What's the Half-Life of the Economic Vote?
(About a Year and a Half)[*]

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Abstract

One long-standing assumption dominates economic voting research: that voters are retrospective and myopic. Recent research attempts to test this assumption and to estimate a time frame for voters' economic perceptions. But the methods that this research uses face serious problems. To overcome this, I specify a new type of model that allows the economic vote to decay as voters' economic time frames increase. Consistent with voter myopia, I find that the economic vote is strongest where this time frame is shortest. After one and a half years, the economic voting effect falls by half. After five years, it becomes practically-equivalent to zero. This suggests two implications. First, that economic conditions at the time of the election matter most when it comes to deciding the incumbent's fate. Second, that governments receive undeserved leeway on economic policies that they implement early in their terms.

Keywords: Economic voting; Retrospective voting; Bayesian methods.

Introduction

In 1992, MacKuen, Erikson, and Stimson argued that economic voting research had moved "little beyond introspection in understanding the processes by which citizens come to perceive economic movement" (MacKuen, Erikson, and Stimson 1992, 597). Three decades later, and we remain none the wiser. Just like the early-1990s, most economic voting scholars now believe that voters are both retrospective and myopic. And — again like the early-1990s — most economic voting scholars still do not know just *how retrospective* or *how myopic* these voters really are.

Instead, ad-hoc assumptions fill the void. As a result, the time frames that economic voting scholars expect voters to use vary from one study to the next. To appreciate the full range of assumptions on offer, consider the following examples. Some economic voting scholars assume that voters respond to economic change that takes place only in the year before an election (Bloom and Price 1975; Kramer 1971). Others, instead, assume that voters respond to the difference between the average economic growth in the first three quarters of the election year compared to the annual average of the previous year (Lewis-Beck, Martini, and Kiewiet 2013). Likewise, some assume that voters' economic perceptions come with a one year lead time (Dassonneville and Hooghe 2017). Others do not and assume instead that voters respond to simple year-on-year (Palmer and Whitten 2011; Clarke, Stewart, and Zuk 1986; Goodhart and Bhansali 1970), quarter-on-quarter (Lanoue 1987), or month-on-month (Lebo and Cassino 2007) changes in the state of the economy. Clearly, not all of these time frames can be correct at the same time.

To address this problem, I specify a new model that estimates both the economic vote and voter myopia at the same time. Data come from two sources. The first is individual-level voting intention data from the British Election Study Continuous Monitoring Survey. The second is aggregate-level economic statistics from the UK's Office for National Statistics. To model voter myopia, I rely on insights from the physical sciences. In particular, I borrow the concept of a "half-life" from biology and nuclear physics. Like a hour, a minute, or a second, a half-life is a unit of time. But unlike these measures it does not reflect a fixed interval. Rather, it reflects the average amount of time that it takes for a quantity to decay to half of its original value. Ordinarily, scientists would use the associated equation to estimate how much time it might take for radioactive decay to deplete the mass of a block of uranium or for the body's various physiological mechanisms to remove a dosage of a drug from a patient's body. That is to say, to estimate the half-life of a substance. Here, I use the equation to estimate the half-life of a parameter instead. Namely, the economic vote itself.

My findings are consistent with voter retrospection and voter myopia: voters respond most strongly to economic change in the recent past. As the time window between the past and the present increases, any economic voting effects being to peter out. After one and half years, they reach their half-life and fall to half of their initial strength. After five years, they become practically equivalent to zero. Consequently, we should not expect voters to judge governments based on the cumulative economic change during their time in office (Healy and Lenz 2014; Hibbs 2006). Rather, we should expect them to judge governments based on the state of the economy when it comes time to vote.

These results suggest two implications. The first is that governments may receive undeserved leeway for any economic downturns that take place when they first come to power. Thus, the electoral consequences of poor economic management are likely to be small so long as it occurs far enough away from the next election. The second is that economic myopia might lead voters to opt not for the party best able to *manage* the economy, but instead the one best able to *manipulate* it. Governments might, therefore, seek to time economic rallies around election events to improve their chances of winning, rather than seek to manage the economy to the benefit of all citizens all of the time. That said, it remains possible that economic downturns might affect incumbent support in other ways. For example, they might still have long-term consequences where they condition voters' perceptions of party competence (Fieldhouse, Green, Evans, Mellon, Prosser, et al. 2020).

How Retrospective are Retrospective Voters?

It seems reasonable to expect voters to forget all sorts of details that political scientists might consider important. After all, voters often show little to no interest in politics (Zaller 1992; Campbell et al. 1960), no one has a perfect memory, and to forget past events appears to be a fundamental aspect of how humans process information (Ariely and Carmon 2000).

Presumably, this is ever truer for complicated topics like the economy. Not only are there no end of important figures to keep track of, these figures also often change value, are subject to revision, and relate to one another in all manner of different ways. To make matters worse, most voters receive little to no formal education in economics. No wonder then that voters sometimes appear not to know what state the economy is really in (Paldam and Nannestad 2000), at least not without a little help (Ansolabehere, Meredith, and Snowberg 2013). As a result, it would be very unusual if they were able to retain far-reaching and detailed memories of the economy's every ebb and flow.

