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Economic Insecurity and the Rise of the Right

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Abstract
Economic insecurity has attracted growing attention in social, academic and policy circles. However, there is no consensus as to its precise definition. Intuitively, economic insecurity is multi-faceted, making any comprehensive formal definition that subsumes all possible aspects extremely challenging. We propose a simplified approach, and characterize a class of individual economic-insecurity measures that are based on the time profile of economic resources. We then apply our economic-insecurity measure to data on political preferences. In US, UK and German panel data, and conditional on current economic resources, economic insecurity is associated with both greater political participation (support for a party or the intention to vote) and notably more support for parties on the right of the political spectrum. We in particular find that economic insecurity predicts greater support for both Donald Trump before the 2016 US Presidential election and the UK leaving the European Union in the 2016 Brexit referendum.

Key words: Economic index numbers; Insecurity; Political participation; Conservatism; Right-leaning political parties; Trump; Brexit.
JEL Codes: D63; D72; I32

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1 Introduction

Preferences are fundamental for the understanding of behavior, and the social sciences have devoted a great deal of attention to preferences in the sphere of politics. The existing literature in this area has considered a wide variety of correlates, including the relationship between political preferences and income (Glaeser and Ward, 2006, among many others), individuals' social origins (Druckman and Lupia, 2000) and the role of personality (Malka, Soto, Inzlicht and Lelkes, 2014). Part of this latter work has underlined the link between conservatism and the need for security and the ability to manage uncertainty (Jost, Glaser, Kruglanski and Sulloway, 2003, Jost, Napier, Thorisdottir, Gosling, Palfai and Ostafin, 2007, and Malka, Soto, Inzlicht and Lelkes, 2014); earlier work along these lines emphasizing the roles of aversion to novelty and worries about security can be found in Adorno, Frenkel-Brunswik, Levinson and Sanford (1950) and Rokeach (1960), for example. Hibbing, Smith and Alford (2014) write that "Compared with liberals, conservatives tend to register greater physiological responses to [features of the environment that are negative] and also to devote more psychological resources to them."

Following this line of work, our main topic here is economic insecurity and its impact on political preferences. A number of recent contributions have considered the link between economic insecurity and, variously, support for populist parties (Guiso, Herrera, Morelli and Sonno, 2017, among others), a lack of trust toward the EU (Algan, Guriev, Papaioannou and Passari, 2017, Dustmann, Eichengreen, Otten, Sapir, Tabellini and Zoega, 2017, and Foster and Frieden, 2017), the 2016 US Presidential election (for example, Inglehart and Norris, 2016, and Mutz, 2018, among many others) and the 2016 UK referendum on EU membership (Sampson, 2017, and Colantone and Stanig, 2018, among others). Economic insecurity is proposed in these contributions as an alternative explanation of populist preferences to a cultural backlash against progressive values, such as cosmopolitanism and multiculturalism (as in Inglehart and Norris, 2016) or status threat, following Mutz (2018).

Economic insecurity is an *a priori* plausible explanation for recent shifts in political preferences, as it has arguably risen for a number of reasons: automation and the fear of job loss, the Chinese import shock, and aging populations and migration, to take some examples. There is no doubt that economic insecurity has appeared with increasing frequency in policy debates and academic research following the Great Recession, with its associated job instability and job losses, the marked decline of the middle class, and numerous home foreclosures (along with stagnant housing markets) that have had a profound effect on the lives of many. As a result, household optimism scores with respect to their financial situation, savings, the threat of future unemployment and the economic outlook in general have all dropped sharply, as reflected for example in the Consumer Confidence indicator of the European Commission (see https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/latest-business-and-consumer-surveys_en).

Economic insecurity reaches beyond politics. Existing work has also proposed links between economic insecurity and obesity (Smith, Stillman and Craig, 2013), suicide rates (Reeves, McKee and Stuckler, 2014), mental health (Rohde, Tang, Osberg and Rao, 2016) and gun violence in US schools (Pah, Hagan, Jennings, Jan, Albrecht, Hockenberry and Amaral, 2017). A related strand of literature has considered the potential intergenerational transmission of parents' insecurity to child future outcomes (Kalil, 2013, and Clark, D'Ambrosio and Barazzetta, 2019).

Despite all of this interest, there is no established definition or measure of economic insecurity. In the recent work on political outcomes noted above, economic insecurity has been measured in a number of arguably *ad hoc* ways; that observation, in itself, may be behind the lack of consensus regarding the drivers of the shift to the right. Algan, Guriev, Papaioannou and Passari (2017) and Foster and Frieden (2017) measure insecurity as the change in the unemployment rate; Inglehart and Norris (2016) by the Goldthorpe class measure, the experience of unemployment, living on benefits, urbanization and self-reported difficulty in living on the current household income; Dustmann, Eichengreen, Otten, Sapir, Tabellini and Zoega (2017) as per capita income and the unemployment rate; Foster and Frieden (2017) by current unemployment; Guiso, Herrera, Morelli and Sonno (2017) as the first principal component of the experience of unemployment over the past five years, self-reported difficulty in living on the current household income, and exposure to globalization (approximated by the type of employment, industry and the worker's skill level); and last the change in family income between 2012 and 2016, looking for work and the subjective perception of family finances in Mutz (2018).

A small number of proposed economic-insecurity indices have appeared in the more general literature, including: (i) the Economic Security Index of Hacker, Huber, Rehm, Schlesinger and Valletta (2010); (ii) proposals by the International Labour Organization (2004) and Osberg and Sharpe (2009); and (iii) the index in Rohde, Tang and Rao (2014). These are respectively based on: (i) the fraction of the population who experience a drop in disposable family income of at least 25% from the previous year and lack an adequate financial safety net; (ii) a weighted average of the 'scores' of different attributes as a percentage of the population; and (iii) the volatility arising from incomes dropping below the household's overall trend. The Business Dictionary (www.businessdictionary.com) defines economic security as "A situation of having a stable source of financial income that allows for the on-going maintenance of one's standard of living currently and in the near future." See Osberg (2015; 2018) and Rohde and Tang (2018) for a thorough discussion and excellent surveys of these measures.

The main contribution of this paper to the literature is two-fold. We first propose and characterize a class of *objective individual* measures of insecurity, as opposed to measures that are self-reported or based on aggregate economic phenomena. We second show that this notion of individual economic insecurity is related to political preferences in a number of well-known datasets.

Our individual economic-insecurity measure reflects the confidence with which individuals face any potential future economic changes. This is argued to depend on their past experiences of gains and losses in resources. As a consequence, the domain of this measure consists of resource streams of varying lengths. The length of these streams is not assumed to be fixed, as individuals are of different (economic) ages in a given time period. Moreover, we allow resources to be negative, which is a realistic assumption.

The proposed index offers, in our opinion, a link between the two main explanations noted above of the determinants of recent political preferences—status threat vs. economic insecurity. Insecurity does not refer to the *levels* of resources but rather to their *changes;* an individual may for example be rich, and belong to the dominant cultural population group, but still be insecure due to their experience of income changes. Our index of insecurity is then one particular way of looking at past variations in economic resources in order to measure individual anxiety about, and hence the threat of, what the future may bring.

The first two properties of an index of economic insecurity that we employ are fundamental in the sense that we consider them essential for a mapping that assigns numerical economic-insecurity values to resource streams. The first is that a gain (loss) from the earliest period under consideration to the following period is associated with a lower (higher) level of insecurity as compared to the situation where no such change occurs, provided that the resource levels remain the same from the next-to-earliest to the current period. The latter restriction to equal resource values serves to ensure that our conclusions are reached without using unnecessarily strong assumptions; we note that the resulting measures do, however, satisfy the requirement with a broader scope. The second basic property ensures that specific movements within a stream have a higher impact the closer to the current period they occur: more recent experiences carry a greater weight in determining insecurity than those further in the past. Again, we limit the scope of the requirement so as to avoid overly-demanding conditions. We think of the conjunction of these two properties as a suitable set of minimal requirements to be met by an individual insecurity index. This is analogous to the standard definition of an inequality measure as an S-convex function—that is, a symmetric function that respects the Pigou-Dalton principle of progressive transfers.

As with the measurement of income inequality, the defining postulates are compatible with a wide range of possible indices. Further properties are thus needed in order to produce more concrete proposals. Again, as is the case for essentially all social index numbers, it would be too much to hope for a single measure that is universally accepted as being the 'best' and, therefore, some additional properties are bound to be more controversial than the fundamental requirements. The main theoretical result of this paper is the characterization of a class of individual insecurity measures, the members of which are based on geometrically-discounted resource differences. Only three parameters need to be chosen: a discount factor that is common to past gains and losses, and two parameters that express the relative importance of aggregate discounted losses and aggregate discounted gains.

We apply our individual insecurity measure to one of the vibrant areas of research in the social sciences: the analysis of political preferences. First, we examine two of the longest-running large-scale panel datasets and show that economic insecurity significantly increases the probability of supporting *some* political party (and thus reduces abstention) in both the UK and Germany. This finding is not in line with the predictions from the theoretical model in Guiso, Herrera, Morelli and Sonno (2017), where insecurity is argued to significantly increase the incentive to abstain.

Following up on this observation, we demonstrate that this greater participation is not equally shared across the political spectrum: economic insecurity increases the support for right-leaning parties (the Conservatives in the UK and the CDU/CSU in Germany), and to a lesser extent center parties (the FDP in Germany). In contrast, support for left-leaning parties falls with economic insecurity (especially in West Germany). These results hold in regressions controlling for current income, homeownership and current and past unemployment, and are independent of the nature of the incumbent government. They are stronger for the married and those with children.

The empirical part of the paper concludes with the examination of two recent notable political events: the 2016 Presidential election in the United States and the 2016 United Kingdom European-Union membership ('Brexit') referendum. Using data from the Understanding American Society and the UK Understanding Society surveys, our economic-insecurity measure is shown to be significantly correlated with voting intentions: greater economic insecurity predicts more support for Donald Trump and Brexit.

The remainder of the paper is organized as follows. Section 2 introduces and axiomatically characterizes our measures of economic insecurity. The empirical relationship between insecurity and voting behavior then appears in Section 3. We first use data from two of the longest-running annual panel datasets, the British Household Panel Survey (BHPS) and the German Socio-Economic Panel (SOEP), to show that economic insecurity predicts greater political participation (support for any political party or the intention to vote) and that this support is for parties on the right of the political spectrum. We then turn to two major political events of 2016: the election of Donald Trump and Brexit, showing that our economic-insecurity measure predicts both. Section 4 is devoted to some concluding remarks. The proof of our theoretical result (including the independence of the axioms employed) can be found in Appendix A, and Appendix B contains additional tables illustrating the empirical findings.

2 Measuring Economic Insecurity

To provide a formal definition of an individual measure of insecurity, we need to introduce some notational conventions. We use $\mathbf{1}_m$ to denote the vector consisting of $m \in \mathbb{N} \setminus \{1\}$ ones. For any $T \in \mathbb{N}$, let $\mathbb{R}^{(T)}$ be the $(T+1)$-dimensional Euclidean space with components labeled $(-T, \ldots, 0)$. Zero is interpreted as the current period and T is the number of past periods taken into consideration. We allow T to vary as people alive in the current period may have been born (or have become economic agents) in different periods. A measure of individual insecurity is a sequence of functions $I = \langle I^T \rangle_{T \in \mathbb{N}}$ where, for each $T \in \mathbb{N}$, $I^T : \mathbb{R}^{(T)} \to \mathbb{R}$. This index assigns a degree of insecurity to each individual resource stream $x = (x_{-T}, \ldots, x_0) \in \mathbb{R}^{(T)}$. We allow resources to be negative. As can be seen from these definitions, we restrict attention to streams that involve at least one past period in addition to the current period; this is because our indices are based on pairwise differences.

In an earlier contribution, Bossert and D'Ambrosio (2013) proposed and characterized classes of linear measures of insecurity that bear a formal resemblance to the single-series Gini and single-parameter Gini inequality measures (see, for instance, Donaldson and Weymark, 1980, Weymark, 1981, and Bossert, 1990). The application of these Gini-type measures requires the choice of numerous parameter values. In particular, the main result in Bossert and D'Ambrosio (2013) involves two sequences of parameters—with one parameter each for past gains and past losses in each time period under consideration. Even restricting our attention to a finite number of periods, this requires a rather formidable number of parameter values. Thus, the flexibility afforded by this large class comes at a price: without further systematic restrictions, it may be difficult to make a sound choice of what may be considered 'suitable' parameter values. Moreover, the measures characterized in Bossert and D'Ambrosio (2013) fail to satisfy stationarity, a standard property in intertemporal economic models. Stationarity implies that no significance is attached to the way in which time periods are numbered, and it is necessary to avoid behavior where, with the mere passage of time, plans that were optimal yesterday may no longer be optimal today.

We begin by introducing two axioms that we consider essential for a measure of individual insecurity. The first of these ensures that a gain in resources from the earliest period under consideration to the next is associated with a lower level of insecurity than a situation in which no change occurs between these two periods. Likewise, a loss in resources that occurs from the earliest period to the following produces greater insecurity than no change. As alluded to in the introduction, we limit the scope of the property in order to avoid the use of unnecessarily-demanding conditions. In particular, we assume that a resource level p is obtained in all but the earliest period and require insecurity to be highest (lowest) if a loss (gain) q is observed when moving from the earliest period to the next.

Gain-loss monotonicity. For all $t \in \mathbb{N}$, for all $p \in \mathbb{R}$ and for all $q \in \mathbb{R}_{++}$,

$$I^t(p+q, p\mathbf{1}_t) > I^t(p, p\mathbf{1}_t) > I^t(p-q, p\mathbf{1}_t).$$

A diagrammatic illustration of the axiom with $t = 2$, $p = 0$ and $q = 1$ is provided in Figures 1, 2 and 3. According to gain-loss monotonicity, the stream in Figure 1 is associated with more insecurity than that depicted in Figure 2 which has, in turn, a higher level of insecurity than the stream in Figure 3.

