beck and Stegmaier, 2007). Variables here include factors such as the growth rate, unemployment, and the inflation rate. Models of voting behavior also include an incumbency effect (duration variable of the incumbent party or candidate for instance). One can expect an incumbency advantage, mainly due to resources and media exposure (Ansolabehere and Snyder Jr, 2002; Mayhew 2008). This advantage differs for Governors, legislators and Senators (Ansolabehere and Snyder, 2002). An incumbency variable can also be added to capture the fact that voters can be tired of a party if it has been in power for a long time (Fair, 1996).

² As noted by Nannestad and Paldam (1994), economists also provide some popularity functions (P-functions) since Mueller (1970), where the popularity of elected politicians is explained both by economic and political variables. The literature often refers to the VP-function: V represents the vote and P represents popularity in polls.

For Kramer (1971), economic events that occurred in the year prior to an election matter the most. Lewis-Beck and Stegmaier (2000) also note that voters weigh economic issues more heavily than any other factors. For Arcelus and Meltzer (1975), voters reward (punish) the incumbent when the economy performs well (poorly) in time periods directly preceding the election. Others have further distinguished economic factors into personal financial well-being (pocketbook or egotropic voters) and national economic conditions (sociotropic voters, those that consider general macroeconomic measures in addition to their own economic conditions). Markus (1988) shows that personal financial conditions have a larger impact on voting behavior but that changing macroeconomic circumstances have a much bigger impact on election outcomes. There is also evidence that the incumbency effect depends upon election-year economic conditions, sometimes referring to the existence of a voters' myopia.

Some additional dummy variables have been included in economic models of voting outcome to consider *ad hoc* events. Mueller (1970) includes what he calls a *rally-around-the flag* variable, to capture the willingness of opponents of a government to rally their support in the event of international tensions or foreign crises (Paldam, 1981). Hopkins and Pettingill (2015) take account of sport victories (how local sport teams perform, including in the Super Bowl) as some local conditions that can affect voting outcomes in large cities. Wattenberg (2005) suggests that the Oscars Awards Ceremony, and other regular big events in American culture, can influence election outcomes. The weather can have an impact on election results, too; Gomez et al. (2007) found that poor weather conditions has benefitted the Republican Party vote share in presidential elections. Other research has shown that terrorism can also influence electoral outcomes (Campbell, 2005; Bali, 2007).

The economic voting paradigm exhibits some limits. Lewis-Beck and Paldam (2000) point out some concerns estimating vote outcomes, with the main problem being the inability to find robust results across countries and even within the same country over time. Bartels and Zaller (2001) remind us of the 2000 U.S. presidential election and Al Gore's defeat in a context of a peaceful and booming economy. Kayser and Peress (2012) emphasize that the international context also matters for the domestic vote. Anderson (2007, p. 286) highlights that the economy-vote link is "intermittent, highly contingent, and substantively small". Economic models of vote outcomes have been criticized for their lack of more explicit theoretical foundations, and others would like to see the economic variables to be better linked to contextual factors (see Singer and Carlin, 2013).

Personality traits and political orientation

Previous research has shown a link between personality traits and voting outcomes where the personality traits of the candidate matters (Markus, 1988). However, personality traits of the voters also have an effect on political orientation and voting patterns. The link between personality types and voter turnout has been well documented in the literature (Denny and Doyle, 2008; Blais and St-Vincent, 2011; Gerber et al., 2011b; Gerber et al., 2013). An association between personality traits and political orientation can also be made (e.g., see Caprara and Zimbardo, 2004; Ozer and Benet-Martinez, 2006). A significant body of research has used the Big Five personality traits framework (McCrae and John, 1992). As noted by Gosling et al. (2003), this is a widely used hierarchical model of personality traits with five broad factors: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience that represent personality at the broadest level of abstraction (John and Srivastava, 2001). Gerber et al. (2010) and Gerber et al. (2011b) use this model to predict political attitudes and behavior; results here show an association between openness to experience (i.e. positive responses to novel stimuli) and liberalism, and an

association between conscientiousness (i.e. concern for order and respect of social norms) and conservatism. Heaven and Bucci (2001) find a negative correlation between open-mindedness and right-wing authoritarianism, which seems related to dutifulness, and being orderly and moralistic. Carney et al. (2008, p. 834) show that liberal voters are “more open, tolerant, creative, curious, expressive, enthusiastic, and drawn to novelty and diversity” and that conservative voters are “more conventional, orderly, organized, neat, clean, withdrawn, reserved, and rigid”. A similar description is provided by Graham et al. (2009): “Liberals on average are more open to experience, more inclined to seek out change and novelty both personally and politically [...]. Conservatives, in contrast, have a stronger preference for things that are familiar, stable, and predictable.” Blais and St-Vincent (2011) note that the effect of personality on political attitude is indirect, being mediated by the level of political interest and the sense of civic duty (considering that a ‘good’ citizen ought to vote). More recently, Abe (2018) finds no significant association between participants’ ratings of their own personality and emotions with their political preferences in the context of the 2016 presidential election in the United States. On the contrary, their ratings of candidates’ personality were more predictive of voting intention than all of the demographic variables, political affiliation, and racial attitudes combined.