Though the economic voting literature now spans more than 600 articles and books (Lewis-Beck and Costa Lobo 2017), little of this research investigates voter myopia. Instead, it glosses over it and simply assumes that voters have economic time frames of a year or less. The few pieces of research that do engage with this problem tend to do so in one of two ways: a voter-centric approach that relies on individual-level data and experimental methods or an electorate-centric approach that relies on aggregate-level time series data instead. Each has its own strengths and weaknesses, and comparing findings from one to the other can be difficult. Even so, they tend to come to the same conclusion: that voters' economic time frames are short. Still, how short remains in question.

Voter-Centric Research

Stiers, Dassonneville, and Lewis-Beck (2019) provide a useful starting point as they are perhaps the only scholars to hold that voters are "attentive to the government's performance in the long run as well as the short" (p.647). Their argument hinges on voter psychology. They claim that proponents of voter myopia make the implicit assumption that voters engage in memory-based information processing. Here, voters store information (e.g. economic conditions) in memory until such time as

it is needed (e.g. to form an economic perception). As they note, storing such information over a government's entire term is clearly burdensome, to say the least. Instead, they contend that voters rely on online processing where they update they beliefs as though maintaining a running tally.

My own view is that it is unclear why information processing style should influence voter myopia. I make this point because retrospective voting under either memory-based or online processing requires exactly the same amount of information. A running tally is certainly more efficient than cataloguing events if one's intention is to maintain a belief about the *present* state of the economy. But that is not the task at hand. Instead, to "ascertain whether the incumbents have performed poorly or well, citizens need only calculate *the changes* in their own welfare" (Fiorina 1981, 5, emphasis own). That is, voters must ask themselves the same question that Ronald Reagan posed during the 1980 US Presidential election campaign, "Are you better off than you were four years ago?". Note that this requires not one but two pieces of information: *present* and *past* conditions. Thus, voters must either retain two specific memories (if we assume memory-based processing) or instead two running tallies (if we assume online processing). As such, both approaches to information processing appear equally demanding.

Stiers, Dassonneville, and Lewis-Beck (2019) test their argument by using panel data from the Netherlands and the US to model incumbent voting as a function of voters' current and past satisfaction with the government in one model and their current and past satisfaction with the economy in another. Yet, again, these models do not reflect retrospective voting theory. To see why, consider the following simple retrospective voting model:

$$Vote_i \sim \text{Bernoulli}(\pi_i)$$
$$logit(\pi_i) = \alpha + \beta(C_0 - C_t)$$

Consistent with Fiorina (1981), respondent i's voting intention, Vote_{i}$, is a function of the difference between conditions now, C_0, and conditions at some point in the past, C_t[1]. That is to say, retrospective voting concerns *change*. Stiers, Dassonneville, and Lewis-Beck (2019), however, use a slightly different model as follows:

$$Vote_i \sim \text{Bernoulli}(\pi_i)$$
$$logit(\pi_i) = \alpha + \beta_1 C_0 + \beta_2 C_t$$

The components here are the same as before. Yet now past and present conditions (in this case either satisfaction with the government or the economy) each have their own effect on support for

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[1]Note that this is also the form that conventional economic voting models take. The only difference is that we measure $C_0 - C_t$ using the standard retrospective voting question ("How do you think the *general economic situation in this country* has changed over the *last 12 months*?") and not two separate items that measure economic conditions now and in the past.

the incumbent party. This is a problem. As C_0 and C_t each have an independent effect on whether respondent i votes for the incumbent, the model privileges the *level of* — rather than the *change in* — conditions. This is akin to assuming either that voters use a weighted average of past conditions when determining how to vote or that their past beliefs continue to have some effect on their voting behaviour that does not operate through their current beliefs[2]. But as neither interpretation concerns change, the model has little to say about voter myopia.

The remaining voter-centric work on voter myopia relies on experimental methods. Huber, Hill, and Lenz (2012), for example, note that psychological evidence suggests that people do not keep track of their utility over time. Rather, they use a heuristic called the "peak-end rule: they rate an experience based either on how it ended or how it was at its most intense (Ariely and Carmon 2000). They specify an experimental game to test this in a retrospective voting setting where they vary when their subjects are made aware of the upcoming"election". They find that those subjects who became aware of the event later on tended also to overweight incumbent performance closer to the event.

Healy and Lenz (2014) conduct a similar study, again drawing on the peak-end rule for inspiration. Their design is particularly interesting as they allow their subjects to explain how they intend to weight the economy in each year of the incumbent's term before conducting their experiment. Consistent with Hibbs (2006), their subjects say that they intend to judge the incumbent party based on the cumulative economic change over its entire term in office. Even so, just like Huber, Hill, and Lenz (2012), Healy and Lenz (2014) show that their subjects instead "substitute the end for the whole". In other words, voters are myopic and focus most of their attention on election year performance.

Electorate-Centric Research

Most electorate-centric research follows the precedent set by Hibbs (1987) and focusses not only on how myopic voters are but also the functional form that their myopia takes. Hibbs' approach is as follows. First, he assumes that voters' memories decay at a known exponential rate. He then takes past estimates of year-on-year real income growth, weights them according to his exponential function, and uses them to predict incumbent vote share across a range of US presidential elections. This, he claims, shows that voters are myopic. Achen and Bartels (2016) come to a similar conclusion using both the same approach as Hibbs and an even more limited one, which assumes that voters respond only to economic growth in the two quarters before an election.