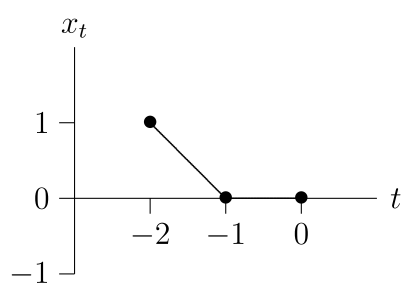

Figure 1: The resource stream $x^1 = (1, 0, 0)$.

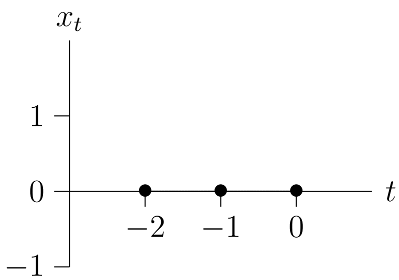

Figure 2: The resource stream $x^2 = (0, 0, 0)$.

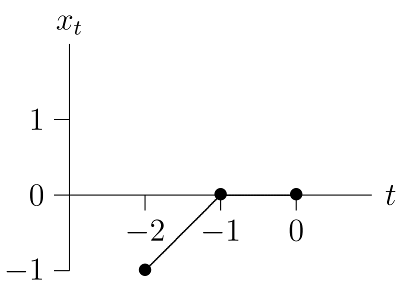

Figure 3: The resource stream $x^3 = (-1, 0, 0)$.

The second fundamental axiom addresses the timing of specific variations in a resource stream. Suppose that there is an increase from a resource level of p to a resource level $p + q$ in one period, followed by a drop from $p + q$ back to p in the following period. We think that, *ceteris paribus,* this first-up-then-down move generates insecurity because the individual is discouraged by the immediate loss of a previous gain. To reflect the hypothesis that more recent experiences are more influential the closer they occur to the present, our property requires that a first-up-then-down move is associated with more insecurity if it occurs closer to the current period. The same argument applies to a first-down-then-up move in which the resource level drops from p to $p - q$ in one period and then immediately goes back up to p in the following period: the individual is encouraged by the immediate recovery from a loss and, therefore, such a move is insecurity-reducing. With the maxim of assigning greater significance to more recent experiences in mind, it is natural to assume that a first-down-then-up move is associated with less insecurity the closer it occurs to the present. Again, we limit the scope of the axiom to a relatively small class of cases.

Proximity monotonicity. For all $t \in \mathbb{N}$, for all $p \in \mathbb{R}$ and for all $q \in \mathbb{R}_{++}$,

$$I^{t+2}(p, p, p + q, p\mathbf{1}_t) \; > \; I^{t+2}(p, p + q, p, p\mathbf{1}_t) \; > \; I^{t+2}(p, p, p, p\mathbf{1}_t) \; > \; I^{t+2}(p, p - q, p, p\mathbf{1}_t) \; > \; I^{t+2}(p, p, p - q, p\mathbf{1}_t). \tag{1}$$

See Figures 4 to 8 for an illustration of the axiom with $t = 1$, $p = 0$ and $q = 1$, where the resource streams are listed in decreasing order of insecurity: the stream in Figure 4 produces more insecurity than that in Figure 5 which, in turn, has more insecurity than that in Figure 6, and so on.

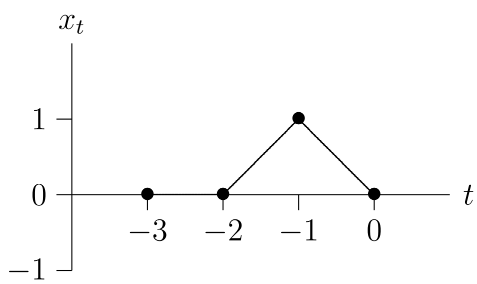

Figure 4: The resource stream $x^4 = (0, 0, 1, 0)$.

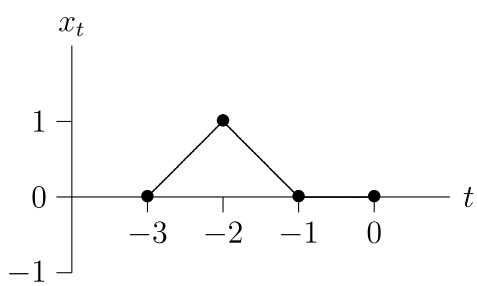

Figure 5: The resource stream $x^5 = (0, 1, 0, 0)$.

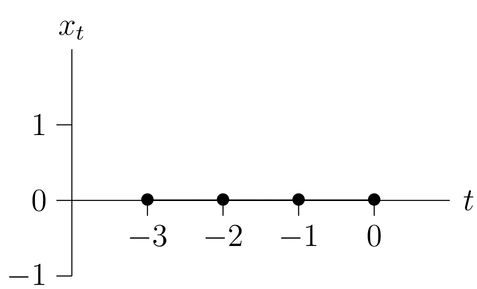

Figure 6: The resource stream $x^6 = (0, 0, 0, 0)$.

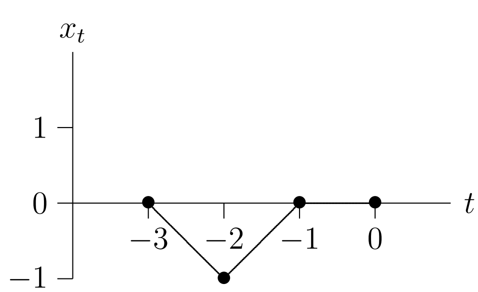

Figure 7: The resource stream $x^7 = (0, -1, 0, 0)$.

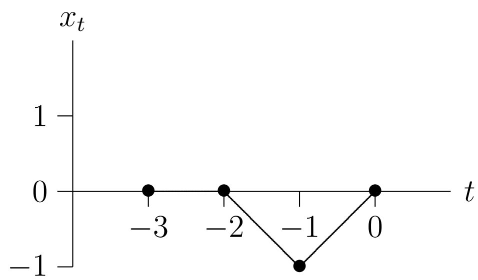

Figure 8: The resource stream $x^8 = (0, 0, -1, 0)$.

In addition to these two fundamental properties, we introduce some further axioms that are of considerable intuitive appeal in our setting.

Linear homogeneity is a standard requirement in the theory of economic index numbers. Under linear homogeneity, a resource stream that is multiplied by a positive constant produces insecurity that is multiplied by the same constant.

Linear homogeneity. For all $T \in \mathbb{N}$, for all $x \in \mathbb{R}^{(T)}$ and for all $b \in \mathbb{R}_{++}$,

$$I^T(bx) = bI^T(x).$$

Our next property is that of translation invariance. This requires that the value of the insecurity measure remain unchanged when the same amount of the resource under consideration is added to the existing levels of the resource available in each period. As for linear homogeneity, translation invariance is well-established in the literature.

Translation invariance. For all $T \in \mathbb{N}$, for all $x \in \mathbb{R}^{(T)}$ and for all $c \in \mathbb{R}$,

$$I^T(x + c\mathbf{1}_{T+1}) = I^T(x).$$

Quasilinearity establishes a link between insecurity comparisons involving resource streams of different lengths. We use this term because of the structural similarity with quasilinear utility functions in consumer-demand theory; see, for example, Varian (1992, p. 154). In the insecurity context, under quasilinearity the insecurity $I^T(x)$ associated with a resource stream $x \in \mathbb{R}^{(T)}$ can be expressed as a quasilinear function involving the insecurity generated by the T most recent resource levels $(x_{-(T-1)}, \ldots, x_0)$ and a function of the resource levels x_{-T} and $x_{-(T-1)}$ of the most remote past. This property is a variant of a well-known axiom phrased in the context of economic insecurity.

Quasilinearity. For all $T \in \mathbb{N} \setminus \{1\}$, there exists a function $F^T \colon \mathbb{R}^2 \to \mathbb{R}$ such that, for all $x \in \mathbb{R}^{(T)}$,

$$I^T(x) = I^{T-1}(x_{-(T-1)}, \ldots, x_0) + F^T(x_{-T}, x_{-(T-1)}).$$

To obtain a class of measures the members of which employ geometric discounting, the following stationarity property is essential. Stationarity applies to situations in which a specific stream is shifted a number r of periods into the past. The formulation employed here differs slightly from the one that is familiar in traditional intertemporal models. This is because, in our setting, the current period cannot be moved forwards or backwards. As a result, some resource levels are repeated in the additional periods.

Stationarity. For all $r \in \mathbb{N}_0$, there exists an increasing function $G^r\colon \mathbb{R} \to \mathbb{R}$ such that, for all $t \in \mathbb{N}_0$ and for all $p, p', s \in \mathbb{R}$,

$$I^{t+2+r}(p, p', s\mathbf{1}_{t+1}, s\mathbf{1}_r) = G^r\left(I^{t+2}(p, p', s\mathbf{1}_{t+1})\right).$$

For instance, if $t = 1$ and $s = 1$, the property requires that

$$I^{3+r}(p, p', \mathbf{1}_2, \mathbf{1}_r)$$

can be expressed as an (r-dependent) increasing transformation G^r of

$$I^3(p, p', \mathbf{1}_2).$$

Clearly, the axiom could be strengthened to include more complex streams but, as before, we state the above weak version which suffices for our purposes.

We now identify the insecurity measures that satisfy our axioms. As stated in the following theorem, these indices employ geometric discounting—which, not surprisingly, follows from stationarity. The relative weights of aggregate losses and gains are expressed by means of the positive parameters ℓ_0 and g_0. However, it is worth emphasizing that the discount factor δ that applies to losses must be the same as that attached to gains. Furthermore, the possible values of δ must be below the smaller of the two ratios ℓ_0/g_0 and g_0/ℓ_0, the other two parameters of the class of insecurity measures characterized below. These parameter restrictions result from proximity monotonicity. Clearly, higher values of δ correspond to greater importance being attached to previous experiences.

Theorem 1. *A measure of individual economic insecurity I satisfies gain-loss monotonicity, proximity monotonicity, linear homogeneity, translation invariance, quasilinearity and stationarity if and only if there exist $\ell_0, g_0 \in \mathbb{R}_{++}$ and $\delta \in (0, \min\{\ell_0/g_0, g_0/\ell_0\})$ such that, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,*

$$I^T(x) = \ell_0 \sum_{\substack{t\in\{1,\ldots,T\}:\\ x_{-t}>x_{-(t-1)}}} \delta^{t-1}\left(x_{-t} - x_{-(t-1)}\right) + g_0 \sum_{\substack{t\in\{1,\ldots,T\}:\\ x_{-t}<x_{-(t-1)}}} \delta^{t-1}\left(x_{-t} - x_{-(t-1)}\right). \quad (2)$$

It is immediate that if losses are to be given higher weight than equivalent gains, then ℓ_0 (the weight on aggregate discounted losses) must exceed g_0 (that on aggregate discounted gains). This implies that

$$\frac{g_0}{\ell_0} < 1 < \frac{\ell_0}{g_0}$$

and the minimum of the two ratios is g_0/ℓ_0. Therefore, the subclass of the measures characterized in the previous theorem that respects such a loss-priority condition must be such that $\ell_0 > g_0$ and the discount factor δ be in the open interval $(0, g_0/\ell_0)$. Loss priority is akin to the notion of risk aversion in decision theory and appears to adequately capture the attitude of individuals who are concerned with their ability to absorb an adverse event. We will therefore use parameter values that respect this condition in the applied part of the paper.

The following example illustrates the class of measures characterized in our theorem.

Example 1. *Throughout the example, suppose that $T = 3$ and the weights assigned to aggregate losses and gains are $\ell_0 = 1$ and $g_0 = 15/16$.*

(a) Consider the stream $x^1 = (4, 12, 12, 16)$. We obtain

$$I^3(x^1) = g_0\left(\delta^2(4-12) + \delta^0(12-16)\right) = -\frac{15}{2}\delta^2 - \frac{15}{4} < 0.$$

As resources never fall from one period to the next, the agent never experiences any losses and, as a result, the resulting insecurity value is negative for any choice of the discount factor $\delta \in (0, 15/16)$. In general, any stream without losses and at least one gain has a negative insecurity value and, thus, produces less insecurity than any constant resource stream.

(b) Now consider the reverse stream $x^2 = (16, 12, 12, 4)$. It follows that

$$I^3(x^2) = \ell_0\left(\delta^2(16-12) + \delta^0(12-4)\right) = 4\delta^2 + 8 > 0.$$

The agent never experiences any gains and, thus, the resulting insecurity value is always positive. Clearly, any stream without gains and at least one loss has a positive insecurity value and therefore is more insecure than any constant resource stream.

(c) Let $x^3 = (16, 4, 4, 12) \in \mathbb{R}^{(3)}$. In this stream, the individual experiences a loss of 12 when moving from three periods ago to two periods ago, no change in the period that follows and, finally, a gain of 8 in the move from the previous period to today. For any discount factor $\delta \in (0, 15/16)$, the corresponding value of the insecurity index is

$$I^3(x^3) = \ell_0\delta^2(16-4) + g_0\delta^0(4-12) = 12\delta^2 - 15/2.$$

For any value of δ above $(1/2)\sqrt{5/2}$, the index value is positive (so that x^3 is associated with more insecurity than that from a constant resource stream); if δ is below $(1/2)\sqrt{5/2}$ insecurity is lower than that from a constant resource stream. Lower values of δ (a higher discount rate) put more weight on the recent gain relative to the more distant initial loss.

(d) Finally, consider the stream $x^4 = (4, 16, 16, 8)$. It follows that

$$I^3(x^4) = g_0\delta^2(4-16) + \ell_0\delta^0(16-8) = -\frac{45}{4}\delta^2 + 8.$$

For any value of δ below $(4/3)\sqrt{2/5}$, the index value is positive and x^4 is associated with more insecurity than the insecurity of a constant stream.