Curiosity and political ideology

“Curiosity can be defined as a desire to know, to see, or to experience what motivates exploratory behavior directed towards the acquisition of new information” (Litman, 2005, p. 793). Curiosity can be seen as one determinant of knowledge and might be an indicator of the trajectory of consumption patterns for an individual. Indeed, Gustavsen and Rickertsen (2019) have shown that greater openness to experience, which is associated with curiosity and preference for variety, increases the frequency of consumption of different food and beverage products. One can know

more about food and beverages by reading books, visiting markets, tasting new products and discussing with others that know about these products. As such, curiosity, through knowledge, would imply a greater degree of diversity in an individual's consumption basket. Van Trijp and Hans (1995) and Van Trijp et al. (1996) add that variety seeking behavior can be the result of curiosity as an underlying psychological process.

Research in marketing makes a link between variety seeking and personality traits. Olsen et al. (2016) shows that openness is a good predictor of variety-seeking tendencies. In a study by Hoyer and Ridgway (1984), liberalness is one of the personality traits that has been found to be related to variety-seeking behavior. They find that a liberal individual would be more likely to adopt variety seeking behavior than someone of a more conservative nature. On the other hand, Fernandes and Mandel (2014) point out that variety-seeking could be considered as a social norm which might have exerted a positive effect on conservative attitudes. Their findings imply that the desire to comply with social norms overrules the desire for status quo and control, contrasting with the findings in Yakovlev and Guessford (2013).

Data

We are interested in examining how the purchase diversity of selected food and alcohol products affects the voting outcomes for presidential candidates at the county and state level in the United States in five election cycles from 2004 to 2020. We expect that the diversity patterns for these products will differ across households, and that the purchase diversity of different food categories and alcoholic beverages will be related to electoral outcomes.

Election data

The dependent variable in our model measures voting behavior, and in this study it is measured as the vote ratio (Democratic votes as a share of total votes) at both the state and the county level (MIT Election Data and Science Lab, 2018). The advantage of county-level over state-level data mostly concerns our measure of purchase diversity, which we compute as an average measure across sampled households. The advantage of county-level data is that they provide a more granular picture of purchase diversity patterns, which may vary greatly from one county to another within a state, and that might not be observed in data that are aggregated to the state level.

Diversity measures

Our key explanatory variable, the purchase diversity of selected food and beverage products purchased by households in a given year, is measured using the Entropy Index (Gollop and Monahan, 1991). The Entropy Index is a measure that increases as the consumption shares of all possible products are more equally distributed. The Entropy Index (EI) is commonly used to measure diversity in the economics and management literature (e.g., Jekanowski and Binkley, 2000; Thiele and Weiss, 2003). We choose the EI here because it emphasizes the less frequently selected items and assigns different weights to different products purchased. It reflects a more accurate profile of diversification in a basket full of different products. The EI ranges between 0 and $\ln(n)$ and is defined as follows:

$$EI = \sum_1^n s_i \cdot \ln \left(\frac{1}{s_i} \right) \quad (1)$$

where s_i is the share of the number of i^{th} products purchased in total purchases of n products.

We use the NielsenIQ Consumer Panel dataset that describes food and beverage purchasing patterns for between 40,000 and 60,000 households in the United States to build the EI variable used in our study. This NielsenIQ dataset also contains socio-demographic information and trip-level purchase record for the panelists as well as product information. Purchased goods are

identified at the Universal Product Code (UPC) level, where the information on product category, item descriptions, brand name, size, price paid, and in-store promotions are included. Lastly, the dataset contains detailed information on each trip that the household makes including the type of retail store, date of trip, total expenditure as well as the main characteristics of the retail location where the products were purchased. Households voluntarily choose to opt into this type of data collection process and are appropriately rewarded for their responses. The sampled panels are balanced on demographic characteristics to reflect the full range of households in the United States, and weights are assigned to each household to ensure representativeness of the sample.

The diversity measures are developed on an annual basis for different categories of food and beverage products. We aggregate household-specific data in the empirical estimation work to the county and state level and use it to identify links between purchase diversity (used as a proxy for curiosity) and voting behavior at different geographical levels. We first computed a series of indices based on the following individual categories: all alcohol, wine, beer, spirits, dry groceries, frozen foods, dairy products, deli products, meats, fruits and vegetables. The EIs are calculated over the subset of households from the sample that purchased alcohol. Households that did not purchase alcohol were not included in our dataset and subsequent analysis. As the EI increases, so does the diversity within the purchased basket of purchased products.

Other covariates included in the analysis

There is substantial evidence that election outcomes are also influenced by recent and current economic events at the time of the election. To control for these potential economic influences, we consider the one-year change in income and unemployment rates (in both the county-level and state-level models) for the period prior to the election. The percentage changes in average per capita income were obtained from the Bureau of Economic Analysis in election years 2004, 2008,

2012, 2016, and 2020 (Bureau of Economic Analysis, 2023). The monthly unemployment data were retrieved from US Bureau of Labor Statistics for the five election years (U.S. Bureau of Labor Statistics, 2023).