Wlezien (2015) argues that these approaches are overly-conservative and that the extent to which we consider the electorate to be myopic depends on the functional form that we assume their myopia to take. Rather than use an exponential weighting function like Hibbs, he uses a logistic one instead. Due to its shape, the logistic function is less conservative and allows voters' some time to reflect on

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[2]It is worth nothing here that we also know that stable aspects of voters' personalities affect how they respond to these items (Conover, Feldman, and Knight 1987) and that many attitudinal items exhibit trait-like stability (Kiley and Vaisey 2020). Thus, we cannot rule out the possibility that both current and past items really tap some stable latent trait or that they are not the product of multicollinearity problems.

the recent past. Wlezien's results indicate that voters are myopic, though less so than often thought: they do not respond to GDP growth at the very start of the incumbent's term, but they do respond to it over at least the past few years.

By and large, this research arrives at a conclusion that satisfies the assumptions that it makes about how voter myopia operates. Though this is perhaps unsurprising, it is a problem. Consider the equation below, which characterises this approach:

$$Vote_i \sim \text{Normal}(\mu_i, \sigma)$$

$$\mu_i = \alpha + \sum_{q=1}^{Q} \beta_q w_q (GDP_q - GDP_{q-4})$$

Here, the incumbent party's vote share at election i, $Vote_i$, is equal to some constant, α, plus the sum of the product of year-on-year change in GDP growth in quarter q, $GDP_q - GDP_{q-4}$, and the weight associated with that figure according to the chosen weighting function of choice, w_q.

This approach requires that we make two ad-hoc assumptions. The first and most obvious is that we must assume that voter myopia takes some particular form, whether exponential or otherwise. But to do so reliably requires some prior knowledge of how myopic voters really are. Of course, if this were possible then there would be no need to research voter myopia in the first place. The second is that these models force us to assume that voters in the present should care about GDP growth over the past year, but also, for example, between two years ago and one year ago. For the same reasons that I point out above, this does not reflect how retrospective voting theory really works. That is to say, we should not expect voters to care about lagged year-on-year GDP growth, but instead the difference between GDP now and at different points in the past.

Towards a Hybrid Approach

I have hoped to show that while the research tends to find that voters are myopic, much uncertainty remains. Ultimately, this is because estimating voters' retrospective economic time frames is complex. Voter-centric approaches have had to deal with items that suffer from known biases (Conover, Feldman, and Knight 1987) and experimental methods that may not generalise outside of the survey context (Barabas and Jerit 2010). Likewise, electorate-centric approaches have had to rely on ad-hoc assumptions and suffer with problems of ecological inference (Stewart and Clarke 2017).

Thus, the most sensible way forward is perhaps to combine the strengths of each approach. That is, to make use of individual-level voting intention data, to avoid problems of ecological inference, and aggregate-level economic indicators, to avoid problems of bias. This hybrid approach is rare in the economic voting literature, where most research relies on cross-sectional surveys (though see Reidy, Suiter, and Breen 2017). Still, when paired with the appropriate methods, it offers the possibility of estimating voters' retrospective time frames in a way that avoids many of the prevailing assumptions.

… And Why Should We Care?

One obvious retort to the points I raise above is "so what?". After all, if voters engage in economic voting, does it really matter what time frame they use? The answer is simple enough: Yes, it does.

First, voters' economic time frames have clear policy implications. Or, as Tufte puts it, a shorter time frame would likely result in "myopic policies for myopic voters" (1978, 143). Imagine a scenario where voters have short economic time frames and, more importantly, their government is aware of this fact. Under such a scenario, the incumbent can reasonably expect only to be punished for choices that fall within this short window of time. In effect, this incentivises governments to make any unpopular policy decisions early in their term, safe in the knowledge that voters will forget them. Likewise, it also incentivises them to make more popular policy decisions later in their term so that voters' perceptions of the party at the election are as positive as possible. In the extreme, where governments lack a clear policy agenda, or simply reach the point of desperation, profligacy is likely to be the end result. After all, uncosted or unaffordable tax cuts and spending pledges offer struggling governments a last-ditch hope at reelection and their consequences can be dealt at the start of the next term, which voters are likely to forget.

Second, myopic voters are prone to voting not for the best economic *manager* but instead for the best economic *manipulator*. Armed with the levers of the state, incumbent parties can and do use their power to shape voters preferences in their own favour (Dunleavy and Ward 1981; Tufte 1978). Though this view is common in the economic voting literature (see Stegmaier, Lewis-Beck, and Brown 2019; Stewart and Clarke 2017; Stegmaier, Lewis-Beck, and Park 2017; Lewis-Beck and Costa Lobo 2017), some doubt whether governments really have such a high degree of control over the state of the economy (Dynes and Holbein 2019). Still, if we relax this assumption the results are not much better: we must accept that luck, not competence, decides elections (Achen and Bartels 2016; Wlezien 2015). Clearly, this is not a satisfactory outcome for democratic accountability.

Third, voter myopia disrupts the mechanism that retrospective voting theory assumes encourages accountability and improves economic outcomes. As Achen and Bartels (2016) argue, if elections are "referenda on the incumbent administration's handling of the economy" (Fiorina 1981, 26), then economic conditions should improve where voters reelect the incumbent. This is because the incumbent has, presumably, demonstrated that it provides better-than-average economic management. To make this decision, voters should make use of *all* available information on the incumbent's ability to manage the economy (Healy and Lenz 2014; Hibbs 2006). If the information that they have access to covers only a small sliver of time close to the election, then this is simply not possible. No wonder then that there is little evidence that economic outcomes do improve where incumbents are reelected (Achen and Bartels 2016).