In our empirical analysis we set $\ell_0 = 1$, $g_0 = 15/16$ and $\delta = 0.9$. We use the stream of annual household equivalized incomes over the previous five years as the empirical counterpart of x above. We have tested the sensitivity of our results to the choice of these different parameters. As we will discuss in the section on empirical results below, our qualitative conclusions are not affected by any reasonable changes in the values of ℓ_0, g_0 and δ.

3 The Rise of the Right

3.1 A Long-run Panel Data Analysis

As noted in the Introduction, social science has paid a great deal of attention in recent years to individual political preferences in general, and the recent success of right-leaning political parties. We now consider the individual-level economic-insecurity index developed above as a potential explanation of both phenomena. As our index requires panel information on individual incomes, we use data from two of the best-known long-run panel surveys: the British Household Panel Survey (BHPS) and the German Socio-Economic Panel (SOEP).

The BHPS was launched in 1991, with annual surveys being carried out up to 2008. It was then incorporated into Understanding Society, but only starting with the second wave of interviews of the latter. The BHPS is a general survey that includes a random sample initially covering approximately 10,000 individuals in 5,500 British households. Later waves of this survey included new population groups and refresher samples that increased the number of individual interviews towards 15,000 per year. It provides a wide range of information on individual and household demographics, income, attitudes and political preferences. There is no information about support for the UK Independence Party (UKIP) in the BHPS: although the party has existed since 1993, it only achieved electoral standing in the early 2010s. Our main variable of interest here is voting intentions, measured as follows. BHPS respondents are first asked the following two questions. "Now I have a few questions about your views on politics. Generally speaking do you think of yourself as a supporter of any one political party?" and "Do you think of yourself as a little closer to one political party than to the others?" If the respondent replies "Yes" to either of these two questions, they are then asked which political party they support. On the contrary, respondents who reply "No" to both questions are then asked, "If there were to be a general election tomorrow, which political party do you think you would be most likely to support?" Our measure of political preference is based on the combination of the answers to these three questions, and individuals are considered as having no political preferences if they reply "No" to the first two questions and "None" or "Don't know" to the hypothetical-election question. We exclude individuals who answered "Can't vote." We then create a categorical political-preference variable, "Party," with the five categories "Conservative Party," "Liberal Party," "Labour Party," "Other parties" and "No political preferences," where the named parties are ordered from right to left.

The SOEP is an ongoing panel survey with yearly re-interviews. The starting sample in 1984 contained close to 6,000 households based on a random multistage sampling design. A sample of about 2,200 East German households was added in June 1990, half a year after the fall of the Berlin wall, and since then new samples have been added either for particular population groups or as refresher samples. As in the BHPS, the SOEP contains information about individual and household demographics, attitudes and income. Political preferences are elicited by means of the following set of questions. "Many people in Germany lean towards one party in the long term, even if they occasionally vote for another party. Do you lean towards a particular party?" If respondents answered "Yes" they were then asked, "Toward which party do you lean?" Our political-preference variable in Germany has the five categories "CDU/CSU," "FDP," "SPD," "Other parties" and "No political preferences;" again, the named parties are ordered from right to left. Later in the paper, we will explicitly distinguish "The Greens" and "Die Linke" from the parties appearing in "Other parties."

Our measure of individual economic resources in both samples is household equivalized income, calculated by dividing household income by the square root of household size. It is an open question whether individuals are more sensitive to movements in nominal income or real income. We carry out our analysis using nominal income but provide a robustness check to confirm that using real income makes no difference to our empirical results.

The estimation samples for both surveys cover individuals aged between 18 and 65 who are not retired and who have valid information on economic insecurity, household equivalized income and political preferences (we consider older respondents as part of the robustness checks in Section 3.1.2). We do not use the first 1984 SOEP wave due to income-measurement errors. Household income is also only available from 1992 onwards in East Germany. This leaves us with data from 1985 to 2016 in West Germany and from 1992 to 2016 in East Germany. There are 67,844 observations in the estimation sample in the BHPS and 209,600 in the SOEP. We provide descriptive statistics on these samples in Tables B1 and B2. The two samples are notably similar with respect to mean age (around 41), percentage female (just over 50), percentage married (two-thirds) and percentage employed (just over three-quarters); in contrast, the share of individuals reporting "No political preferences" in the UK is only just under half that in Germany. We might expect political preferences to be relatively stable over time at the individual level. Tables B3 and B4 present the transition matrices for political preferences between $t-1$ and t. In both countries, the diagonal is heavily-populated, reflecting the stability of individual political preferences over time. This in particular implies that it will be difficult to run panel analyses of political preferences.

Regarding our key explanatory variable in the political-preference regressions, Figure 6 depicts the evolution of mean economic insecurity in the UK (on the left) and Germany (on the right), where the 2000 value of the insecurity index in each country serves as base 100. These are plotted together with the national unemployment rates (taken from the OECD), revealing as expected a positive correlation between the two. There is serial correlation in economic insecurity, as the $t-1$ and t values share three out of four of the changes in income that are used to calculate the index; even so, in the data an individual's economic-insecurity score always changes from one wave to the next, so that this is not synonymous with an individual fixed effect. Economic insecurity is negatively correlated with current household equivalized income, but not particularly strongly so, with the correlation coefficients being −0.4 in both the BHPS and the SOEP. In terms of the four income changes that serve as the basis for the index, around 60% are positive and just under 40% negative (with very few zeros). Only 10% of economic-insecurity observations do not include a loss among the four income changes.

Figure 6: Economic insecurity and unemployment over time – BHPS and SOEP

The general models of economic insecurity and political preferences we estimate are as follows:

$$Support_{i,t} = \beta_1 HHincome_{i,t-1} + \beta_2 I^5_{i,t-1} + \beta_3 X_{i,t-1} + \lambda_t + \epsilon_{i,t} \quad (3)$$

$$Party_{i,t} = \beta_1 HHincome_{i,t-1} + \beta_2 I^5_{i,t-1} + \beta_3 X_{i,t-1} + \lambda_t + \epsilon_{i,t} \quad (4)$$

where $Support_{i,t}$ is a dummy for individual i supporting any party and $Party_{i,t}$ the party supported, both measured at time t, $HHincome_{i,t-1}$ represents the equivalized annual household income of i at time $t-1$, and $I^5_{i,t-1}$ is the value of economic insecurity of i at time $t-1$. As economic insecurity is calculated using information on household nominal equivalized income, the standard errors in these equations are clustered at the household level. We standardize both economic insecurity and equivalized household income in the regressions, so that the estimated coefficients refer to the effect of a one-standard-deviation change in these variables. The variable λ_t controls for year fixed effects, while the vector $X_{i,t-1}$ includes a set of individual covariates measured at time $t-1$: age, gender, education, marital status, number of children, labor-force status, homeownership and region fixed effects. Homeownership here acts as a measure of wealth. Figure 6 suggests that we should also take into account a possible confounding influence of unemployment (and Algan, Guriev, Papaioannou and Passari, 2017, suggest unemployment as a determinant of populist preferences). To do so, the vector $X_{i,t-1}$ includes dummies for the individual's recent unemployment (over the past four years). As we require income information over a five-year period to calculate our insecurity index at time $t-1$ (which is then related to political preferences at time t), our first observation on the dependent political variable in these regressions comes from 1996 in the BHPS and 1990 in the SOEP.

As noted above, the BHPS was incorporated into Understanding Society starting with the second wave of interviews of the latter in 2010. The BHPS respondents in Understanding Society thus have missing values for their equivalized household incomes in 2009, so that we could only extend our analysis (of political preferences in t to economic insecurity measured over the five-year window between $t-5$ and $t-1$) to Understanding Society starting in the 2015 wave. Our long-run analysis of UK political preferences in general will thus refer to the 18 waves of the BHPS (although we will use cross-section Understanding Society data below when we consider the Brexit vote).

Equation 3 is estimated using a logit model while, as in much of the economic-voting literature, we estimate Equation 4 via a multinomial logit model. In the context of voting decisions, it can be argued that multinomial probit models are more appropriate. Dow and Endersby (2004) discuss the strengths and weaknesses of the multinomial logit and multinomial probit models in the economic-voting literature. They conclude that while the multinomial probit model does not rely on the independence-of-irrelevant-alternatives assumption, its relatively difficult maximum-likelihood optimization procedure may fail to converge and produce imprecise estimates.

3.1.1 Empirical Results

Table 1 asks whether economic insecurity at time $t-1$ predicts future support for any political party at time t. We show the marginal effects for economic insecurity, income and homeownership (wealth) from Equation 3. The resulting coefficients on economic insecurity are thus estimated holding both income flow and stock constant, so that we do not confound insecurity with low income. The estimated coefficients in the first row show that economic insecurity is associated with significantly higher political support at the 1% level in both the BHPS and the SOEP: all else equal, a one-standard-deviation rise in economic insecurity at $t-1$ increases the probability of supporting any party at t by 0.8 percentage points in the UK and 1.0 percentage points in Germany, corresponding to one-third of the size of the marginal effects of equivalized household income and homeownership in both countries. The full set of results, including the estimated coefficients on all of the control variables, appears in Table B5.

In Table 2, we show which parties benefit from this greater political engagement. The estimates in the last column of both panels of this table, on the probability of not supporting any party, are of course the mirror images of those for any party support in Table 1. With respect to the actual parties supported, the results in Table 2 are similar for the BHPS and the SOEP: economic insecurity mainly benefits right-leaning parties (the Conservatives and the CDU/CSU) and, to a lesser extent, center parties (the Liberals/FDP). Economic insecurity is not correlated with support for the SPD in Germany, for the Labour Party in the UK and for the other parties in both countries. In most cases, the economic-insecurity coefficient for support for a specific party is of the same sign as the coefficients on equivalized household income and homeownership.

Economic insecurity therefore increases support at the right side of the political spec-

Table 1: Economic insecurity and probability of supporting any party: Logit results - BHPS and SOEP

	(1) BHPS	(2) SOEP
Economic Insecurity (std)	0.008***	0.010***
	(0.002)	(0.002)
Log(Eq. HH Income) (std)	0.025***	0.032***
	(0.002)	(0.004)
Homeowner (dummy)	0.025***	0.027***
	(0.005)	(0.006)
Observations	67844	209600
Log Likelihood	-38563	-132737

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

trum. Recent research in psychology and political science (see Jost, Glaser, Kruglanski and Sulloway, 2003, Jost, Napier, Thorisdottir, Gosling, Palfai and Ostafin, 2007, Inglehart and Norris, 2016, and Walley, 2017) has underlined that individuals who value security and stability are more likely to support conservative parties. The economic-insecurity index that we propose using panel data on individuals' past incomes thus appears to at least partly capture this shift in political support towards the right.

To simplify the comparison between the BHPS and the SOEP we reduced the spectrum of German political parties in Table 2. In Table B6 we relax this simplification by separating "Alliance 90/The Greens" and "Die Linke" from the other-parties category (both of which attract about five per cent support in our German sample). We first present the full-sample results in Panel A. Then, as we may expect West and East Germans to react differently to economic insecurity, we analyze these two regions separately in Panels B and C. Economic insecurity never affects Green support in any panel. However, economic insecurity does reduce Die Linke support in Panel A and, with West Germans representing 75% of the total estimation sample, similarly so in Panel B. The results in East Germany are somewhat different, as economic insecurity still benefits right-leaning parties, but also to a lesser extent the SPD (although the marginal effect here is not significantly different from zero at conventional levels).

While Table B6 shows regional heterogeneity in Germany, Tables B7 and B8 consider the results by time period, pre-2000 versus post-2000, in the BHPS and SOEP respectively. The last column of each table indicates how economic insecurity at $t-1$ affects the probability of not supporting any party at t. In both tables, this estimated coefficient is

Table 2: Economic insecurity and political-party preferences: Multinomial logit results – BHPS and SOEP

	BHPS				
	Conserv.	Liberal	Labour	Other	No Pol. Pref.
Economic Insecurity (std)	0.011***	0.002	-0.002	-0.002	-0.008***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Log(Eq. HH Income) (std)	0.024***	0.000	0.006**	-0.005***	-0.025***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Homeowner (dummy)	0.051***	0.016***	-0.047***	0.002	-0.025***
	(0.004)	(0.003)	(0.006)	(0.003)	(0.005)
Observations			67844		
Log Likelihood			-89876		
	SOEP				
	CDU/CSU	FDP	SPD	Other	No Pol. Pref.
Economic Insecurity (std)	0.012***	0.002***	-0.002	-0.002*	-0.010***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)
Log(Eq. HH Income) (std)	0.035***	0.007***	-0.002	-0.007***	-0.032***
	(0.004)	(0.001)	(0.003)	(0.002)	(0.004)
Homeowner (dummy)	0.065***	0.002	-0.024***	-0.013***	-0.027***
	(0.005)	(0.001)	(0.005)	(0.004)	(0.006)
Observations			209600		
Log Likelihood			-229885		

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

significantly negative only after 2000, with the difference from the pre-2000 effect being significant at least at the 5% level. In Table B7, economic insecurity increases support for the Conservative Party, but only significantly so post-2000. The pattern is somewhat similar in Germany in Table B8: economic insecurity increases support for the CDU/CSU in both time periods, but with a larger coefficient post-2000, and insecurity only reduces "no political preference" in the more recent time period. In both Tables B7 and B8 economic insecurity benefits right-leaning parties to a significantly (at the 10% level) greater extent post-2000.

Table B9 then explores potential heterogeneity in the relationship between economic insecurity and political-party support at t by gender, marital status, parenthood and age. Rather than presenting the full multinomial results by party (these results are available upon request), Table B10 illustrates the estimated coefficient for right-leaning parties. In Table B9 the relationship between insecurity and political support is somewhat larger for women, but only significantly so in Germany. Economic insecurity has a greater effect for the married and parents in both countries (at the 1% level, except for parenthood in the SOEP), reflecting perhaps the greater vulnerability of those with a family. Last, insecurity only affects political support for the under-40s in the BHPS. Table B10 shows the estimated coefficients for support for right-leaning parties from the multinomial logit regressions. The results here show that the shift to the right (from economic insecurity) is larger for the married and (in the BHPS) for younger respondents and those with children. We have also looked for possible moderating effects of income, splitting the sample into those above and below median income, education and renters vs. homeowners, but found no significant differences in any of these cases.