We also control for incumbency and home state effects in our model. Eisenberg and Ketcham (2004) specified the incumbency variable as 1 for the incumbent president as a Democrat and -1 for the incumbent president as a Republican. For the home state variable, they specify 1 for the county in the home state for the Democrat presidential and vice presidential candidate and -1 for the county in the home state for the Republican presidential and vice presidential candidate. This type of measure is problematic as value is assigned to the case when the elected president is not an incumbent and when the county is not in the home state of both parties' candidates. The values of 1 and -1 capture the essence of the continuous variable and the symmetrical impact of different party affiliations, but the value assignment for non-incumbent president and counties with no home state advantage is problematic. For example, in the 2008 and 2016 elections, the non-incumbent Barack Obama and Donald Trump won the election. Counties with no home state advantage including California and New York state in all the election years do not weigh less than those in home states of presidential and vice-presidential candidates. Here, we decided to specify these two variables as categorical variables and expand the respective definition in the existing literature. First, we set *Incumbency*=2 if the presidential candidate is an incumbent and a Democrat, 1 for the candidate to be an incumbent and Republican, and 0 for candidate as non-incumbent in either party. In addition, we set *Home state*=2 if the county is in the home state of a Democratic presidential or vice presidential candidate or in the state where the candidate is currently holding an office during the election year, 1 for counties in the home state of a Republican presidential or vice presidential candidate or in the state where the candidate is currently holding a position, and

0 for counties that do not belong to the home-state or position-state group in either parties during each election cycle. By construct, the incumbency variable only changes by time and the home-/position- state variable changes by both state and time.

In addition to the political covariates, we also include variables to describe the alcohol retail environment, age profiles, and the rurality/urbanity of the population. Controlling for the alcohol retail environment (U.S. Census Bureau, 2023a) is done because the retail availability of alcoholic beverages at the state level might confound the impact of alcohol purchases on voting outcomes. Some states that have greater regulations on retail alcohol sales could be predisposed to the religious or cultural factors that predominantly affect the electoral outcome (Smith, 1982). We define two variables to address this concern: Number of proprietary retail stores with primary sales revenue coming from alcoholic beverages and the number of breweries, wineries, and distilleries in each county. Demographic information such as age (U.S. Census Bureau, 2023b) is also included as a control in the model since age has been found to play an important role in determining the electoral outcomes (Geys et al., 2022; Knoke and Hout, 1974). The age variable is divided into three categories, the share of population younger than 45 years old, the share of population between 45 and 60 years old, and the share of population above 65 years old.

Lastly, we control for the rurality of the county (U.S. Census Bureau, 2023c) to mitigate the bias from inappropriately interpreting the impact of a relatively low purchase variety score in an area with fewer retail outlets and/or where the store size is smaller, which does not necessarily mean that the consumers are showing less variety-seeking behavior (Jekanowski and Binkley, 2000). The rurality/urbanity of a region is defined by three levels according to the share of population in each county: Metropolitan area, urban area, and rural area. For the state-level indicators, we use the mode statistics across these three categories in each county to infer the

rurality/urbanity at the state level. Also, the 2016 election shows how the voting preference in rural areas could dominate the electoral outcome, particularly when those areas are associated with more distressed socio-economic characteristics such as divorce rate, economic and health status, and education level (Monnat and Brown, 2017).

Table 1 presents the summary statistics at both the county and the state level. Consumption baskets comprised of dry groceries, frozen foods, dairy products, deli products, meats, fruits and vegetables demonstrate greater diversity than consumption baskets made of alcoholic beverages or each alcohol type. This observation is reasonable since purchases of the grocery categories include many more UPC products and because they are purchased much more frequently. Also, the variety-seeking tendency in the wine category is higher than in the beer or spirits categories. For the macroeconomic indicators, the change in per capita income at the county level and the unemployment rate at the state level show relatively high levels of variability (higher standard deviations) across states and years.

Methodology

In this section, we provide the framework we use to estimate the main determinants of voting outcomes across five U.S. presidential elections. We pay particular attention to the role of curiosity which is measured as purchase diversity patterns of food and alcoholic beverage products. The standard linear regression model assumes that data can be characterized by a normal distribution with a mean related to its predictors. However, there are obvious instances when a normal distribution is inappropriate including when the dependent variable is a share and constrained between 0 and 1. This is the reason why a Generalized Linear Model (GLM) approach is often recommended (Nelder and Wedderburn, 1972). This is particularly important when the dependent

variable and the residuals are not normally distributed. In our case, the democratic vote shares follow a normal distribution, which is quite common when dealing with election data (François and Gergaud, 2019).

We present results from linear models estimated using both state-level and county-level data. The model we estimate is as follows:

$$sd_{it} = \alpha + \beta_1 Food_{it} + \beta_2 Alcohol_{it} + \beta_3 X_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where sd_{it} is the share of democratic votes in county or state i in election year t (2004, 2008, 2012, and 2016, and 2020). This dependent variable is regressed against two main entropy indices denoted $Food_{it}$ and $Alcohol_{it}$ that reflect the purchase diversity of the food (including foods from the categories of meat, fruits & vegetables, dry groceries, dairy, deli, and frozen food) and alcohol (beer, wine, spirits) in the county/state as well as a vector of covariates declared above (X_{it}); ε_{it} is a well-behaved error term measuring the extent to which the model cannot fully explain the share of democratic votes in the county/state and μ_i is the level 2 error and random intercept.