Data

As I discuss above, I take a hybrid approach here that combines the strengths of the voter-centric and electorate-centric economic voting research. This requires two sources of information: individual-level voting intention data and aggregate-level economic statistics.

My individual-level voting intention data come from the British Election Study Continuous Monitoring Survey (CMS). The CMS comprises a series of monthly political surveys that took place in Great Britain between April 2004 and February 2014. The polling company YouGov administered the data collection process in all cases and the data were structured as a series of monthly repeated cross-sections. In total, 132,369 people took part in the CMS. To ensure that the data are representative, YouGov also weights each respondents according to both their past voting behaviour and their socio-demographic characteristics (Twyman 2008).

My aggregate-level economic data come from the UK's Office for National Statistics (ONS). The ONS is the UK's national statistics body and is charged with producing and reporting a range of economic statistics including GDP, the rate of unemployment, and the level of inflation. In most cases, it does so on a quarterly basis, though the most popular indicators are often available as monthly time series too. The economic voting literature most often uses GDP as its indicator of choice. Indeed, some go so far as to call it "the most general objective measure of economic welfare" (Kayser and Wlezien 2011, 376). As such, I follow suit and use the ONS' time series of monthly UK GDP.

Methods

Where it uses aggregate economic indicators, economic voting research often faces a major constraint: the release schedule of national statistical agencies themselves. In most cases, these agencies release economic statistics like the rate of GDP growth or the level of unemployment on a quarter-by-quarter, or even year-by-year, basis. But this is of little use where your research question requires the use of more granular time periods. This is true in the present case, as estimating voter myopia requires continuous measures of economic change.

I use a two-stage approach to circumvent this problem. In the first stage, I produce a time series of daily GDP estimates for the UK that run from 1 January 1997 to 1 December 2019. To do so, I fit a penalized regression spline to monthly GDP estimates from the ONS and use the model to fill in the missing dates. In the second stage, I link each of the individual respondents in the CMS data to a random date up to five years before the date they took their survey and then calculate GDP growth in percentage terms between the two time points. I then fit my half-life model to these data to estimate the economic vote and voter myopia.

Stage 1: Estimating Daily GDP

Figure 1 shows the three steps that I take to compute daily estimates of UK GDP. Consider first the left-most panel. Here, each point reflects a single estimate from the ONS' monthly time series of UK
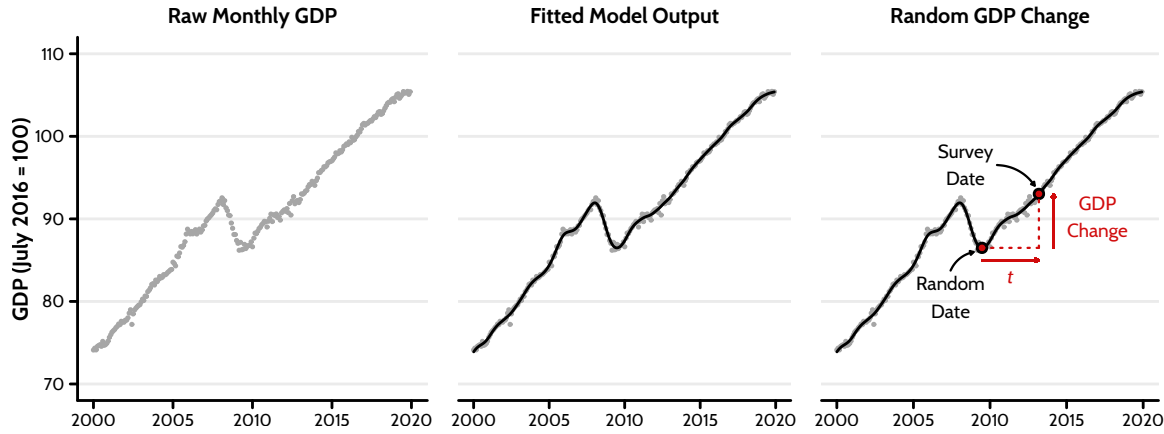
Figure 1: To estimate daily GDP, I fit a spline (k = 100) to monthly GDP data from the ONS. I then assign each case to a random date from up to 5 years ago and calculate GDP change between the two dates.

GDP data. These start in January 1997, end in December 2019, and are indexed such that July 2016 is equal to 100. In viewing the data, we see that two patterns are most obvious. First, that UK GDP tended to grow from one month to the next over the entire period. Second, that the global financial crisis interrupted this process in the mid-2000s. Further, UK GDP did not change at a constant pace either. On average, GDP growth was faster before than after the financial crisis. What's more, periods of faster and slower growth also occur at different points along the series. As a result, it appears that the change in UK GDP is a decidedly non-linear process.

The center-most panel shows the same GDP estimates as the first, though a curve now runs through the series. This curve serves to track the average level of GDP across the time series and, due to its form, does not assume that UK GDP changes at a constant rate. To compute this curve, I fit a generalized additive model to the data that predicts GDP as a non-linear function of time. In particular, I use a penalized cubic regression spline with 100 knots. As we can see, the model has a good fit to the data: it tracks UK GDP well and does so with limited uncertainty due to the large number of cases and relatively consistent changes in the underlying data. Consequently, there is good reason to believe that any estimates that it produces should reflect historic GDP levels.