Finally, we ask whether the effect of economic security on political support depends on the nature of the party in power. We first re-estimate Equation 3 separately for the periods when Labour and the Conservatives were in power in the UK for the BHPS, and when the Chancellor was from the SPD or CDU for the SOEP. We also look at the parties that were in power during the period of calculation of our economic-insecurity index (between $t-1$ and $t-5$). In both cases, although the estimated coefficient on economic insecurity is often larger in absolute size when a left-leaning party is/was in power, none of the differences in the requisite coefficients are statistically significant.

3.1.2 Robustness Checks

Our main results relate political preferences at t to economic insecurity at $t-1$. This relationship will not be causal if there is an omitted variable that simultaneously predicts both past economic insecurity and current political preferences. To help control for this possibility, we estimate a value-added model controlling for political preferences at $t-2$. The intuition here is that any time-invariant omitted variable that predicts both economic insecurity at $t-1$ and political preferences at t will be picked up by political preferences at $t-2$. The equation estimated is

$$Party_{i,t} = \alpha_1 HHincome_{i,t-1} + \alpha_2 I^5_{i,t-1} + \alpha_3 Party_{i,t-2} + \alpha_4 X_{i,t-1} + \lambda_t + \epsilon_{i,t}.$$

The regression results from this value-added model appear in columns (1) and (2) of Table B11. Compared to our baseline results in Table 1, the marginal effects of economic insecurity (as well as those of household income and homeownership) fall by about 50% but remain significantly different from zero. As economic insecurity is defined over the period $t-1$ to $t-5$ we have also estimated a value-added model controlling for political preferences at $t-6$. The estimated coefficients on economic insecurity are somewhat larger than those in the first two columns of Table B11, and are both significant at the one per-cent level.

Liberini, Redoano and Proto (2017) and Ward (2019) have recently shown that subjective well-being predicts voting behavior, and Algan, Beasley and Senik (2018) show in French data that low well-being predicts support for the *Front National*. If insecurity affects satisfaction (as shown in Clark, 2018) and satisfaction affects voting, how much of our political-participation effect is mediated by life satisfaction? Columns (3) and (4) in Table B11 re-estimate our main regression controlling for life satisfaction (note that the BHPS sample size is smaller here, as life satisfaction is only recorded in waves 6 to 10 and 12 to 18). This does not change the estimated coefficients, so that life satisfaction does not mediate the relationship between economic insecurity and political preferences.

Columns (5) and (6) of Table B11 check the convergent validity of our results by considering a different dependent variable. Respondents in both the BHPS and the SOEP are asked about their interest in politics (both on a four-point scale), and we re-estimate Equation 4 by OLS with the dependent variable being interest in politics at t (the results from ordered-logit estimation are the same). Economic insecurity increases interest in politics in both samples (as do equivalized household income and homeownership), similar to the results for any political-party support in Table 1.

Subjective evaluations of economic insecurity may play a role in our analysis. To address this issue, the BHPS includes the question "Would you say that you yourself are better off or worse off financially than you were a year ago?" with the response categories being "Better off" (30.2)%, "Worse off" (21.0%) and "About the same" (48.8%). We add a dummy variable for major financial worsening over the past year to our baseline specifications in Tables 1 and 2 (the results are available upon request). This attracts a significant positive estimated coefficient in both tables: those who say that they have become worse off are both more likely to support any political party and to support right-wing parties. The coefficient is sizeable, being about half of that on standardized equivalized household income. However, the inclusion of this subjective variable has almost no impact on the size of the estimated coefficient on (objective) economic insecurity, which remains at the level seen in Tables 1 and 2.

Our main results consider the sample of individuals who are aged between 18 and 65. The rationale for doing so is that the income streams of the retired are different in nature from those of individuals of working age. We can re-estimate the regressions in Tables 1 and 2 including respondents of all ages, which produces very similar results (available upon request).

The last two specification checks refer to the measure of income and the parameters of the economic-insecurity index. We first check that our results continue to hold when we use real equivalized household income in the construction of the index, as well as a control variable in its own right: this is indeed the case. Next, the economic-insecurity index has three key parameters: the discount factor and the weights on aggregate losses and gains. In our empirical analysis above these were set to 0.9, 1 and 15/16. To assess the sensitivity of our results to these particular values we carried out a grid search, varying the discount factor δ from 0.9 to 0.01 and the value of the gains parameter g_0 from 0.9 to δ+0.01 (keeping the value of losses parameter ℓ_0 at 1). The estimated coefficient on economic insecurity in the SOEP remained at its baseline level across the grid; that in the BHPS became insignificant when the discount factor dropped below one quarter for any g_0 between δ and ℓ_0 or when gains were valued 40% or less than losses when the discount factor was between 0.25 and 0.5, both of which may be considered as fairly extreme parameterizations.

3.1.3 Comparing Different Indices

We now ask whether the insecurity index we propose outperforms other measures such as that in Hacker, Huber, Rehm, Schlesinger and Valletta (2010) of a sharp (over 25%) drop in available income over the past year, and the variance in household equivalized income over five years. Note that the Hacker index also includes the lack of an adequate financial safety net, but data constraints prevent us from including this dimension in the index. As our index is based on movements in income, it might be thought that it is similar to a variance. However, gains and losses can potentially cancel each other out in our economic-insecurity index, making it different in nature to the variance in resources (it is easy to construct profiles with positive variance but an economic-insecurity index of zero). In both the BHPS and the SOEP, the correlation between the variance in income and the economic-insecurity index between $t-5$ and $t-1$ is below 0.05. We also consider the change in income between $t-2$ and $t-1$ as well as the trend growth rate in income between $t-5$ and $t-1$ as predictors of political preferences. We apply the same approach as in Clark (2001), comparing the explanatory power of each of these four alternative income measures to that of economic insecurity. We introduce these measures in turn into a regression with the same sample and set of controls: the best model has the least-negative log-likelihood. The log-likelihood in Table 1 is −38318 (−132736) for the BHPS (SOEP) with our index: these figures are reproduced in Columns (1) and (6) of Table B12 for ease of comparison. Columns (2) to (5) and (7) to (10) in Table B12 show the results for the other indices, all of which produce log-likelihoods that are more negative than that from our index. Thus, the economic-insecurity index we propose fits the data the best compared to these different measures. We can alternatively introduce these indices one by one into a regression that also includes our economic-insecurity index. In that case, none of these new variables renders the estimated coefficient on economic insecurity insignificant.

3.1.4 Potential Mechanisms

Many income movements happen for a reason: they may come about through a change in family size or marital status (these are especially important as we use equivalized income in our analysis), or because of unemployment or ill health. In order to investigate the role of observable life events in producing the economic insecurity we measure, we consider four that may have occurred between $t-5$ and $t-1$, the time period of our economic-insecurity index: marital separation, unemployment, a change in the number of children and health shocks. In the tables we show below, the health shock is measured as rise in the number of nights spent in hospital from one year to the next in the $t-5$ to $t-1$ period: we find the same results if we consider entry into disability (as in Oswald and Powdthavee, 2008) or changes in self-assessed health. We first re-estimate our main political-support equation, as in Table 1, separately according to whether each of these four events occurred, and then separately for individuals who experienced at least one of these events versus those who experienced none of them.

The estimated coefficient on economic insecurity in Table B13 is never significantly different across these pairwise comparisons (i.e. event occurred vs. event did not occur) in the SOEP, so that the political effect of economic insecurity in Germany does not depend on these life events having occurred. In the BHPS, those who experienced a change in the number of children or a health shock (and those who experienced at least one of the events) have a significantly larger estimated economic-insecurity coefficient than those who did not. We might be tempted to then think that our main results in Table 1 actually reflect an omitted variable: number of children and health both change income and affect political support. This is however not the case in either of our datasets. With respect to the four events in Table B13, number of children and unemployment both actually reduce political support, with there being no correlation with health shocks or marital separation (this pattern equally holds for support for right-leaning parties). Our preferred reading of Table B13 is that, in the British data, it is the economic insecurity that results from these two life events that helps shape political support.

Table B14 carries out an the same analysis for the probability of supporting a right-leaning party, following on from Table 2. Probably the key finding in this table is that, in both datasets, economic insecurity increases the probability of right-leaning support for those who did not separate, did not experience unemployment, did not have more children and did not suffer a health shock. To this extent, life events do not seem to lie behind our estimated relationship between economic insecurity and support for the right.

3.2 The Election of Donald Trump

Our results above refer to two European countries. We now turn to US data, and in particular to the 2016 Presidential election. To do so, we require data with both past household income and current political preferences. To the best of our knowledge, the only dataset with this information is the Understanding American Society (UAS, see https://uasdata.usc.edu/index.php) survey conducted by the University of Southern California. UAS is a panel of households with approximately 6,500 respondents, and is representative of the entire United States. The study is an Internet panel, where respondents answer the surveys online at the time of their choosing. From the beginning of the study on May 31st 2014 up until August 2018, the University of Southern California carried out approximately 150 different UAS surveys on different topics such as politics, consumer behavior, financial literacy and health. Individuals in the panel could reply to as many of these surveys as they wished (although in general only once to each one), and each survey questionnaire included a standard set of socio-demographic characteristics, including (banded) income. This therefore gives us theoretically up to 150 income observations per individual from May 31^{st} 2014 through August 2018.

The survey topic that interests us here is political behavior. This was measured in the Election Poll Study wave of the UAS, run between July 4^{th} 2016 and November 7^{th} 2016, in which respondents were asked to report their probability (on a 0 to 100 scale) of voting in the Presidential election and their probability to vote for Donald Trump, Hillary Clinton or any of the other candidates. Unlike most of the UAS questionnaires, respondents could reply as many times as they wanted during the period in which the poll was open (respondents replied on average 11.3 times). As for the other UAS questionnaires, every time the individual responded they provided information on their socio-demographic characteristics and income.

Overall 4,295 UAS respondents participated in the Election Poll Study, of whom 2,367 were between 18 and 65 years old, not retired and had at least five observations on household income (either from the Election Poll Study or from previous UAS surveys on other topics): on average, these 2,361 respondents have 28.5 income observations up to their first participation in the Election Poll Study. Income in the UAS is measured as an annual household figure in banded categories. For each income observation, we calculate the annual household income by assigning the mean value per income band using data from the Current Population Survey from the year of the observation under consideration. We only keep individuals with at least five observations on household income over the period from the start of the UAS to the closing of the Election Poll (i.e. May 31^{st} 2014 to November 7^{th} 2016), and use the last five of their equivalent income observations before the wave in which they report their political preferences to calculate our insecurity index. As we now have observations at the daily level, rather than every year as for the BHPS and SOEP datasets above, we use a daily discount factor δ between observations calculated so that the discount factor over 365 days is 0.9, as in our annual analyses above.

Our first OLS regression is based on the equation

$$Probability_{i,t} = \beta_1 HHincome_{i,t-1} + \beta_2 I^5_{i,t-1} + \beta_3 X_{i,t-1} + \lambda_t + \epsilon_{i,t}$$

where $Probability_t$ refers successively to the probabilities of voting on election day, and voting for Trump, Clinton, or any of the other candidates. These are two separate questions, with all four probabilities being reported on a 0 to 100 scale, and even individuals with a low or zero reported probability of voting give percentage figures for their support for the Presidential candidates. Respondents indicate their candidate support by giving three separate figures, for Trump, Clinton and Other, which (by the design of the questionnaire) have to sum to 100%.

Although individuals can reply multiple times to the Election Poll Study, our main analysis refers only to the most recent political-preference observation per individual to proxy for their actual voting behavior on the day of the Presidential election. We can nevertheless reproduce our results using all of the individual observations or the individual mean of political preferences. The periods t and $t-1$ refer to the ultimate and penultimate individual observations before the election. $HHincome_{i,t-1}$ is the equivalized annual household income of i at time $t-1$, while the vector $X_{i,t-1}$ includes a set of individual covariates similar to those in Equations 3 and 4. We cannot control for homeownership as this information is not available in the UAS. We again standardize both economic insecurity and equivalized household income in the regressions.

As in Section 3.1, we also estimate the following multinomial-logit regression

$$Candidate_{i,t} = \beta_1 HHincome_{i,t-1} + \beta_2 I^5_{i,t-1} + \beta_3 X_{i,t-1} + \lambda_t + \epsilon_{i,t}$$

where $Candidate_t$ is a categorical variable for the candidate to whom the survey respondent assigns the highest vote probability. We cannot identify this variable in the 327 cases where the respondent assigned either a probability of one half to each of two candidates or one third to the three candidates. The complete descriptive statistics for the estimation sample can be found in Table B15.

Table 3 shows the estimates on our economic-insecurity and equivalized household income variables as predictors of voting intentions in the 2016 US Presidential election. The estimated coefficient in the first column is of the same size as that in the BHPS and SOEP: a one standard-deviation rise in economic insecurity predicts an increase of 0.68 percentage points in the probability to vote in the election, although the estimate is not significant at conventional levels. The next three columns estimate the support for the individual candidates. We weigh the percentage support individuals by the probability that they will vote in the election (our rationale is that we should give less weight to the preferences of those who have only a low probability of voting). Economic insecurity predicts greater support for Donald Trump and reduces support for Hillary Clinton (with no effect for the other candidates). We can alternatively estimate this OLS candidate-support equation without this weighting, or excluding those who say they have a zero probability of voting: these estimations produce very similar results. The full results with all of the controls for Table 3 can be found in Table B16.

Columns 5 to 7 depict the marginal effects from a multinomial-logit analysis of the preferred candidate, again weighting the vote probability: the results here confirm that economic insecurity is associated with political support for the right. As in the OLS regression, we find the same results if we do not weight by vote probability or if we drop those with a zero probability of voting.