For the county-level data, although the time span is short and only includes five cycles, the number of unique identifiers is large (around 3,000 per year), while the state-level data is a smaller panel with fewer identifiers. The choice criteria for the method proposed by Buddelmeyer et al. (2008) is more applicable to state-level data in this study; they show that with five periods and less than 100 identifiers, the OLS model will provide the most accurate estimates. Therefore, for our empirical strategy, we use the fixed-effects model for the county-level data and the pooled OLS model for the state-level data. Our main findings focus on the county-level data, and we use our results from the state-level data to complement our key findings that use the county-level data.

Results

Our results using county- and state-level data are presented in Table 2 through Table 8. We first show the results from the county-level sample using the pooled-OLS and fixed-effects models, and then from the state-level sample using the pooled OLS model. In both models, estimation results are first presented from a baseline model where only the political and macroeconomic variables explaining the electoral outcome in politics literature are included. Results from additional specifications are included in each table to examine the role of diversity in food purchases, in alcohol purchases, in wine purchases, in beer purchases, and in spirits purchases respectively. Here, we extend the standard voting model to account for the role of varietal preference in predicting election results. We do not control for both food and alcohol purchases in all the specifications since we are interested in how variety-seeking tendencies in each category alone affect voting outcomes. Our sensitivity analysis considers the impact from the retailing and production environment, population age, and rurality (share of population that resides in rural areas).

Table 2 shows the results from the pooled OLS model and Table 3 shows results from the fixed-effects model. The fixed-effects model provides more appropriate estimates compared to the pooled-OLS model as the pooled-OLS model may overestimate the impact of variety-seeking behavior on voting outcomes (e.g., $\beta = 0.082$ for all food purchases in the OLS model compared to $\beta = 0.078$ in the fixed-effects model, and even larger differences for the various alcoholic beverages). We do not control for year effects since it will confound with the incumbency effect. The interpretation for the diversity effect for wine purchases, 0.025 in the fixed-effects model, implies that the vote share for Democrats increases by 2.5% when the diversity score for wine purchases increases by 1 point. For the subsequent analysis, we focus on the results from the fixed-effects model.

The baseline model shows the influence of only macroeconomic and political variables. Including both the economic growth and the unemployment rate variables does not lead to collinearity since the correlation between these two variables is regarded as low (Holbrook, 1991). Across the specifications, the share of Democratic votes consistently decreases with the average unemployment rate prior to the election (for example, the estimated coefficient is -0.02 in the wine model), and this is a result that is opposite to Rees et al. (1962) and Wright (2012). The unemployment rate has been a partisan issue such that Democrats enjoy a reputational advantage as being viewed as the party best able to handle this issue (Wright, 2012; Burden and Wichowsky, 2014). Another camp has argued that high unemployment rates penalize the incumbent candidates (Park and Reeves, 2020). The effect of economic growth (most often measured by annual growth in per capita GDP) on political outcomes has been less clear (Holbrook, 1991). In our results the impact of GDP growth changes once we account for food and alcohol purchase diversity ($\beta = 0.087$ in the baseline model vs. $\beta = -0.138$ in the wine model). Our negative estimates for the income variable imply that the Democratic party garners more support when the economy worsens in the year preceding an election (Blinder and Watson 2016).

The estimated incumbency effect and the estimated home state effect align with prior findings (Lewis-Beck and Rice, 1983; Mayhew, 2008). In our models that include purchase diversity variables there is a positive relationship between the incumbency variable and the vote outcome ($\beta = 0.014$ in the alcohol and wine model); these results indicate that the president being both an incumbent and a Democrat will earn a higher share of votes. The positive coefficient for the home state variable ($\beta = 0.061$ in the food model, $\beta = 0.063$ in the alcohol model, $\beta = 0.061$ in the wine model) shows that the counties in the home state of a presidential or a vice-presidential candidate provide more support for that party. The home state variable here expands

the standard definition to include both the birth state of a presidential candidate as well as the state where the candidate most recently held an elected position. The effects remain strong and significant across various specifications, implying that familiarity with a candidate is an important factor, regardless of the party affiliation.

The columns labelled Model 2 to Model 6 in Table 3 show results that include purchase diversity for food, alcohol, wine, beer, and spirits respectively. These results consistently show a positive effect of the purchase diversity variable for alcohol, wine, and spirits on the Democratic share of votes; this finding suggests a positive relationship between “curiosity” and liberal-leaning vote outcomes (Graham, 2009; Gerber et al., 2011a). In addition, the share of Democrat votes is higher in those counties where consumers exhibit more varied consumption patterns within the broadly-defined food category (which includes dry grocery, deli, frozen food, meat, dairy, and fruits & vegetables).

Table 4 and 5 extend the results shown in Table 3 to examine how additional controls for age, the supply environment, and rurality of the locality affect our general findings in the earlier tables. In Table 4, results are shown for the subsample defined as “metropolitan” and another subsample defined as “rural and urban”; we do this with a focus on the diversity variable for either food, wine, or beer. A higher food purchase diversity score is associated with a higher vote for Democrat candidates in both subsamples ($\beta = 0.074$ in metropolitan area, $\beta = 0.089$ in non-metropolitan area). However, the purchase diversity variable for beer and for wine is only statistically significant in the metropolitan sample ($\beta = 0.023, p < 0.01$ in the wine model; $\beta = 0.009, p < 0.1$ in the beer model). Earlier work has also shown that Democratic candidates receive greater support in urban areas (Kim et al., 2003).