The right-most panel shows how I intend to put these estimates to use. Each of the 132,369 respondents in the CMS data took their survey on a particular date between 8 April 2004 and 2 February 2014. For example, imagine a respondent who took their survey in March 2013, shown here by a red dot. I allocate the respondent to a random date up to five years before the date that they completed their survey, again shown here as a red dot, then calculate the time, t, that has passed between the two points. This is shown as a red horizontal arrow that spans the distance between the two red points parallel to the x-axis. Next, I use the fitted model whose output is shown in the center-most panel to estimate UK GDP on each day, then compute the amount of GDP growth that has occurred between the two dates in percentage terms. This is shown as a second red arrow, which this time spans the vertical distance between the two points parallel to the y-axis. I repeat this process for each respondent in the data until each is linked to a time interval and GDP growth estimate based on their survey date and their randomly-allocated reference date.

Stage 2: Estimating the Exponential Decay Model

The simplest way to explain the model that I use is to start with a simpler, more familiar, model and then build up each additional element step-by-step. As such, consider the following model:

$$Vote_i \sim \text{Bernoulli}(\pi_i) \qquad \text{Likelihood function}$$
$$logit(\pi_i) = \alpha + \beta \Delta GDP_t \qquad \text{Linear model on } \pi_i$$

This is, for all intents and purposes, a standard economic voting model. Here, we assume that the voting intention of respondent i is drawn from a Bernoulli distribution with probability π_i and takes the value 1 where person i intends to vote for the incumbent party and 0 otherwise. We then model the vector of voting intention figures as a function of ΔGDP, the change in GDP over some time frame. This model yields two parameters: α, the log odds of voting for the incumbent where ΔGDP is zero, and β, the change in the log odds of voting for the incumbent for a unit change in ΔGDP.

The CMS data were collected in waves, so it is possible that there might be wave-specific variation that we need to account for. As we are working in a Bayesian framework, we can allow this by including an adaptive prior that lets α vary over each survey wave. We also know how the GDP change data were computed (see stage 1). As such, we can include this information in our equation too:

$$Vote_i \sim \text{Bernoulli}(\pi_i) \qquad \text{Likelihood function}$$
$$logit(\pi_i) = \alpha_{\text{wave}[i]} + \beta(\frac{\widehat{GDP_0} - \widehat{GDP_t}}{\widehat{GDP_t}} \times 100) \qquad \text{Linear model on } \pi_i$$
$$\alpha_{\text{wave}} \sim \text{Normal}(\overline{\alpha}, \sigma_\alpha) \qquad \text{Adaptive prior on varying intercepts}$$
$$\overline{\alpha} \sim \text{Normal}(0, 1.5) \qquad \text{Prior on grand mean of intercepts}$$
$$\sigma_\alpha \sim \text{Exponential}(5) \qquad \text{Prior on standard deviation of intercepts}$$

Now, $\alpha_{wave[i]}$ measures the log odds of voting for the incumbent in each survey wave where GDP change is zero and varies around the grand mean $\overline{\alpha}$, and β measures the effect of a unit change in GDP growth between time 0, when respondent i responded to their survey, and time t, the random date that we allocated them to.

As the time interval t varies for each respondent, it makes little sense to have β, the economic voting effect, be fixed to a single value. Instead, we want β to vary as a function of t. In particular, we expect β to decay as t increases, as people are also more likely to forget events that took place further into the past. One useful way of thinking of this problem is in terms of exponential decay. That is, we expect β to have some initial value which decays quickly before levelling out as it approaches zero.

Exponential decay is a common phenomenon in the physical sciences and described using the following equation (Rösch 2014):

$$N(t) = N_0 e^{-\lambda t}$$

Here, $N(t)$ represents the quantity of some substance N that remains at time t after having undergone exponential decay. Note that where $t = 0$, $N(t) = N_0$, the substance's initial quantity. As time passes, this value decays subject to the "decay constant", λ. Where λ is positive, the substance experiences exponential decay. Where λ is negative, the substance instead experiences exponential growth. Once we know the value of λ, we can use the following simple equation to obtain the substance's half-life (i.e. how long it would take for the substance to decay by half), $t_{1/2}$:

$$t_{1/2} = \frac{log(2)}{\lambda}$$

In this case, we do not have a *substance* but, instead, a *parameter*: the economic voting effect, β. As such, we can simply substitute N in the original equation for β to obtain the non-linear exponential decay model that we will use to allow for voter myopia:

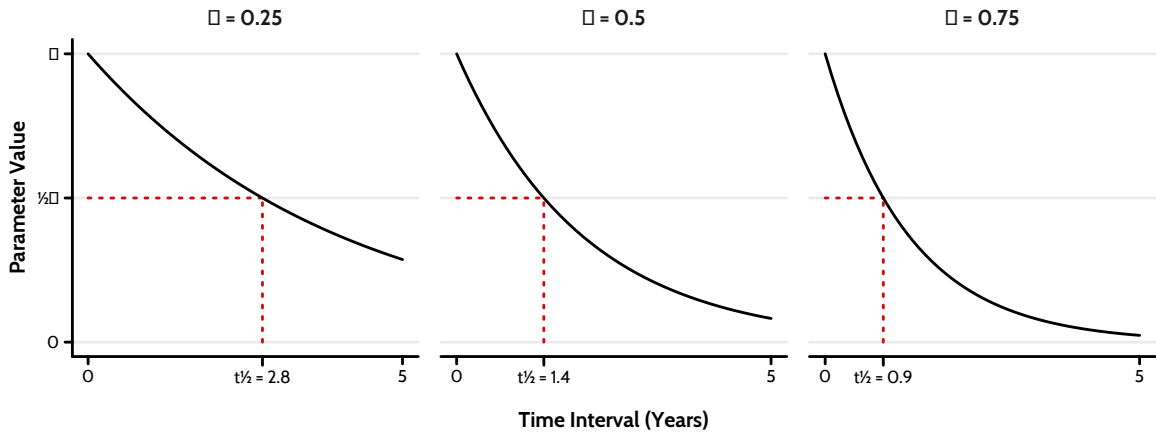$$\beta_t = \beta_0 e^{-\lambda t}$$

Figure 2: The decay constant and half-life are related. When the former increases, the latter decreases. This is because the relationship between the two is deterministic. More specifically, t½ = ln(2)/λ.

As this approach is somewhat unusual, it is worth considering how λ affects the economic vote in more detail. Figure 2 shows how changes in the decay constant, λ, affect changes in the half-life parameter, $t_{1/2}$. As we move from the left-most to the right-most panel, the decay constant, λ, increases from 0.25, to 0.5, to 0.75. As it does so, two things happen. First, the effect of the economic vote, β, decays more quickly over time. Note, however, that so long as λ is positive, the value of β will always approach zero in the limit. Second, the value of the half-life parameter, $t_{1/2}$, *decreases* to

account for the increasing decay in the effect of the economic vote, β. This is because the half-life parameter, $t_{1/2}$, must always occur where the effect of the economic vote, β, reaches half of its initial value. Thus, as the economic voting effect, β, decays more quickly, so too does the point at which it reaches its half-life, $t_{1/2}$.
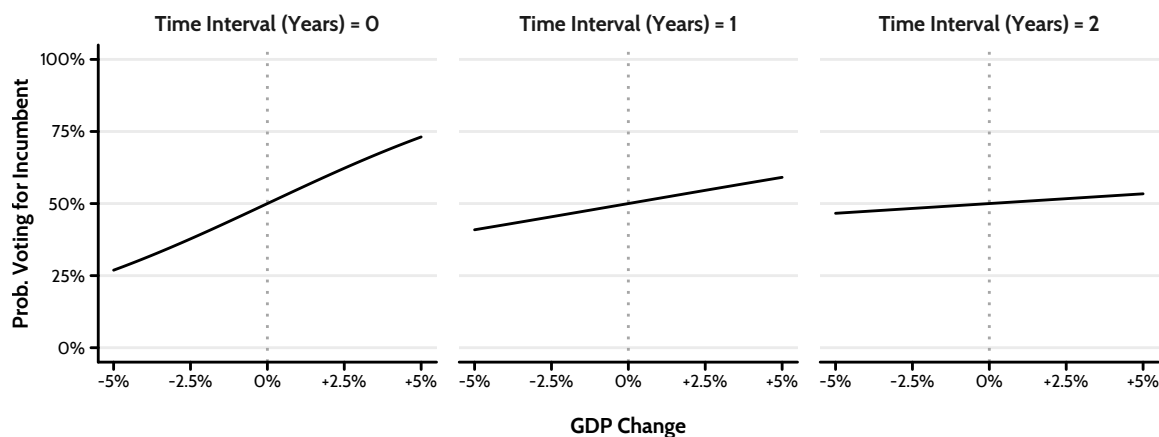

Figure 3: The slope is related to the time interval. As the interval increases, the slope decays. In this simulated example, the slope at time 0 is held at 0.2 and the decay constant is held at 1.

Figure 3 reveals how the decay shown in figure 2 plays out over time. Here, the time interval between the date that the respondent answered their survey and their random reference date increases as we move from the left to right. In the left-most panel, this time interval is equal to zero. As such, the economic voting effect has undergone no exponential decay and remains at its initial value. In this simulated example, there is a strong economic voting effect: as GDP change increases, these hypothetical voters become more likely to vote for the incumbent party. This is true also in the center-most and right-most panels, though, in both cases, the economic voting effect has undergone some decay due to voter myopia. In the centre-most panel, where the time interval equals one year, an effect persists, though is now more modest than it was when the time interval equalled zero. In the right-most panel, where the time interval now equals two years, the economic voting effect has decayed to such an extent that it is only marginally distinct from zero.