We consider potential heterogeneity in the estimated coefficient on economic insecurity, as in Table B9 for the BHPS and the SOEP. There is no evidence of any significant differences: economic insecurity increased support for Donald Trump for all of the demographic groups we considered. Last, as noted above, the UAS is different in structure to the SOEP and the BHPS, with observations being much closer together: the median number of days elapsed between the $t-5$ and $t-1$ interviews was around five months. We re-estimated the analysis in Table 3 using only those with above-median values of this gap, producing estimated coefficients that are only slightly smaller in size (but lose significance due to the smaller sample size of just over 1000).

Table 3: Economic insecurity, voting behavior and political preferences: OLS and Multinomial Logit results – UAS

	OLS Probability to Vote (0-100):				Multinomial Logit Preferred Candidate:		
	Election (1)	Trump (2)	Clinton (3)	Other (4)	Trump (5)	Clinton (6)	Other (7)
Economic Insecurity (std)	0.676	2.128**	-1.682*	-0.443	0.025**	-0.020*	-0.005
	(0.645)	(0.945)	(0.983)	(0.608)	(0.011)	(0.011)	(0.007)
Log(Eq. HH Inc.) (std)	1.532**	0.133	0.857	-1.025	-0.000	0.008	-0.008
	(0.728)	(1.009)	(1.070)	(0.742)	(0.011)	(0.011)	(0.008)
Observations	2367	2367	2367	2367		2040	
Adjusted R^2	0.082	0.183	0.178	0.051			
Log Likelihood	.	.	.	.		-1527	

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, a white dummy, wave dummies, region dummies, labor-force status and dummies for unemployment over the past five observations. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

3.3 Support for Brexit

Our last empirical application considers the relationship between economic insecurity and support for Brexit, using data from the UK Household Longitudinal Study (UKHLS), also known as Understanding Society, which started in 2009. UKHLS is the largest panel survey in the world devoted to social and economic research, covering around 100,000 individuals in 40,000 households in the United Kingdom. In Wave 8, UKHLS respondents were asked the question "Should the United Kingdom remain a member of the European Union or leave the European Union?" Wave 8 of Understanding Society was conducted between 2017 and 2018, so that this question was asked more than a year after the actual Brexit referendum on June 23^{rd} 2016. Nevertheless, the wording of the question in Understanding Society is the same as that used in the actual referendum and we consider the response to this question as a reliable proxy for Brexit support (a related contribution by Powdthavee, Plagnol, Frijters and Clark, 2019, considers the relationship between the Brexit referendum outcome and subjective well-being in UKHLS data, as a function of the prior Brexit preferences that the individual expressed). We estimate the following equation via logit

$$Leave_{i,t} = \beta_1 HHincome_{i,t-1} + \beta_2 I^5_{i,t-1} + \beta_3 X_{i,t-1} + \lambda_t + \epsilon_{i,t}$$

where $Leave_{i,t}$ takes the value of one if respondent i stated that the United Kingdom should leave the European Union and zero if it should remain a member. The independent variables are the same as those in Section 3.1 and the estimation sample has the same characteristics. Of the 13,381 individuals in the estimation sample, 41% replied "Leave the EU." The complete descriptive statistics of the UKHLS sample can be found in Table B17.

Table 4 shows the marginal effects for the economic insecurity, equivalized household income and homeownership variables; the full set of results appears in Table B18. The estimated effect of economic insecurity is in line with all of the results presented above: one standard deviation higher economic insecurity is associated with a one percentage-point higher probability of stating "Leave the EU." The effects of household income and wealth (as proxied by homeownership) are both significant and are of the opposite sign: individuals with more resources were more likely to prefer "Remain." As for all of our analyses, we last looked at heterogeneity in the estimated coefficient on economic insecurity by demographic group. This produced only little evidence of significant differences in the association between economic insecurity and Brexit support. Liberini, Oswald, Proto and Redoano (2019) estimate the probability of supporting Brexit in Wave 8 UKHLS data, with interviews from January 2016 to December 2016. Their key explanatory variable of Brexit preferences is the response to the question "How well would you say you yourself are managing financially these days?" They show that, conditional on income, more negative responses to this question predict Brexit support. It would be of interest to correlate such subjective financial evaluations with our insecurity index set out above.

Table 4: Economic insecurity and the probability of supporting Brexit: Logit results – UKHLS

	Leave the EU
Economic Insecurity (std)	0.010**
	(0.005)
Log(Eq. HH Income) (std)	-0.066***
	(0.006)
Homeowner (dummy)	-0.065***
	(0.012)
Observations	13381
Log Likelihood	-8626

Notes: The standard errors in parentheses are clustered at the household level. The figures refer to marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

4 Concluding Remarks

Economic insecurity appears to be on the rise, and is of obvious importance for social cohesion, the understanding of changing inequality, and the perceived and actual effects of public-policy choices. At the same time, there is no accepted standard economic-insecurity measure. The first contribution of this paper is to propose and characterize a class of individual measures of economic insecurity based on income streams (although the general principle can be applied to streams of any kind of resource). We hope that the measures presented here will be of use in future research in a wide variety of areas.

In a second step, we apply a member of this class of indices to data from long-running large-scale panel datasets in the UK and Germany in order to examine how economic insecurity affects political preferences. The results in both countries are unambiguous: insecurity significantly increases political activism (in terms of the probability of supporting any political party), with this increased participation mainly benefiting parties on the right (the Conservative Party in the UK and the CDU/CSU in Germany). Insecurity is not a proxy for individual-level resources here, as its consistent significant effect is conditional on individual income, homeownership, current labor-force status and past unemployment. These results are more pronounced for the married, those with children and younger respondents, have become notably stronger post-2000, and are not mediated by life satisfaction.

We use US panel data to show that economic insecurity affected political preferences before the 2016 Presidential election: the more insecure were significantly more likely to vote in the Presidential election and to vote for Donald Trump, and were less likely to vote for Hillary Clinton. Last, we employ recent UK panel data to show that our economic-insecurity measure predicts stronger support for Brexit. As above, these specific political preferences are conditional on the individual's current level of economic resources.

The notion of insecurity that we characterize and empirically analyze is specifically based on movements in resources over time, and we refer to it as economic insecurity. Our measure is correlated with political attitudes, as shown in the analysis of four different datasets. However, economic insecurity as we understand it does not seem to be a synonym for a more general or social variant of insecurity. Both the BHPS and the SOEP contain questions on the fear of crime, and the SOEP on worries about terrorism. None of these variables are correlated with our economic-insecurity index, suggesting that the latter is more closely related to the economic domain. On the contrary, in the BHPS, the economic-insecurity index is correlated with right-leaning economic attitudes (increasing support for the private sector and reducing belief in the efficacy of trade unions).

We believe that these results are important. They first provide new evidence on political outcomes, showing that economic insecurity encourages political activism, but of a certain kind: support for the right. Our work employs a fairly broad measure of political preferences, by considering the political party (or position) supported. Considering the relationship between economic insecurity and more specific economic and political attitudes would seem to be a promising research area.

One salient question is why the shift to the right has taken place in recent years, rather than in the more remote past. In Figure 6, German economic insecurity from 2005 onwards is not notably higher than previously, and that in the UK has risen from the early 2000s but still remains below the figures seen in the late 1990s. It may be that insecurity matters more now (in terms of political preferences) than it did in the past, and indeed our Tables B7 and B8 reveal a stronger effect on support for the right post-2000. At the same time, our heterogeneity analysis in the UK and Germany highlighted a greater effect for younger respondents (40 or under). We called this an age effect but in fact cannot distinguish it from a cohort effect: it may well be the case that newer cohorts (and voters) coming onto the political scene are more insecurity-sensitive.

More generally, we show that the theoretical work on socio-economic index numbers can successfully be complemented by empirical research on large-scale panel datasets. This allows us to test the index's predictions and to compare the empirical performance of different indices. In this latter respect, we find that our index of economic insecurity predicts future political preferences better than a number of existing measures. Applying this same test to other indices and more general individual outcomes constitutes a useful project for the evaluation of the salience of different insecurity measures.

In conclusion, insecurity seems to provoke conservative responses. Our main finding is of the same nature as that in the research on terrorism and voting, which has mostly concluded that the former increases right-leaning support; see, for instance, Berrebi and Klor (2006), Akay, Bargain and Elsayed (2018) and Bonanno and Jost (2006). Montalvo (2011) is an exception here, suggesting that the switch to left-leaning parties following the Madrid train bombings in 2004 was instead an indictment of the ruling (conservative) party's handling of the event. While terrorism thankfully remains relatively rare, our results here show that the widespread phenomenon of individual economic insecurity is also associated with a significant shift in political preferences towards the right.

Appendix A: Proof of Theorem 1

Proof of the 'if' part of Theorem 1. That gain-loss monotonicity is satisfied follows because the values $\ell_0\delta^{t-1}$ and $g_0\delta^{t-1}$ are positive for all $\ell_0, g_0, \delta \in \mathbb{R}_{++}$ and for all $t \in \mathbb{N}$.

To see that proximity monotonicity is satisfied, let $p \in \mathbb{R}$ and $q \in \mathbb{R}_{++}$. Substituting (2) in (1) yields

$$q\left[\ell_0\delta^{t-1} - g_0\delta^t\right] \;>\; q\left[\ell_0\delta^t - g_0\delta^{t+1}\right] \;>\; 0 > \; q\left[\ell_0\delta^{t+1} - g_0\delta^t\right] \;>\; q\left[\ell_0\delta^t - g_0\delta^{t-1}\right]$$

which is equivalent to

$$\delta^{t-1}\left[\ell_0 - g_0\delta\right] \;>\; \delta^t\left[\ell_0 - g_0\delta\right] \;>\; 0 \;>\; \delta^t\left[\ell_0\delta - g_0\right] \;>\; \delta^{t-1}\left[\ell_0\delta - g_0\right]. \tag{5}$$

These inequalities are satisfied because $\delta \in (0, \min\{\ell_0/g_0, g_0/\ell_0\})$.

It is immediate that linear homogeneity and translation invariance are satisfied.

To establish quasilinearity, define the function $F^T \colon \mathbb{R}^2 \to \mathbb{R}$ by letting

$$F^T(y,z) = \begin{cases} \ell_0\delta^{T-1}(y-z) & \text{if } y \geq z, \\ g_0\delta^{T-1}(y-z) & \text{if } y < z \end{cases}$$

for all $(y,z) \in \mathbb{R}^2$.

That stationarity is satisfied follows from setting $G^r(y) = \delta^r y$ for all $r \in \mathbb{N}_0$ and for all $y \in \mathbb{R}$ in the definition of the axiom. ■

The following lemma will be of use in the 'only-if' part of the proof.

Lemma 1. *A measure of individual economic insecurity I satisfies gain-loss monotonicity, linear homogeneity, translation invariance and quasilinearity if and only if there exist functions $\ell \colon \mathbb{N} \to \mathbb{R}_{++}$ and $g \colon \mathbb{N} \to \mathbb{R}_{++}$ such that, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,*

$$I^T(x) = \sum_{\substack{t \in \{1,\ldots,T\}: \\ x_{-t} > x_{-(t-1)}}} \ell(t)\left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t \in \{1,\ldots,T\}: \\ x_{-t} < x_{-(t-1)}}} g(t)\left(x_{-t} - x_{-(t-1)}\right). \tag{6}$$

Proof of Lemma 1. 'If.' To prove that quasilinearity is satisfied, define the function $F^T \colon \mathbb{R}^2 \to \mathbb{R}$ by letting

$$F^T(y,z) = \begin{cases} \ell(T)(y-z) & \text{if } y \geq z, \\ g(T)(y-z) & \text{if } y < z \end{cases}$$

for all $(y,z) \in \mathbb{R}^2$. That the remaining axioms are satisfied is immediate.

'Only if.' Suppose that I satisfies the axioms of the lemma statement. We prove the requisite implication by inductively constructing the functions ℓ and g and showing that (6) is satisfied.

Step 1. Let $T = 1$ and $x = (x_{-1}, x_0) \in \mathbb{R}^{(1)}$.

Case (1.i). If $x_{-1} = x_0$, the application of translation invariance with $c = -x_0$ yields

$$I^1(x_{-1}, x_0) = I^1(x_0, x_0) = I^1(x_0 - x_0, x_0 - x_0) = I^1(0, 0).$$

Linear homogeneity implies that $I^1(b \cdot 0, b \cdot 0) = I^1(0, 0) = bI^1(0, 0)$ for all $b \in \mathbb{R}_{++}$ and, thus, it follows that $I^1(x_{-1}, x_0) = 0$ whenever $x_{-1} = x_0$.

Case (1.ii). If $x_{-1} > x_0$, translation invariance with $c = -x_0$ implies

$$I^1(x_{-1}, x_0) = I^1(x_{-1} - x_0, 0).$$

Using linear homogeneity with $b = x_{-1} - x_0 > 0$, it follows that

$$\begin{aligned} I^1(x_{-1}, x_0) &= I^1(x_{-1} - x_0, 0) = I^1((x_{-1} - x_0) \cdot 1, (x_{-1} - x_0) \cdot 0) \\ &= (x_{-1} - x_0) I^1(1, 0) = \ell(1)(x_{-1} - x_0), \end{aligned}$$

where $\ell(1) = I^1(1, 0)$. It follows from gain-loss monotonicity that $\ell(1) > 0$.

Case (1.iii). If $x_{-1} < x_0$, translation invariance with $c = -x_0$ implies

$$I^1(x_{-1}, x_0) = I^1(x_{-1} - x_0, 0)$$

and, using linear homogeneity with $b = -(x_{-1} - x_0) > 0$, we obtain

$$\begin{aligned} I^1(x_{-1}, x_0) &= I^1(x_{-1} - x_0, 0) = I^1(-(x_{-1} - x_0) \cdot (-1), -(x_{-1} - x_0) \cdot 0) \\ &= -(x_{-1} - x_0) I^1(-1, 0) = g(1)(x_{-1} - x_0), \end{aligned}$$

where $g(1) = -I^1(-1, 0)$. That $g(1) > 0$ follows again from gain-loss monotonicity.