In Table 5, the effect of food purchase diversity remains a strong and positive determinant of vote outcomes when we control for age ($\beta = 0.033, p < 0.01$) and the alcohol supply environment ($\beta = 0.079, p < 0.01$). Additional results in Table 5 show that the higher vote for Democratic candidates is associated with the pre-retirement population ($\beta = 0.604$ for the under-40 population and $\beta = 1.398$ for the middle-aged population in the all food model; $\beta = 0.771$ for the under-40 population and $\beta = 1.624$ for the middle-aged population in the wine model). In the models where we control for the supply environment, the positive impact of purchase diversity on the share of Democrat votes remains only for food and wine. The number of liquor stores and the number of alcohol production establishments does not have a statistically significant effect on the vote share in any of our specifications.

Table 6 to Table 8 show results using state-level data. The main result remains, but there are some differences from the results presented in Tables 3, 4, and 5 (using county-level data). Overall, the results using the state-level data show that greater purchase diversity is linked to a higher vote share for Democrat candidates. However, the estimated effects for the economic variables (unemployment rate and change in GDP) are opposite to our results that use the county-level data. In Table 6, Models 2 through Model 6 show that purchases diversity across the food and alcoholic beverage categories continues to positively impact the vote outcome for the Democratic candidate except for beer purchases ($\beta = 0.155$ in the food model, $\beta = 0.322$ in the alcohol model, $\beta = 0.404$ in the wine model, $\beta = 0.321$ in the spirits model). Table 7 shows that the impact of purchase diversity of food and wine has a positive relationship with the vote outcome in all population subsamples ($\beta = 0.547$ in the metropolitan area, $\beta = 0.292$ in the non-metropolitan area, and $\beta = 0.364, p < 0.01$ in the rural area). The negative estimates for the “Urban” and the “Rural” variables indicate that the Democrats receive more votes in metropolitan

areas compared to rural and urban areas. The purchase diversity for food variable continues to be positively associated with a higher vote share for Democratic candidates when the rurality factor is considered ($\beta = 0.14, p < 0.1$) in the final column in Table 7.

Table 8 provides results using state-level data to show how age affects the results shown in Table 6. Here the purchase diversity for wine, beer, and spirits continues to be positively associated with a higher vote outcome for Democratic candidates ($\beta = 0.385, p < 0.01$ for wine purchase, $\beta = 0.101, p < 0.1$ for beer purchases, $\beta = 0.264, p < 0.01$ for spirits purchases). In the beer model, the effect of purchase diversity on vote outcome may be affected by the effect found for the cohort aged between 40 and 65.

Conclusion

Studying the role of personality traits has mostly been confined to the fields of consumer research (Hoyer and Ridgway, 1984) and marketing research (Trijp et al., 1996). However, it is reasonable to ask how personality traits such as “curiosity” may have influenced consumers’ political ideology and general voting outcomes (van Hiel et al., 2000; Mondak and Halperin, 2008; Verhulst et al., 2012; Wang, 2016). Using household-level NielsenIQ data to generate a measure of purchase diversity, this study extends earlier work to study how the “curiosity” trait impacts political vote outcomes. We find that greater purchase diversity patterns, regardless whether it is for food products or alcoholic beverages, is associated with a higher vote share for the Democratic Party. This general result is robust across different specifications and across different subsamples based on age and geography.

The use of the household trip-level dataset allows us to calculate a reasonably accurate measurement of purchase diversity which we use as a proxy for “curiosity”. Combining

household-level purchase information with electoral outcomes and economic indicators at a more aggregated level allows us to weigh in on the potential relationship between a personality trait and vote outcomes. We use a fixed-effects model with county-level data and a pooled OLS regression using state-level data, and the results are largely similar. Once we control for retail environments, age group, and the degree of rurality, the link between purchase diversity and vote outcomes is robust.

Overall, our primary finding that regions with households that are more “curious” (as measured by their purchase diversity score) are more likely to vote for more liberal or center-left candidates aligns reasonably well with earlier studies. Personality traits have been found to indirectly affect voters’ choices, where the mechanism is mediated by attitudinal factors such as policy preferences; people with a higher level of openness to experiences have been found to be more likely to vote for Democrat candidates (Wang, 2016). Openness to experience has also been found to contribute to a greater degree of identification with center-left coalitions and liberal candidates (Gerber et al., 2011a). Our research extends the classic economic voting model to include the impact of a personality trait, namely curiosity or openness, on vote outcomes. Considering the multiple causal paths and the potential mediating mechanism between political ideology and various personality traits, we are careful not to assert a direct causal relationship but rather highlight the positive association between our measure of curiosity and vote outcomes in recent U.S. presidential elections. Our objective is to improve and augment the standard economic voting model that typically only considers variables describing the political landscape and key macroeconomic variables. We also consider the role of geography (rural and urban subsamples) and age in our analysis. We hope that our work will inform future studies that seek to establish a

more robust causal relationship between personality traits and vote outcomes at a more disaggregated level.