We can now substitute this equation into our previous one to arrive at the final model that we will fit to the data. Note that in doing so we also include a set of covariates, x, that account for the time trend, the different Prime Ministers in power throughout the period, their time in office, and the interaction between each Prime Minister and their time in office. Finally, we also include a set of prior distributions on each of our parameters. This gives the following model:

$$Vote_i \sim \text{Bernoulli}(\pi_i) \qquad \text{Likelihood function}$$

$$logit(\pi_i) = \alpha_{\text{wave}[i]} + \beta_t(\frac{\widehat{GDP_0} - \widehat{GDP_t}}{\widehat{GDP_t}} \times 100) + \sum_{j=1}^{6} \delta_j x_{ji} \qquad \text{Linear model on } \pi_i$$

$$\beta_t = \beta_0 e^{-\lambda t} \qquad \text{Exponential decay model on } \beta_t$$

$$\alpha_{\text{wave}} \sim \text{Normal}(\overline{\alpha}, \sigma_\alpha) \qquad \text{Adaptive prior on varying intercepts}$$

$$\overline{\alpha} \sim \text{Normal}(0, 1.5) \qquad \text{Prior on grand mean of intercepts}$$

$$\sigma_\alpha \sim \text{Exponential}(5) \qquad \text{Prior on standard deviation of intercepts}$$

$$\beta_0 \sim \text{Normal}(0, 0.5) \qquad \text{Prior on } \beta \text{ where } t = 0$$

$$\delta_j \sim \text{Normal}(0, 0.5) \text{ for } j \text{ in } 1..J \qquad \text{Prior on } \delta \text{ parameters}$$

$$\lambda \sim \text{Normal}(0, 0.5) \qquad \text{Prior on the decay constant, } \lambda$$

Results

Table 1 shows the resulting parameter estimates from the fitted model. In all cases, coefficients show the expected relationships. Consider first the chief variable of interest: GDP change at $t = 0$. Consistent with economic voting theory, this effect is positive. As a result, the model does provide some support for the idea that economic growth affects whether individual voters decide to support the incumbent party or not. Note, however, that this effect is small. As few economic voting studies match aggregate economic statistics to individual voting intention data, it is hard to know whether this effect is usual. But we can rule out that

A series of robustness tests do show

First, GDP change where $t = 0$ is positive. This is consistent with economic voting theory and implies that economic growth does affect whether voters decide to support the incumbent party. Note, however, that the effect is small. What's more, this small effect persists

Isn't a product of estimating GDP change where no time has passed. Even a model that estimates year-on-year GDP change (whether using the estimated daily GDP or the raw monthly estimates) shows effects of X, consistent with this model.

Table 1 shows the resulting parameter estimates from the fitted model. Here, each coefficient is in the expected direction. GDP change at $t = 0$ is small, but positive. The decay constant, λ, is also positive, indicating that the economic voting effect undergoes exponential decay consistent with voter myopia. As the costs of governing literature would have us believe, incumbent voting decays over time. And voters were more inclined to vote for Gordon Brown and David Cameron than Tony Blair, to varying extents.

Figure 4 shows how the economic vote diminishes as voters' time horizons increase. At $t = 0$, GDP change has the same effect as shown in table 1. As t gets larger and larger, the economic voting effect gets smaller and smaller until it finally reaches zero. We can use the equation shown above to

Table 1: Parameter estimates from the half-life model predicting incumbent voting intention. Note that the model converged with no divergent transitions, no iterations saturated the maximum treedepth, and R̂ statistics all equalled 1. Data come from the BES Continuous Monitoring Survey, 2004–2014.

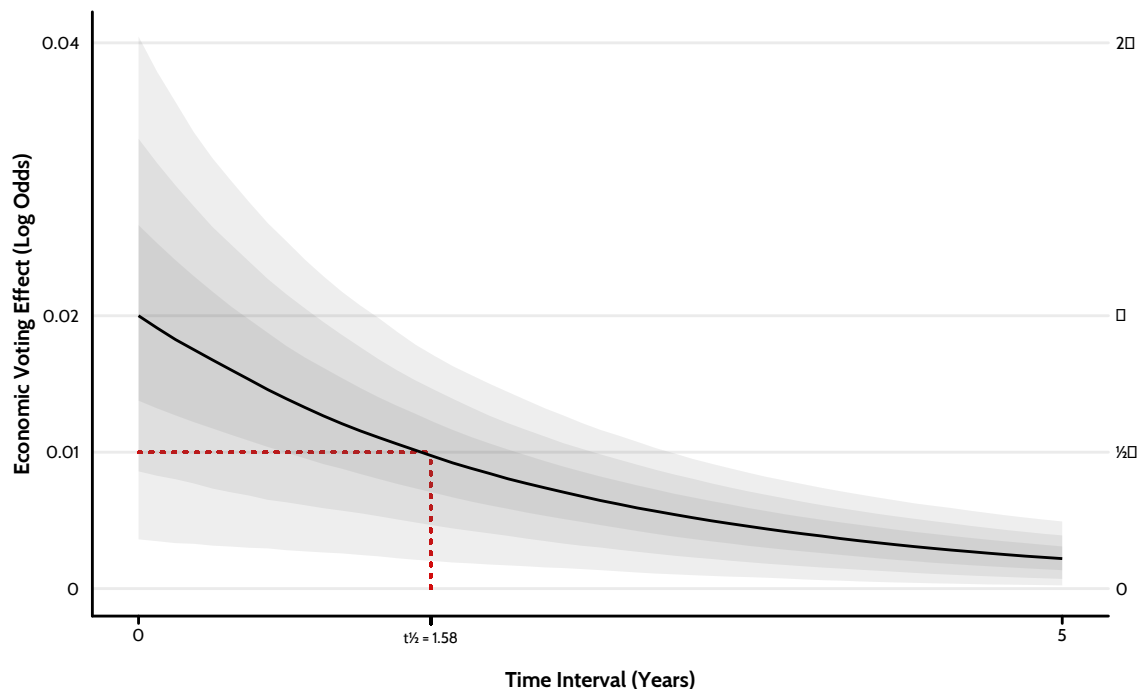|	Median	Error	2.5%	97.5%
Intercept	−0.59	0.23	−1.05	−0.15
GDP (t = 0)	0.02	0.01	0.00	0.05
Decay Constant	0.44	0.17	0.17	0.84
Years Passed	−0.01	0.04	−0.08	0.06
Time in Office	−0.06	0.03	−0.11	0.01
Gordon Brown (vs. Tony Blair)	−0.45	0.30	−1.04	0.15
David Cameron (vs. Tony Blair)	0.30	0.39	−0.45	1.06
Gordon Brown × Time	−0.06	0.04	−0.15	0.02
David Cameron × Time	−0.13	0.03	−0.20	−0.07
N (Individuals)				130, 145
N (Survey)				112