Combining theses three cases, it is immediate that (6) applies for $T = 1$.

Step 2. Now suppose that $T \geq 2$ and, for all $x \in \mathbb{R}^{(T-1)}$,

$$I^{T-1}(x) = \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} > x_{-(t-1)}}} \ell(t) \left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} < x_{-(t-1)}}} g(t) \left(x_{-t} - x_{-(t-1)}\right) \tag{7}$$

where $\ell(t) > 0$ and $g(t) > 0$ for all $t \in \{1, \ldots, T-1\}$. The conjunction of quasilinearity and (7) implies that there exists a function $F^T : \mathbb{R}^2 \to \mathbb{R}$ such that, for all $x \in \mathbb{R}^{(T)}$,

$$\begin{aligned} I^T(x) &= I^{T-1}(x_{-(T-1)}, \ldots, x_0) + F^T(x_{-T}, x_{-(T-1)}) \\ &= \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} > x_{-(t-1)}}} \ell(t) \left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} < x_{-(t-1)}}} g(t) \left(x_{-t} - x_{-(t-1)}\right) \\ &+ F^T(x_{-T}, x_{-(T-1)}). \end{aligned}$$

We now construct the function F^T. Because this function only depends on x_{-T} and $x_{-(T-1)}$, we can, without loss of generality, assume that $x_0 = \ldots = x_{-(T-1)}$; this allows us to invoke the property of gain-loss monotonicity because all resource values other than x_{-T} are equal.

By assumption, I^{T-1} satisfies translation invariance. Thus, letting $c = -x_{-(T-1)}$, this axiom requires that

$$\begin{aligned} I^T(x) = I^T(x - x_{-(T-1)}\mathbf{1}_{T+1}) &= I^{T-1}(x_{-(T-1)}, \ldots, x_0) + F^T(x_{-T} - x_{-(T-1)}, 0) \\ &= I^{T-1}(x_{-(T-1)}, \ldots, x_0) + \bar{F}^T(x_{-T} - x_{-(T-1)}), \end{aligned}$$

where $\bar{F}^T(x_{-T} - x_{-(T-1)}) = F^T(x_{-T} - x_{-(T-1)}, 0)$.

Linear homogeneity implies that $\bar{F}^T\left(b(x_{-T} - x_{-(T-1)})\right) = b\bar{F}^T(x_{-T} - x_{-(T-1)})$ for all $b \in \mathbb{R}_{++}$. As in Step 1, we distinguish three cases.

Case (2.i). If $x_{-T} = x_{-(T-1)}$, linear homogeneity implies $\bar{F}^T(b \cdot 0) = b\bar{F}^T(0)$ for all $b \in \mathbb{R}_{++}$ and hence $\bar{F}^T(0) = 0$.

Case (2.ii). If $x_{-T} > x_{-(T-1)}$, linear homogeneity with $b = x_{-T} - x_{-(T-1)} > 0$ implies

$$\bar{F}^T(x_{-T} - x_{-(T-1)}) = \bar{F}^T\left((x_{-T} - x_{-(T-1)}) \cdot 1\right) = (x_{-T} - x_{-(T-1)})\bar{F}^T(1) = \ell(T)(x_{-T} - x_{-(T-1)})$$

where $\ell(T) = \bar{F}^T(1)$. Gain-loss monotonicity implies that $\ell(T) > 0$ so that the function ℓ is positive-valued.

Case (2.iii). If $x_{-T} < x_{-(T-1)}$, linear homogeneity with $b = -(x_{-T} - x_{-(T-1)}) > 0$ implies

$$\begin{aligned} \bar{F}^T(x_{-T} - x_{-(T-1)}) &= \bar{F}^T\left(-(x_{-T} - x_{-(T-1)}) \cdot (-1)\right) = -(x_{-T} - x_{-(T-1)})\bar{F}^T(-1) \\ &= g(T)(x_{-T} - x_{-(T-1)}) \end{aligned}$$

where $g(T) = -\bar{F}^T(-1)$. Again, gain-loss monotonicity implies that $g(T) > 0$ and, thus, g is positive-valued.

Combining the observations of cases (2.i) to (2.iii) and substituting back into (7), we obtain

$$\begin{aligned} I^{T-1}(x) &= \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} > x_{-(t-1)}}} \ell(t)\left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t \in \{1,\ldots,T-1\}: \\ x_{-t} < x_{-(t-1)}}} g(t)\left(x_{-t} - x_{-(t-1)}\right) \\ &+ \begin{cases} \ell(T)\left(x_{-T} - x_{-(T-1)}\right) & \text{if } x_{-T} - x_{-(T-1)} \geq 0 \\ g(T)\left(x_{-T} - x_{-(T-1)}\right) & \text{if } x_{-T} - x_{-(T-1)} < 0 \end{cases} \\ &= \sum_{\substack{t \in \{1,\ldots,T\}: \\ x_{-t} > x_{-(t-1)}}} \ell(t)\left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t \in \{1,\ldots,T\}: \\ x_{-t} < x_{-(t-1)}}} g(t)\left(x_{-t} - x_{-(t-1)}\right) \end{aligned}$$

which completes the proof of the lemma. ■

Proof of the 'only-if' part of Theorem 1. Suppose that I satisfies the required axioms. By Lemma 1, there exist functions $\ell \colon \mathbb{N} \to \mathbb{R}_{++}$ and $g \colon \mathbb{N} \to \mathbb{R}_{++}$ such that (6) is satisfied. It remains to be shown that there exist $\ell_0, g_0 \in \mathbb{R}_{++}$ and $\delta \in (0, \min\{\ell_0/g_0, g_0/\ell_0\})$ such that $\ell(t) = \ell_0\delta^{t-1}$ and $g(t) = g_0\delta^{t-1}$ for all $t \in \mathbb{N}$.

First, we identify the class of parameter functions ℓ that apply to the losses experienced in each period. This part of the proof parallels that of Theorem 4 in Blackorby, Bossert and Donaldson (1997). Let $p, p' \in \mathbb{R}_+$ be such that $p \geq p'$, and let $s = 0$. Substituting (6) in the definition of stationarity, we obtain

$$\ell(t+r+1)p' + \ell(t+r+2)(p-p') = G^r\left(\ell(t+1)p' + \ell(t+2)(p-p')\right)$$

for all $t, r \in \mathbb{N}_0$ or, setting $u^0 = p'$ and $u^1 = p - p'$,

$$\ell(t+r+1)u^0 + \ell(t+r+2)u^1 = G^r\left(\ell(t+1)u^0 + \ell(t+2)u^1\right) \tag{8}$$

for all $t, r \in \mathbb{N}_0$ and for all $u^0, u^1 \in \mathbb{R}_+$.

Now define $y = \ell(t+1)u^0$, $z = \ell(t+2)u^1$, $\overline{\ell}(t+r, y) = \ell(t+r+1)u^0$ and $\widehat{\ell}(t+r, z) = \ell(t+r+2)u^1$. Substituting, (8) implies

$$\overline{\ell}(t+r, y) + \widehat{\ell}(t+r, z) = G^r(y+z)$$

for all $t, r \in \mathbb{N}_0$ and for all $y, z \in \mathbb{R}_+$. This is a Pexider equation defined on the domain $\mathbb{R}_+$ and, by definition, the possible values of the functions $\overline{\ell}$ and $\widehat{\ell}$ (and, thus, the possible values of G^r) are bounded below by zero. Therefore, the solutions of this functional equation are such that there exist functions $d\colon \mathbb{N}_0 \to \mathbb{R}_+$ and $e\colon \mathbb{N}_0 \to \mathbb{R}_+$ such that

$$\overline{\ell}(t+r, y) = d(r)y + e(r)$$

for all $t, r \in \mathbb{N}_0$ and for all $y \in \mathbb{R}_+$; see, for instance, Aczél (1966, p. 46 and p. 142). Also, note that d and e cannot depend on t because G^r does not. Using the definition of $\overline{\ell}$, it follows that

$$\ell(t+r+1)u = d(r)\ell(t+1)u + e(r) \tag{9}$$

for all $t, r \in \mathbb{N}_0$ and for all $u \in \mathbb{R}_+$. Setting $t = 0$ in (9), it follows that

$$\ell(r+1)u = d(r)\ell(1)u + e(r) \tag{10}$$

and, therefore,

$$\ell(t+r+1)u = d(t+r)\ell(1)u + e(t+r) \tag{11}$$

for all $t, r \in \mathbb{N}_0$ and for all $u \in \mathbb{R}_+$. Setting $r = 0$ in (10), we obtain

$$\ell(1)u = d(0)\ell(1)u + e(0)$$

for all $u \in \mathbb{R}_+$. Setting $u = 0$, it follows that $e(0) = 0$. Once this is established, we can choose any $u > 0$ to conclude that $d(0) = 1$. Substituting (10) in (9), it follows that

$$\ell(t+r+1)u = d(r)\left[d(t)\ell(1)u + e(t)\right] + e(r)$$

and, together with (11),

$$d(t+r)\ell(1)u + e(t+r) = d(r)\left[d(t)\ell(1)u + e(t)\right] + e(r)$$

for all $t, r \in \mathbb{N}_0$ and for all $u \in \mathbb{R}_+$. This is equivalent to

$$\ell(1)u\left[d(t+r) - d(t)d(r)\right] = d(r)e(t) + e(r) - e(t+r)$$

for all $t, r \in \mathbb{N}_0$ and for all $u \in \mathbb{R}_+$. Because $\ell(1)$ is positive and the right side of this equation does not depend on u, both sides must be identical to zero and, therefore, it follows that

$$d(t + r) = d(t)d(r) \tag{12}$$

for all $t, r \in \mathbb{N}_0$. Setting $\delta = d(1)$, a simple induction argument together with (12) establishes that $d(t) = \delta^t$ for all $t \in \mathbb{N}$. Setting $u = 0$ in (10), it follows that $e(t) = 0$ for all $t \in \mathbb{N}_0$. Using this observation together with $d(t) = \delta^t$ in (10), we obtain

$$\ell(t + 1)u = \delta^t \ell(1)u$$

and, choosing any $u > 0$, it follows that $\ell(t + 1) = \ell(1)\delta^t$ for all $t \in \mathbb{N}_0$ or, equivalently,

$$\ell(t) = \ell_0 \delta^{t-1} \tag{13}$$

for all $t \in \mathbb{N}$, where $\ell_0 = \ell(1) > 0$. Because ℓ is positive-valued, it follows that $\delta > 0$.

To obtain the class of parameter functions g that apply to the gains experienced in each period, we can reproduce the above argument with the hypothesis that $p, p' \in \mathbb{R}_-$ are such that $p \leq p'$ (instead of the hypothesis that $p, p' \in \mathbb{R}_+$ are such that $p \geq p'$) to obtain the existence of $g_0 \in \mathbb{R}_{++}$ and $\sigma > 0$ such that

$$g(t) = g_0 \sigma^{t-1} \tag{14}$$

for all $t \in \mathbb{N}$.

We now show that $\delta = \sigma$. Using (13) and (14) in (1), proximity monotonicity requires that

$$\ell(t) - g(t + 1) = \ell_0 \delta^{t-1} - g_0 \sigma^t > 0 \quad \text{for all } t \in \mathbb{N} \tag{15}$$

and

$$\ell(t + 1) - g(t) = \ell_0 \delta^t - g_0 \sigma^{t-1} < 0 \quad \text{for all } t \in \mathbb{N}. \tag{16}$$

If $\delta < \sigma$, we can write $\sigma = a\delta$ with $a = \sigma/\delta > 1$. Substituting in (15), we obtain

$$\delta^{t-1}(\ell_0 - g_0 a^t \delta) > 0 \quad \text{for all } t \in \mathbb{N}$$

which, because $\delta^{t-1} > 0$, is equivalent to

$$g_0 a^t \delta < \ell_0 \quad \text{for all } t \in \mathbb{N}.$$

But this is impossible because $a > 1$ implies that $g_0 a^t \delta$ approaches infinity as t goes to infinity and, therefore, this expression cannot be bounded above by the finite number ℓ_0.

Analogously, if $\delta > \sigma$, we can write $\sigma = a\delta$ with $a = \sigma/\delta < 1$. Substituting in (16), we obtain

$$\delta^{t-1}(\ell_0 \delta - g_0 a^{t-1}) < 0 \quad \text{for all } t \in \mathbb{N}$$

which, because $\delta^{t-1} > 0$, is equivalent to

$$g_0 a^{t-1} > \ell_0 \delta \quad \text{for all } t \in \mathbb{N}.$$

Again, this is impossible because $a < 1$ implies that $g_0 a^{t-1}$ approaches zero as t goes to infinity and, therefore, this expression cannot be bounded below by the positive number $\ell_0 \delta$.

Therefore, it must be the case that $\delta = \sigma$. Substituting in (5), proximity monotonicity requires that $\delta < \ell_0/g_0$ and $\delta < g_0/\ell_0$, which completes the proof. ■

The following examples show that the axioms used in the theorem are independent.

(a) Let $\ell_0 = -1$, $g_0 = -15/16$ and $\delta = 9/10$ in (2). The resulting index satisfies all of our axioms except gain-loss monotonicity.

(b) Let $\ell_0 = 1$, $g_0 = 4/5$ and $\delta = 9/10$ in (2). The resulting index satisfies all of our axioms except proximity monotonicity.

(c) Let $\delta \in (0,1)$ and define, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,

$$I^T(x) = \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} > x_{-(t-1)}}} \delta^{t-1} \left(x_{-t} - x_{-(t-1)}\right)^3 + \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} < x_{-(t-1)}}} \delta^{t-1} \left(x_{-t} - x_{-(t-1)}\right)^3.$$

This index satisfies all of our axioms except linear homogeneity.