There are a couple of limitations of our work that we would like to acknowledge. First, we create a county (or state) average score of purchase diversity across households that were included in the NielsenIQ panel. We assume that the average purchase diversity scores that we calculate are reflective of the residents in that county (or state). The panel of households is selected to be representative, so this assumption seems justifiable. Second, the direct interpretation of our measure of purchase diversity is not intuitive, and therefore the estimated coefficients for the purchase diversity scores are not necessarily straightforward. Therefore, we emphasize the direction of our estimates rather than their magnitudes.

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Table 1. Descriptive statistics for the county- and the state-level samples

County-level sample/Variable	Observation	Mean	Std. dev.	Min	Max
Share of Democratic votes	12,488	0.377	0.148	0.006	2.578
Diversity in wine purchases	5,176	0.65	0.442	0	2.895
Diversity in beer purchases	5,599	0.599	0.371	0	2.737
Diversity in spirits purchases	4,772	0.588	0.407	0	3.03
Diversity in purchases of all alcohol	5,787	0.829	0.513	0	2.655
Diversity in purchases of all food	5,787	2.615	0.617	0.635	3.749
Change in per capita income from previous year	12,447	3.901	5.885	-39.6	117.2
Average unemployment rate 12 months prior to election	12,576	6.593	2.642	0	30.28
Home-/position- state of presidential candidates	15,762	0.11	0.4	0	2
The party affiliation of incumbent candidate	15,762	1.40	0.49	1	2
State-level sample/Variable	Observation	Mean	Std. dev.	Min	Max
Share of Democratic votes	196	0.499	0.108	0.25	0.928
Diversity in wine purchases	245	0.731	0.248	0.144	1.469
Diversity in beer purchases	245	0.654	0.149	0.249	1.278
Diversity in spirits purchases	245	0.631	0.236	0	1.553
Diversity in purchases of all alcohol	245	0.988	0.348	0.231	1.699
Diversity in purchases of food	245	2.795	0.464	1.66	3.247
Change in per capita income from previous year	245	4.083	2.656	-5.3	15.2
Average unemployment rate 12 months prior to election	245	21.26	49.164	-32.4	229.3
Home-/position- state of presidential candidates	255	0.11	0.41	0	2
The party affiliation of incumbent candidate	255	1.4	0.49	1	2

Table 2. Impact of purchase diversity on presidential votes (County-level OLS model)

	Baseline	Model 2	Model 3	Model 4	Model 5	Model 6
Diversity in purchases of all food		0.082*** (0.005)				
Diversity in purchases of all alcohol			0.081*** (0.006)			
Diversity in wine purchases				0.058*** (0.006)		
Diversity in beer purchases					0.034*** (0.005)	
Diversity in spirits purchases						0.052*** (0.006)
Average unemployment rate 12 months prior to election	-0.044*** (0.003)	0.026*** (0.005)	0.007 (0.005)	-0.009** (0.005)	-0.026*** (0.004)	-0.001 (0.005)
Change in per capita income from previous year	0.075*** (0.016)	-0.347*** (0.063)	-0.427*** (0.062)	-0.471*** (0.069)	-0.555*** (0.068)	-0.371*** (0.072)
<i>Base: No home state advantage of either party</i>						
Home state of Republican candidate	-0.008** (0.003)	-0.018*** (0.005)	-0.017*** (0.006)	-0.020*** (0.005)	-0.020*** (0.006)	-0.020*** (0.005)
Home state of Democratic candidate	0.059*** (0.003)	0.082*** (0.006)	0.088*** (0.007)	0.083*** (0.006)	0.089*** (0.006)	0.069*** (0.006)
<i>Base: Incumbent candidate of GOP</i>						
Incumbent presidential candidate as Democrat	0.012*** (0.001)	0.002 (0.002)	0.015*** (0.002)	0.013*** (0.002)	0.025*** (0.002)	0.009*** (0.002)
constant	0.407*** (0.044)	0.111*** (0.026)	0.269*** (0.021)	0.296*** (0.023)	0.325*** (0.023)	0.303*** (0.024)
Observation	15309	5701	5701	5097	5517	4704
R-squared	0.275	0.389	0.392	0.340	0.351	0.292

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position. Controlling for state fixed effects. All specifications control for state-fixed effects.

Table 3. Impact of purchase diversity on presidential votes (County-level fixed-effects model)

	Baseline	Model 2	Model 3	Model 4	Model 5	Model 6
Diversity in purchases of all food		0.078*** (0.004)				
Diversity in purchases of all alcohol			0.025*** (0.004)			
Diversity in wine purchases				0.018*** (0.004)		
Diversity in beer purchases					0.004 (0.004)	
Diversity in spirits purchases						0.020*** (0.004)
Average unemployment rate 12 months prior to election	-0.062*** (0.002)	0.030*** (0.004)	-0.016*** (0.003)	-0.022*** (0.003)	-0.028*** (0.003)	-0.017*** (0.003)
Change in per capita income from previous year	0.087*** (0.012)	0.010 (0.041)	-0.122*** (0.041)	-0.138*** (0.042)	-0.141*** (0.041)	-0.112*** (0.042)
<i>Base: No home state advantage of either party</i>						
Home state of Republican candidate	-0.011*** (0.004)	-0.013** (0.005)	-0.014** (0.006)	-0.016*** (0.006)	-0.015*** (0.006)	-0.016*** (0.006)
Home state of Democratic candidate	0.056*** (0.005)	0.056*** (0.007)	0.063*** (0.007)	0.061*** (0.007)	0.062*** (0.007)	0.057*** (0.007)
<i>Base: Incumbent candidate of GOP</i>						
Incumbent presidential candidate as Democrat	0.010*** (0.001)	-0.003 (0.003)	0.014*** (0.003)	0.014*** (0.003)	0.017*** (0.003)	0.013*** (0.003)
constant	0.354*** (0.001)	0.170*** (0.013)	0.369*** (0.005)	0.396*** (0.004)	0.395*** (0.004)	0.406*** (0.004)
Observation	15309	5701	5701	5097	5517	4704
F-value	320.600	124.787	75.106	62.306	65.859	47.826
R-squared	0.116	0.176	0.114	0.099	0.102	0.081

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.