Figure 4: The economic vote diminishes as the time interval between the survey and reference date increases. At a time interval of 1.58 years, the economic voting effect decays to half of its initial value. Here light, medium, and dark areas reflect 95%, 80%, and 50% credible intervals, respectively.

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convert between the decay constant, λ, and the parameter's half-life, $t_{1/2}$. As a reminder, the latter reflects the amount of time that it takes for the economic voting effect to fall to half of its initial value. Doing so shows that the half-life of the economic vote is around 1.58 years (95% CI = 0.81 to 3.9)[3]. That is to say, were voters to compare the state of the economy now to the state of the economy 1.58 years ago, we would expect the effect to be half the size of the effect where they simply considered the state of the economy in the present moment.

Note how that as the economic voting effect *diminishes*, our certainty about its true value actually *increases*. This might seem unusual: why should we be any more certain about the effect of GDP growth over five years than over, say, one year or even one month? To see why, reflect on what we know about exponential decay. Under this process, we start with some initial quantity that we expect to deplete over time. Eventually, the quantity will fall to such a low amount that it is, for all intents and purposes, equal to zero. Here, we also have to estimate the initial quantity, as it is a parameter and not a substance that we can simply measure with a scale or ruler. Even so, no matter the estimate that we arrive at, we know that it will always equal in the limit where t approaches ∞ if it exhibits exponential decay. As a result, we therefore know that as t increases, the parameter is more likely to be closer to zero.
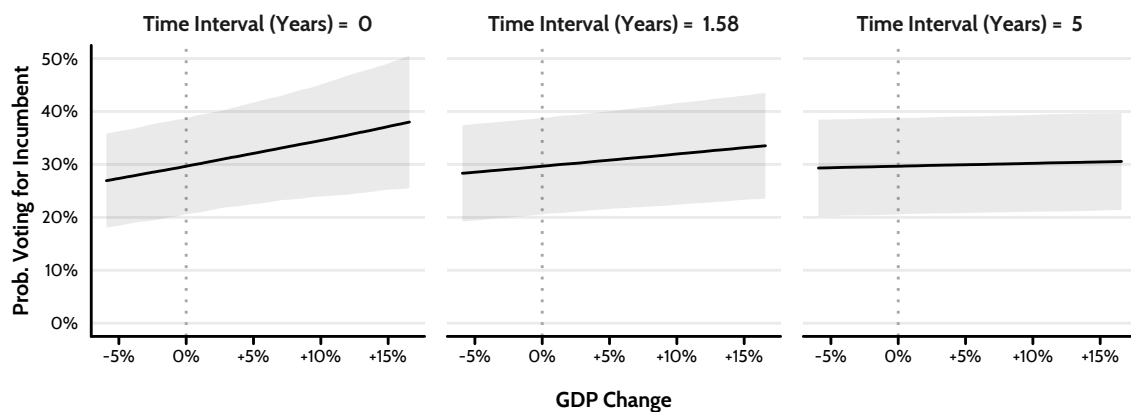

Figure 5: At t = 0, the economic vote has a reasonably-large effect on the probability of voting for the incumbent. After 1.58 years, it is only very small. And after 5 years, it is practically-equivalent to zero.

Figure 5 shows how voter myopia shapes the effect of GDP change on the probability of voting for the incumbent party.

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[3]Note that this figure is computed by transforming the entire posterior distribution of the decay constant, λ, and then taking its median and not simply transforming the point estimate shown in table 1. As such, there may be a small discrepancy between the two.

Discussion and Conclusion

Recency is a real concern: current economic conditions matter more. While that raises the problem that voters might vote for the best manipulator and not the best manager, voters' time horizons do look to be long enough that historic performance matters.

For governments: more evidence that they should stack bad economic news at the start of the session.

Another possibility is that some types of economic change linger longer than others. Downturns seem an obvious example.

That said, economic voting effects here are quite weak. Hard to contrast to other figures as most economic voting research relies on economic perceptions (which suffer all sorts of bias) or, where they do use economic statistics do so at the aggregate level.

Another possibility is that some types of economic change linger longer than others. Fieldhouse, Green, Evans, Mellon, and Prosser (2020), for example, argue that British politics felts the effects of the 2008 global financial crisis much longer than

If past events matter less because voters are not attentive to them, then we might expect the half-life of the economic voting effect to also vary according to the attention that voters pay to politics. More attentive voters might also have greater time frames.

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