(d) Let $\delta \in (0,1)$ and define, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,

$$I^T(x) = \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} > x_{-(t-1)}}} \delta^{t-1} \left(x_{-t}^3 - x_{-(t-1)}^3\right)^{1/3} - \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} < x_{-(t-1)}}} \delta^{t-1} \left(x_{-(t-1)}^3 - x_{-t}^3\right)^{1/3}.$$

This index satisfies all of our axioms except translation invariance.

(e) Let $\delta \in (0,1)$ and define, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,

$$I^T(x) = \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} > x_0}} \delta^{t-1} \left(x_{-t} - x_0\right) + \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} < x_0}} \delta^{t-1} \left(x_{-t} - x_0\right).$$

This index satisfies all of our axioms except quasilinearity.

(f) Define, for all $T \in \mathbb{N}$ and for all $x \in \mathbb{R}^{(T)}$,

$$I^T(x) = \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} > x_{-(t-1)}}} \frac{1}{2t-1} \left(x_{-t} - x_{-(t-1)}\right) + \sum_{\substack{t\in\{1,\ldots,T\}: \\ x_{-t} < x_{-(t-1)}}} \frac{1}{2t-1} \left(x_{-t} - x_{-(t-1)}\right).$$

This index satisfies all of our axioms except stationarity.

Appendix B: Additional Tables

Table B1: Descriptive statistics – BHPS

	Mean	SD	Min	Max
Political Preferences:				
Conservatives [R]	0.18		0	1
Labour [L]	0.11		0	1
Liberal [L]	0.33		0	1
Other Party	0.10		0	1
No Pol. Pref.	0.27		0	1
Sociodemographic Variables:				
Equivalized HH Income (log)	10.25	0.68	2.72	12.90
Economic Insecurity	-1,968.28	5439.45	-14997.38	14999.84
Homeowner	0.78		0	1
Age	41.29	11.46	19	65
Female	0.54		0	1
Married	0.63		0	1
Separated	0.02		0	1
Divorced	0.10		0	1
Widowed	0.01		0	1
Never Married	0.24		0	1
No. Children	0.76	1.04	0	8
Employed	0.79		0	1
Unemployed	0.03		0	1
Out of the Labor Force	0.18		0	1
Observations	67844			

Notes: [R] and [L] respectively indicate whether the party is right-leaning or left-leaning based on the average position of the party in terms of its overall ideological stance and the classification in Hix and Lord (1997). (Source: 1999-2014 Chapel Hill Expert Survey.)

Table B2: Descriptive statistics – SOEP

	Mean	SD	Min	Max
Political Preferences:				
CDU/CSU [R]	0.15		0	1
FDP [R]	0.02		0	1
SPD [L]	0.16		0	1
The Greens [L]	0.05		0	1
Die Linke [L]	0.02		0	1
Other Party	0.02		0	1
No Party	0.58		0	1
Sociodemographic Variables:				
Equivalized HH Income (log)	10.38	0.56	0.69	12.94
Economic Insecurity	-1,738.81	6,230.22	-29,978.79	29,979.42
Homeowner	0.50		0	1
Age	42.40	11.31	20	65
Female	0.52		0	1
Married	0.68		0	1
Separated	0.02		0	1
Divorced	0.07		0	1
Widowed	0.01		0	1
Never Married	0.22		0	1
Number of Children in HH	0.74	0.96	0	10
Employed	0.78		0	1
Unemployed	0.06		0	1
Out of the Labor Force	0.16		0	1
Observations	209600			

Notes: [R] and [L] respectively indicate whether the party is right-leaning or left-leaning based on the average position of the party in terms of its overall ideological stance and the classification in Hix and Lord (1997). (Source: 1999-2014 Chapel Hill Expert Survey.)

Table B3: Transition matrix – BHPS

		Party supported at t					
		Conservatives [R]	Liberal/SPD [L]	Labour [L]	Other Party	No Pol. Pref.	Total
Party supported at $t-1$	Conservatives [R]	**9969**	337	530	195	1509	12540
		(79.5)	(2.7)	(4.2)	(1.6)	(12.0)	
	Liberal/SPD [L]	433	**4869**	830	278	1189	7599
		(5.7)	**(64.1)**	(10.9)	(3.7)	(15.6)	
	Labour [L]	569	862	**17739**	488	2988	22646
		(2.5)	(3.8)	**(78.3)**	(2.2)	(13.2)	
	Other Party	187	211	400	**5131**	1083	7012
		(2.7)	(3.0)	(5.7)	**(73.2)**	(15.4)	
	No Pol. Pref.	1,489	969	2119	1103	**12367**	18047
		(8.2)	(5.4)	(17.7)	(6.1)	**(68.5)**	
	Total	12647	7248	21618	7195	19136	67844

Notes: The parentheses contain the row percentages. [R] and [L] respectively indicate whether the party is right-leaning or left-leaning based on the average position of the party in terms of its overall ideological stance and the classification in Hix and Lord (1997). (Source: 1999-2014 Chapel Hill Expert Survey.)

Table B4: Transition matrix – SOEP

		Party supported at t							
		CDU/ CSU [R]	FDP [R]	SPD [L]	The Greens [L]	Die Linke [L]	Other Party	No Pol. Pref.	Total
Party supported at $t-1$	CDU/ CSU [R]	**24534** **(75.7)**	351 (1.1)	473 (1.5)	119 (0.4)	46 (0.1)	262 (0.8)	6,602 (20.4)	32387
	FDP [R]	453 (13.4)	**1937** **(56.4)**	86 (2.5)	32 (0.9)	13 (0.4)	38 (1.1)	842 (24.8)	3391
	SPD [L]	554 (1.58)	112 (0.3)	**24974** **(71.2)**	852 (2.4)	223 (0.6)	314 (0.9)	8067 (23.0)	35096
	The Greens [L]	103 (0.9)	113 (1.1)	729 (6.7)	**7,570** **(70.1)**	124 (1.2)	217 (2.0)	1944 (18.0)	10800
	Die Linke [L]	37 (0.79)	15 (0.3)	230 (4.9)	209 (4.5)	**2933** **(62.7)**	97 (2.1)	1153 (24.7)	4674
	Other Party	0 (0.00)	0 (0.00)	0 (0.00)	206 (11.1)	105 (5.6)	**1553** **(83.3)**	0 (0.00)	1864
	No Pol. Pref.	6631 (5.46)	733 (0.6)	7414 (6.1)	1984 (1.6)	1121 (0.9)	1314 (1.1)	**102191** **(84.2)**	121388
	Total	32312	3251	33906	10972	4565	3795	120799	209600

Notes: The parentheses contain the row percentages. [R] and [L] respectively indicate whether the party is right-leaning or left-leaning based on the average position of the party in terms of its overall ideological stance and the classification in Hix and Lord (1997). (Source: 1999-2014 Chapel Hill Expert Survey.)

Table B5: Economic insecurity and probability of supporting any party: Logit results with all controls – BHPS and SOEP

	BHPS	SOEP
Economic Insecurity (std)	0.008***	0.010***
	(0.002)	(0.002)
Log(Eq. HH Income) (std)	0.025***	0.032***
	(0.002)	(0.004)
Homeowner (dummy)	0.025***	0.027***
	(0.005)	(0.006)
Age	0.007***	0.005***
	(0.000)	(0.000)
Female	-0.030***	-0.073***
	(0.003)	(0.004)
No. children	-0.006***	-0.010***
	(0.002)	(0.003)
High Education	0.095***	
	(0.005)	
Secondary Education	0.041***	
	(0.006)	
Years of Education		0.038***
		(0.001)
Married	-0.019***	-0.022***
	(0.005)	(0.009)
Separated	-0.069***	-0.010
	(0.011)	(0.014)
Divorced	-0.046***	-0.018
	(0.044)	(0.011)
Widowed	-0.088***	-0.023
	(0.015)	(0.021)
Employed	-0.014***	-0.023***
	(0.005)	(0.006)
Unemployed	-0.018	-0.036***
	(0.011)	(0.007)
N	67844	209600
Likelihood	-38563	-132737

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The non-reported control variables include the wave dummies, region dummies and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B6: Economic insecurity and political preferences: Multinomial logit results – West and East Germany

	SOEP						
	CDU CSU	FDP	SPD	The Greens	Die Linke	Other Party	No Pol. Pref.
Panel A: Whole Sample							
Econ. Insec. (std)	0.012***	0.002***	-0.002	-0.000	-0.003***	-0.000	-0.010***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)
Log(Eq. HH Inc.) (std)	0.035***	0.007***	-0.002	-0.001	-0.004***	-0.001**	-0.032***
	(0.004)	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.004)
Homeowner (dummy)	0.065***	0.002	-0.024***	-0.003	-0.010***	-0.001	-0.027***
	(0.005)	(0.001)	(0.005)	(0.003)	(0.002)	(0.001)	(0.006)
Observations				209600			
Log Likelihood				-244132			
Panel B: West Germany							
Econ. Insec. (std)	0.013***	0.002***	-0.004**	-0.001	-0.001***	-0.001	-0.008***
	(0.002)	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.002)
Log(Eq. HH Inc.) (std)	0.039***	0.008***	-0.006*	-0.002	-0.002***	-0.002***	-0.034***
	(0.004)	(0.001)	(0.004)	(0.002)	(0.000)	(0.001)	(0.004)
Homeowner (dummy)	0.068***	0.003*	-0.025***	-0.002	-0.005***	-0.001	-0.038***
	(0.006)	(0.002)	(0.007)	(0.003)	(0.001)	(0.001)	(0.007)
Observations				162575			
Log Likelihood				-193062			
Panel C: East Germany							
Econ. Insec. (std)	0.015***	0.001	0.002	0.001	-0.003	0.002**	-0.019***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.004)
Log(Eq. HH Inc.) (std)	0.026***	0.005**	0.012**	-0.000	-0.009**	0.001	-0.035***
	(0.007)	(0.002)	(0.005)	(0.003)	(0.004)	(0.002)	(0.008)
Homeowner (dummy)	0.049***	-0.002	-0.014**	-0.007	-0.028***	-0.002	0.004
	(0.010)	(0.003)	(0.007)	(0.004)	(0.008)	(0.003)	(0.013)
Observations				47025			
Log Likelihood				-50437			

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B7: Economic insecurity and political preferences: Multinomial logit results – Before and after 2000 in BHPS

	Conserv.	Liberal	Labour	Other	No Pol. Pref.
Panel A: Before 2000					
Economic Insecurity (std)	0.006	0.003	-0.007	-0.002	0.000
	(0.004)	(0.003)	(0.005)	(0.002)	(0.004)
Log(Eq. HH Income) (std)	0.028***	-0.003	-0.004	-0.004***	-0.017***
	(0.005)	(0.003)	(0.005)	(0.001)	(0.004)
Homeowner (dummy)	0.044***	0.012*	-0.027**	-0.003	-0.026***
	(0.009)	(0.007)	(0.012)	(0.005)	(0.010)
Observations			19660		
Log Likelihood			-26150		
Panel B: After 2000					
Economic Insecurity (std)	0.012***	0.001	-0.000	-0.002	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log(Eq. HH Income) (std)	0.022***	0.002	0.010***	-0.005**	-0.030***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Homeowner (dummy)	0.054***	0.018***	-0.055***	0.004	-0.021***
	(0.005)	(0.004)	(0.006)	(0.004)	(0.006)
Observations			47884		
Log Likelihood			-63538		

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B8: Economic insecurity and political preferences: Multinomial logit results – Before and after 2000 in SOEP

	CDU CSU	FDP	SPD	The Greens	Die Linke	Other Party	No Pol. Pref.
Panel A: Before 2000							
Econ. Insec. (std)	0.009***	0.002**	-0.005*	0.000	-0.002**	0.001	-0.004
	(0.003)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.004)
Log(Eq. HH Inc.) (std)	0.029***	0.006***	-0.014***	-0.002	-0.003***	-0.001*	-0.015**
	(0.006)	(0.002)	(0.005)	(0.002)	(0.001)	(0.001)	(0.006)
Homeowner (dummy)	0.090***	0.005***	-0.028***	0.001	-0.006***	0.000	-0.062***
	(0.008)	(0.002)	(0.009)	(0.003)	(0.002)	(0.001)	(0.009)
Observations				72732			
Log Likelihood				-82142			
Panel B: After 2000							
Econ. Insec. (std)	0.014***	0.002***	-0.002	-0.001	-0.001*	-0.000	-0.012***
	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Log(Eq. HH Inc.) (std)	0.040***	0.009***	0.003	-0.002	-0.005***	-0.001*	-0.044***
	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)	(0.001)	(0.004)
Homeowner (dummy)	0.049***	0.000	-0.020***	-0.006*	-0.012***	-0.001	-0.009
	(0.006)	(0.002)	(0.006)	(0.004)	(0.003)	(0.002)	(0.007)
Observations				136868			
Log Likelihood				-161271			

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B9: Economic insecurity and probability of supporting any party: Logit results – Heterogeneity in BHPS and SOEP

Panel A: BHPS	Males	Females	Married	Not Married	Children	No Children	Below Age 40	Above Age 40
Economic Insecurity (std)	0.005*	0.011***	0.013***	0.002	0.023***	0.001	0.012***	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Log(Eq. HH Income) (std)	0.024***	0.027***	0.028***	0.025***	0.039***	0.016***	0.039***	0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Homeowner (dummy)	0.016**	0.035***	0.028***	0.025***	0.031***	0.022***	0.012	0.028***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.012)	(0.006)	(0.010)	(0.006)
Observations	31124	36720	42306	25538	28563	39281	32819	35025
Log Likelihood	-17029	-21455	-23183	-15300	-16899	-21580	-19947	-18490
Panel B: SOEP	Males	Females	Married	Not Married	Children	No Children	Below Age 40	Above Age 40
Economic Insecurity (std)	0.006***	0.012***	0.014***	0.006**	0.013***	0.008***	0.008***	0.011***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Log(Eq. HH Income) (std)	0.025***	0.038***	0.058***	0.014***	0.044***	0.028***	0.011**	0.055***
	(0.005)	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.004)	(0.005)
Homeowner (dummy)	0.027***	0.026***	0.038***	-0.003	0.034***	0.018**	0.013*	0.043***
	(0.008)	(0.007)	(0.008)	(0.009)	(0.009)	(0.008)	(0.007)	(0.008)
Observations	100433	109167	141574	68026	92623	116977	92077	117523
Log Likelihood	-65263	-67308	-89693	-42722	-57315	-75286	-56750	-75650