Table 4. Impact of purchase diversity on presidential votes considering rurality/urbanity
(County-level)

	All food		wine		beer	
	Metro sample	Rural and urban sample	Metro sample	Rural and urban sample	Metro sample	Rural and urban sample
Diversity in purchases of all food	0.074*** (0.005)	0.089*** (0.008)				
Diversity in wine purchases			0.023*** (0.005)	0.005 (0.007)		
Diversity in beer purchases					0.009* (0.005)	-0.009 (0.008)
Average unemployment rate 12 months prior to election	0.031*** (0.005)	0.016* (0.009)	-0.016*** (0.003)	-0.051*** (0.007)	-0.023*** (0.003)	-0.056*** (0.007)
Change in per capita income from previous year	-0.059 (0.046)	0.299*** (0.084)	-0.190*** (0.047)	0.121 (0.092)	-0.182*** (0.047)	0.080 (0.086)
<i>Base: No home state advantage of either party</i>						
Home state of Republican candidate	-0.011* (0.006)	-0.024** (0.011)	-0.014** (0.006)	-0.024* (0.013)	-0.014** (0.006)	-0.022* (0.012)
Home state of Democratic candidate	0.056*** (0.008)	0.060*** (0.015)	0.060*** (0.008)	0.071*** (0.016)	0.059*** (0.008)	0.074*** (0.016)
<i>Base: Incumbent candidate of GOP</i>						
Incumbent presidential candidate as Democrat	0.000 (0.003)	-0.016*** (0.006)	0.016*** (0.003)	0.006 (0.006)	0.019*** (0.003)	0.009* (0.005)
constant	0.212*** (0.016)	0.082*** (0.022)	0.415*** (0.005)	0.347*** (0.007)	0.422*** (0.005)	0.342*** (0.007)
Observation	3705	1996	3580	1517	3663	1854
F-value	81.117	51.636	50.691	16.865	47.987	23.124
R-squared	0.153	0.275	0.103	0.121	0.097	0.147

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.

Table 5. Impact of purchase diversity on presidential votes considering age and supply environment
(County-level)

	Influence of age		All food	Influence of alcohol supply		
	All food	wine		wine	beer	spirits
Diversity in purchases of all food	0.033*** (0.005)		0.079*** (0.004)			
Diversity in wine purchases		0.004 (0.004)		0.018*** (0.004)		
Diversity in beer purchases					0.004 (0.004)	
Diversity in spirits purchases						0.020*** (0.004)
Average unemployment rate 12 months prior to election	0.031*** (0.004)	0.014*** (0.003)	0.030*** (0.004)	-0.022*** (0.003)	-0.029*** (0.003)	-0.017*** (0.003)
Change in per capita income from previous year	-0.052 (0.039)	-0.116*** (0.039)	0.012 (0.041)	-0.137*** (0.042)	-0.140*** (0.041)	-0.112*** (0.042)
<i>Base: No home state advantage for either party</i>						
Home state of Republican candidate	-0.009* (0.005)	-0.009 (0.005)	-0.014** (0.005)	-0.016*** (0.006)	-0.015*** (0.006)	-0.016*** (0.006)
Home state of Democratic candidate	0.058*** (0.007)	0.060*** (0.007)	0.056*** (0.007)	0.061*** (0.007)	0.061*** (0.007)	0.057*** (0.007)
<i>Base: Incumbent candidate of GOP</i>						
Incumbent presidential candidate as Democrat	0.008*** (0.003)	0.016*** (0.002)	-0.004 (0.003)	0.014*** (0.003)	0.017*** (0.003)	0.013*** (0.003)
<i>Base: population with age >65</i>						
percentage of population with age <40	0.604*** (0.110)	0.771*** (0.107)				
percentage of population with age between 40 and 65	1.398*** (0.078)	1.624*** (0.071)				
Number of liquor stores (1,000 establishments)			0.004 (0.006)	-0.003 (0.006)	-0.004 (0.006)	-0.000 (0.006)
Number of wineries/breweries/distilleries (1,000 establishments)			0.009 (0.008)	0.006 (0.008)	0.005 (0.008)	0.005 (0.008)
constant	-0.531*** (0.051)	-0.588*** (0.050)	0.167*** (0.014)	0.398*** (0.006)	0.399*** (0.006)	0.406*** (0.006)

Observations	5701	5097	5639	5066	5469	4690
F-value	142.467	123.568	93.914	46.786	49.466	35.905
R-squared	0.245	0.226	0.176	0.099	0.102	0.081

Note: Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.