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B10: Economic insecurity and the probability of supporting the right: Multinomial logit results – Heterogeneity in BHPS and SOEP

Panel A: BHPS	Males	Females	Married	Not Married	Children	No Children	Below Age 40	Above Age 40
Economic Insecurity (std)	0.010***	0.011***	0.015***	0.005*	0.017***	0.006**	0.013***	0.006**
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Log(Eq. HH Income) (std)	0.024***	0.023***	0.036***	0.010***	0.030***	0.020***	0.026***	0.022***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Homeowner (dummy)	0.059***	0.043***	0.055***	0.048***	0.061***	0.049***	0.050***	0.050***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.009)	(0.007)	(0.010)	(0.006)
Observations	31124	36720	42306	25538	28563	39281	32819	35025
Log Likelihood	-41434	-48082	-55869	-33603	-36981	-52512	-42720	-46636
Panel B: SOEP	Males	Females	Married	Not Married	Children	No Children	Below Age 40	Above Age 40
Economic Insecurity (std)	0.013***	0.011***	0.014***	0.010***	0.013***	0.012***	0.009***	0.018***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Log(Eq. HH Income) (std)	0.038***	0.033***	0.046***	0.024***	0.044***	0.035***	0.026**	0.368***
	(0.005)	(0.004)	(0.005)	(0.003)	(0.006)	(0.004)	(0.004)	(0.004)
Homeowner (dummy)	0.064***	0.066***	0.079***	0.039***	0.075***	0.056***	0.050***	0.062***
	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.005)	(0.009)
Observations	100433	109167	141574	68026	92623	116977	92077	117523
Log Likelihood	-117455	-111981	-156278	-73012	-97295	-132140	-94676	-134246

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B11: Economic insecurity and probability of supporting any party: Logit results – Robustness checks in BHPS and SOEP

	Support any Party in t				Interest in politics in t	
	BHPS (1)	SOEP (2)	BHPS (3)	SOEP (4)	BHPS (5)	SOEP (6)
Econ. Insec. (std)	0.005***	0.005***	0.007***	0.010***	0.013***	0.013***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)
Log(Eq. HH Inc.) (std)	0.014***	0.016***	0.024***	0.030***	0.073***	0.052***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.005)	(0.006)
Homeowner (dummy)	0.017***	0.013***	0.022***	0.026***	0.021*	0.046***
	(0.005)	(0.003)	(0.006)	(0.006)	(0.011)	(0.010)
Controlling for:						
Political pref. in $t-2$	✓	✓	.	.	.	.
Life Satisfaction	.	.	✓	✓	.	.
Observations	67844	209600	62151	209600	48109	206152
Log Likelihood	-32040	-102420	-35224	-132666	.	.
Adjusted R^2	.	.	.	.	0.129	0.192

Notes: Columns (1)-(4) come from logit regressions, and columns (5) and (6) from OLS regressions of the four-point interest in politics variables. The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B12: Economic insecurity and probability of supporting any party: Logit results – Other insecurity measures in BHPS and SOEP

	Support any Party in t									
	BHPS					SOEP				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Econ. Insec. (std)	0.008***					0.010***				
	(0.002)					(0.002)				
Hacker's Index (dummy)		0.003					0.023***			
		(0.006)					(0.005)			
Variance HH Income (std)			0.003					0.006**		
			(0.002)					(0.003)		
$\Delta\ Y_{t-1}$ (std)				-0.003*					-0.006***	
				(0.002)					(0.001)	
Trend (std)					-0.007***					-0.007***
					(0.002)					(0.002)
Log(Eq. HH Inc.) (std)	0.025***	0.022***	0.021***	0.022***	0.024***	0.032***	0.028***	0.025***	0.028***	0.030***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Homeowner (dummy)	0.025***	0.026***	0.026***	0.026***	0.025***	0.027***	0.028***	0.029***	0.028***	0.028***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Observations	67844	67844	67844	67844	67844	209600	209600	209600	209600	209600
Log Likelihood	-38563	-38573	-38571	-38571	-38566	-132737	-132754	-132759	-132755	-132751

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B13: Economic insecurity and the probability of supporting any party: Logit results – Mechanisms in BHPS and SOEP

Panel A: BHPS	Separation	No Separation	Unemp.	No Unemp.	Change in No. Children	No Change in No. Children	Health Shock	No Health Shock	At least one Event	None of the Events
Economic Insecurity	0.004	0.009***	0.017**	0.007***	0.022***	0.002	0.016***	0.002	0.015***	-0.004
(std)	(0.010)	(0.002)	(0.007)	(0.002)	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Log(Eq. HH Income)	0.025**	0.025***	0.016**	0.026***	0.040***	0.020***	0.032***	0.019***	0.030***	0.014***
(std)	(0.012)	(0.002)	(0.006)	(0.002)	(0.005)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)
Homeowner	-0.027	0.026***	0.095***	0.020***	0.024***	0.023***	0.040***	0.019***	0.033***	0.015**
(dummy)	(0.031)	(0.006)	(0.020)	(0.006)	(0.012)	(0.006)	(0.013)	(0.007)	(0.009)	(0.008)
Observations	2431	65413	5238	62606	20952	47252	13601	39983	27067	26517
Log Likelihood	-1495	-37019	-3199	-35316	-12079	-26419	-7844	-22073	-15616	-14285
Panel B: SOEP	Separation	No Separation	Unemp.	No Unemp.	Change in No. Children	No Change in No. Children	Health Shock	No Health Shock	At least one Event	None of the Events
Economic Insecurity	0.010	0.010***	0.015***	0.009***	0.014***	0.009***	0.009***	0.011***	0.011***	0.010***
(std)	(0.007)	(0.002)	(0.007)	(0.002)	(0.005)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
Log(Eq. HH Income)	0.036***	0.032***	0.019***	0.034***	0.028***	0.033***	0.044***	0.036***	0.039***	0.038***
(std)	(0.007)	(0.004)	(0.006)	(0.004)	(0.009)	(0.004)	(0.006)	(0.04)	(0.005)	(0.005)
Homeowner	0.028	0.027***	0.018	0.027***	0.025**	0.027***	0.025***	0.009	0.021***	0.009
(dummy)	(0.020)	(0.007)	(0.012)	(0.007)	(0.012)	(0.007)	(0.009)	(0.007)	(0.008)	(0.008)
Observations	7063	202537	23322	186278	27719	181881	43951	113007	67568	89391
Log Likelihood	-4437	-128245	-13565	-119093	-17049	-115614	-27331	-71572	-41702	-571999

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B14: Economic insecurity and probability of supporting a right-leaning party: Multinomial Logit results – Mechanisms in BHPS and SOEP

Panel A: BHPS	Separation	No Separation	Unemp.	No Unemp.	Change in No. Children	No Change in No. Children	Health Shock	No Health Shock	At least one Event	None of the Events
Economic Insecurity	0.003	0.012***	0.003	0.012***	0.018***	0.008***	0.017***	0.008***	0.014***	0.005*
(std)	(0.007)	(0.002)	(0.005)	(0.002)	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Log(Eq. HH Income)	0.022**	0.027***	0.011**	0.029***	0.038***	0.025***	0.030***	0.026***	0.033***	0.029***
(std)	(0.010)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)	(0.004)
Homeowner	0.009	0.054***	0.046***	0.052***	0.071***	0.045***	0.042***	0.057***	0.057***	0.051***
(dummy)	(0.022)	(0.005)	(0.012)	(0.005)	(0.009)	(0.005)	(0.009)	(0.006)	(0.007)	(0.007)
Observations	2431	65413	5238	62606	20952	47252	13601	39983	27067	26517
Log Likelihood	-3058	-84220	-1555	-87367	-9424	-79473	-17602	-54155	-15614	-73297
Panel B: SOEP	Separation	No Separation	Unemp.	No Unemp.	Change in No. Children	No Change in No. Children	Health Shock	No Health Shock	At least one Event	None of the Events
Economic Insecurity	0.009	0.012***	0.005	0.013***	0.018***	0.011***	0.012***	0.014***	0.012***	0.014***
(std)	(0.005)	(0.002)	(0.003)	(0.002)	(0.004)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Log(Eq. HH Income)	0.023***	0.036***	0.012***	0.038***	0.037***	0.036***	0.039***	0.039***	0.035***	0.041***
(std)	(0.008)	(0.004)	(0.004)	(0.004)	(0.007)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
Homeowner	0.030**	0.066***	0.048***	0.066***	0.063***	0.065***	0.051***	0.055***	0.049***	0.057***
(dummy)	(0.013)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)
Observations	7063	202537	23322	186278	27719	181881	43951	113007	67568	89391
Log Likelihood	-7434	-222276	-20642	-208404	-28593	-201044	-47177	-125679	-71207	-101670

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The control variables include age, gender, education, marital status, the number of children, wave dummies, region dummies, labor-force status and dummies for unemployment over the past four years. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B15: Descriptive statistics – UAS

	Mean	SD	Min	Max
Political Preferences:				
Probability to Vote	84.85	31.74	0	100
Probability to Vote for Trump	44.03	45.29	0	100
Probability to Vote for Clinton	39.90	44.60	0	100
Probability to Vote for Other	16.02	32.03	0	100
Sociodemographic Variables:				
Equivalized HH Income (log)	9.72	1.29	6.20	12.40
Economic Insecurity	-99.07	1086.91	-4990.56	4964.77
Age	42.11	11.22	18	65
Female	0.60		0	1
White	0.86		0	1
No college degree	0.49		0	1
College degree	0.37		0	1
More than College degree	0.13		0	1
Married	0.59		0	1
Separated	0.02		0	1
Divorced	0.14		0	1
Widowed	0.01		0	1
No. HH Members	2.98	1.48	1	11
Employed	0.72		0	1
Unemployed	0.08		0	1
Out of the Labor Force	0.20		0	1
Observations	2361			

Table B16: Economic insecurity, voting behavior and political preferences: OLS results with full controls - UAS

	OLS - Probability to Vote (0-100):			
	Election	Trump	Clinton	Other
Economic Insecurity (std)	0.665	2.128**	-1.682*	-0.444
	(0.645)	(0.937)	(0.983)	(0.604)
Log(Eq. HH Income) (std)	1.492**	0.110	0.860	-1.005
	(0.728)	(1.082)	(1.068)	(0.741)
Age	0.315***	0.071	0.205**	-0.282***
	(0.066)	(0.098)	(0.097)	(0.069)
Female	0.438	-5.469***	6.053***	-0.639
	(1.366)	(2.031)	(1.994)	(1.386)
White	-2.924	36.879***	-37.189***	0.622
	(2.035)	(2.542)	(2.980)	(2.018)
High Education	-9.408***	22.962***	-21.041***	-1.849
	(2.114)	(3.056)	(3.164)	(2.247)
Secondary Education	-0.883	12.280***	-13.151***	0.766
	(2.099)	(3.051)	(3.204)	(2.214)
Married	3.138*	14.988***	-17.921***	3.218*
	(1.779)	(2.539)	(2.670)	(1.838)
Separated	-3.192	7.635	-9.489	2.207
	(4.852)	(6.588)	(6.123)	(4.437)
Divorced	0.474	10.296***	-14.219***	4.282*
	(2.407)	(3.434)	(3.538)	(2.417)
Widowed	4.739	16.032*	-25.568***	10.033
	(5.758)	(8.884)	(8.227)	(6.948)
Employed	3.799**	2.639	-2.104	-0.290
	(1.727)	(2.553)	(2.560)	(1.810)
Unemployed	-1.064	4.813	-1.065	-3.449
	(2.763)	(4.102)	(4.150)	(2.552)
Observations	2367	2367	2367	2367
Adjusted R^2	0.081	0.196	0.193	0.040

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The non-reported control variables include wave dummies, region dummies and dummies for unemployment over the past five observations. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

Table B17: Descriptive statistics – UKHLS

	Mean	SD	Min	Max
Political Preferences:				
Leave the EU	0.41		0	1
Sociodemographic Variables:				
Equivalized HH Income (log)	10.08	0.60	3.91	11.87
Economic Insecurity	-2304.54	10180.34	-44663.60	33999.38
Homeowner	0.73		0	1
Age	42.87	10.74	19	65
Female	0.57		0	1
Married	0.59		0	1
Separated	0.02		0	1
Divorced	0.09		0	1
Widowed	0.01		0	1
Never Married	0.30		0	1
Number of Children in HH	0.77	1.03	0	9
Employed	0.82		0	1
Unemployed	0.04		0	1
Out of the Labor Force	0.14		0	1
Observations	13381			

Table B18: Economic insecurity and the probability of supporting Brexit: Logit results with full controls – UKHLS

	Leave the EU
Economic Insecurity (std)	0.010**
	(0.005)
Log(Eq. HH Income) (std)	-0.066***
	(0.006)
Homeowner (dummy)	-0.065***
	(0.006)
Age	0.005***
	(0.000)
Female	-0.066***
	(0.007)
No. children	0.001
	(0.005)
High Education	-0.040***
	(0.004)
Secondary Education	-0.026***
	(0.005)
Married	0.029**
	(0.013)
Separated	0.027
	(0.029)
Divorced	0.075***
	(0.018)
Widowed	-0.004
	(0.043)
Employed	-0.023*
	(0.013)
Unemployed	0.044*
	(0.024)
Observations	13381
Log Likelihood	-8626

Notes: The standard errors in parentheses are clustered at the household level. The figures are marginal effects. The non-reported control variables include wave dummies, region dummies and dummies for unemployment over the past five observations. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$.

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