Table 6. Impact of purchase diversity on presidential votes (State-level Pooled-OLS model)

	baseline	Model 2	Model 3	Model 4	Model 5	Model 6
Diversity in purchases of all food		0.155* (0.087)				
Diversity in purchases of all alcohol			0.322*** (0.065)			
Diversity in wine purchases				0.404*** (0.081)		
Diversity in beer purchases					0.153 (0.106)	
Diversity in spirits purchases						0.321*** (0.083)
Average unemployment rate 12 months prior to election	-0.034** (0.016)	0.078 (0.070)	0.134*** (0.036)	0.098*** (0.030)	-0.008 (0.019)	0.083*** (0.029)
Change in per capita income from previous year	0.328 (0.221)	0.653*** (0.241)	0.834*** (0.260)	0.809*** (0.265)	0.424 (0.258)	0.719** (0.306)
<i>Base: No home state advantage of either party</i>						
Home state of Republican candidate	-0.004 (0.043)	-0.012 (0.042)	-0.027 (0.041)	-0.023 (0.038)	-0.004 (0.041)	-0.013 (0.039)
Home state of Democratic candidate	0.114*** (0.037)	0.112*** (0.039)	0.098** (0.046)	0.080** (0.037)	0.119*** (0.040)	0.105*** (0.039)
<i>Base: Incumbent candidate of GOP</i>						
Incumbent presidential candidate as Democrat	0.017*** (0.006)	-0.017 (0.019)	-0.020* (0.011)	-0.014 (0.009)	0.009 (0.008)	0.003 (0.007)
constant	0.383*** (0.021)	-0.075 (0.264)	0.025 (0.066)	0.054 (0.061)	0.276*** (0.071)	0.146** (0.065)
Observation	245	245	245	245	245	245
F-value	4.267	5.097	8.031	7.985	3.769	5.082
R-squared	0.036	0.084	0.216	0.244	0.050	0.118

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.

Table 7. Impact of purchase diversity on presidential votes considering rurality/urbanity (State-level)

	Metro sample	wine Rural and urban sample	rurality dummy	All food Rural and urban sample
Diversity in purchases of all food				0.140* (0.083)
Diversity in wine purchases	0.547*** (0.152)	0.292*** (0.069)	0.364*** (0.072)	
Change in per capita income from previous year	0.190 (0.917)	1.011*** (0.203)	0.935*** (0.250)	0.813*** (0.195)
Average unemployment rate 12 months prior to election	0.154*** (0.047)	0.053* (0.031)	0.078*** (0.026)	0.059 (0.068)
<i>Base: No home state advantage of either party</i>				
Home state of Republican candidate	-0.050 (0.047)	-0.039 (0.072)	-0.043 (0.040)	-0.038 (0.044)
Home state of Democratic candidate	0.046 (0.038)	0.053** (0.020)	0.055 (0.034)	0.077** (0.036)
<i>Base: Incumbent candidate of GOP</i>				
Incumbent presidential candidate as Democrat	-0.032 (0.019)	-0.008 (0.009)	-0.008 (0.008)	-0.011 (0.018)
<i>Base: metropolitan</i>				
Urban			-0.067** (0.033)	-0.088** (0.039)
Rural			-0.131*** (0.038)	-0.142*** (0.047)
Constant	0.008 (0.133)	0.102* (0.053)	0.126** (0.056)	0.020 (0.266)
Observation	105	140	245	245
F-value	6.235	.	8.214	13.612
R-squared	0.207	0.208	0.299	0.170

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.

Table 8. Impact of purchase diversity on presidential votes considering age (State-level)

	All food	wine	beer	spirits
Diversity in purchases of all food	0.086 (0.064)			
Diversity in wine purchases		0.385*** (0.122)		
Diversity in beer purchases			0.101* (0.059)	
Diversity in spirits purchases				0.264*** (0.088)
Average unemployment rate 12 months prior to election	0.481* (0.243)	0.778** (0.310)	0.355 (0.223)	0.625** (0.296)
Change in per capita income from previous year	0.062 (0.050)	0.103*** (0.028)	0.029 (0.025)	0.093*** (0.029)
<i>Base: No home state advantage of either party</i>				
Home state of Republican candidate	-0.010 (0.043)	-0.023 (0.039)	-0.007 (0.042)	-0.013 (0.040)
Home state of Democratic candidate	0.107** (0.041)	0.080** (0.038)	0.109** (0.042)	0.101** (0.039)
<i>Base: Incumbent candidate of GOP</i>				
Incumbent presidential candidate as Democrat	-0.000 (0.015)	-0.012 (0.011)	0.014** (0.006)	0.007 (0.007)
<i>Base: population with age >65</i>				
percentage of population with age <40	0.781 (1.209)	0.273 (0.713)	0.912 (1.076)	0.500 (0.988)
percentage of population with age between 40 and 65	1.332 (0.840)	0.404 (1.177)	1.850* (0.944)	1.257 (0.993)
constant	-0.746** (0.297)	-0.209 (0.346)	-0.841*** (0.297)	-0.552* (0.287)
Observations	245	245	245	245
F-value	7.009	13.181	6.828	8.687
R-squared	0.102	0.247	0.099	0.139

Note: Significance level: *** p<0.01, ** p<0.05, * p<0.1. The “Home state” here includes both the home state of presidential candidate and the state where the candidate most recently held an elected position.