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

Jack Bailey†

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Abstract

Economic voting theory assumes that voters focus their attention on the recent past. Yet testing this assumption is difficult and past research remains inconclusive. I estimate voters' economic time frames using a new model that measures the economic vote and voter myopia at the same time. I show that voter myopia is real. After around a year and a half, economic voting effects half in size. After five years, they approach zero. Yet I find that even economic growth over the past 5 years affects how people vote nonetheless. This is because as economic time frames grow, so too do rates of economic growth. My findings have positive implications. Though they are myopic, voters appear able to hold governments accountable for economic management over the course of their tenure.

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†Research Associate, Department of Politics, The University of Manchester, UK. If you have any comments or questions, feel free to contact me either by email (jack.bailey@manchester.ac.uk) or on Twitter (@PoliSciJack).

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. As in the early-1990s, economic voting scholars now believe that voters are both retrospective and myopic. They vote based on the difference between present and past conditions, though can only remember so far back in time. Yet—again as in the early-1990s—economic voting scholars still do not know just *how retrospective* or *how myopic* voters really are.

This matters because myopic voters are open to abuse. Two issues are most important. First, that voter myopia allows governments to do what they like early in their term, safe in the knowledge that voters will have forgotten by the next election. Clearly, this would be bad news for democratic accountability: it would permit governments to pursue their own priorities and not those of their voters. Second, that myopic voters might not vote for the best economic *managers* but, instead, the best economic *manipulators*. When they control the levers of the state, parties can and do use their power to shape voters' preferences in their own favour (Dunleavy and Ward 1981). Myopic voters let them do so strategically. They might, for example, pull out all the stops to make sure that the economy is booming come election time. And if this has negative consequences down the line, then so be it: voters will probably not remember anyway. As a result, myopic voters might expect the party to ensure strong economic growth, but be stuck with worse outcomes than if they had voted for someone else.

Given these gaps in our understanding, most economic voting research makes do with ad-hoc assumptions. But, as different scholars make different assumptions, the time frames that they expect voters to use often vary from one project to the next. Consider the following examples. Some economic voting scholars assume that voters respond to economic change only in the year before an election (Bloom and Price 1975; Kramer 1971). Some, instead, that voters respond to the difference between the average economic growth in the first three quarters of the election year and the average of the entire previous year (Lewis-Beck, Nadeau, and Foucault

2013). Further others assume that voters respond to year-on-year (Palmer and Whitten 2011; Clarke, Stewart, and Zuk 1986; Goodhart and Bhansali 1970), quarter-on-quarter (Lanoue 1987), or even month-on-month (Matthew J. Lebo and Cassino 2007) economic change.

My intention in this paper is to put these assumptions to rest. I test voter myopia by estimating how voters' support for the incumbent party responds to economic change over different periods of time. To do so, I rely on insights from the physical sciences: I borrow the concept of a "half-life" from pharmacology, biology, and nuclear physics. Like an hour, a minute, or a second, a half-life is a unit of time. But, unlike these familiar measures, it does not reflect a fixed interval. Rather, it reflects the average amount of time that it takes for some quantity to decay to half of its initial value. This is useful when we want to estimate, say, how long it takes for radioactive decay to reduce the mass of a block of uranium or for the human body to remove some drug from a person's bloodstream. That is, to estimate the half-life of a *substance*. Here, instead, I use individual-level data from the Comparative Study of Electoral Systems Integrated Module Dataset (Quinlan et al. 2018) and aggregate-level GDP data from the Organisation for Economic Co-operation and Development (OECD 2021) to estimate the half-life of a *parameter*: the economic vote itself.

I show that voters are myopic. As the time between the past and the present increases, the economic vote diminishes in size. After around a year and a half, it reaches its half-life. After around five years, it begins to approach zero. Nevertheless, economic change over even long time frames continues to affect how people vote. This is because as economic time frames increase, so too does the amount of economic growth that has occurred (at least on average). Thus, these two patterns interact to produce a persistant economic influence across a range of time frames.

The implications of my findings are largely positive. Voters are not as short-sighted as some past research would have us believe. Economic change at election time is not the sole determinant of how they vote. Economic change further into the past matters too. These means that fears that governments might benefit from undeserved leeway by front-loading economic pain seem unfounded. And, even though the size of the economic voting effect diminishes over time, voters appear able to hold their governments to account for how they manage the economy.

How Retrospective are Retrospective Voters?

It seems reasonable to expect voters to forget all sorts of details that political scientists might think of as important. After all, voters often show very little interest in politics (Zaller 1992; Campbell et al. 1960), no one has a perfect memory, and to forget appears to be a fundamental aspect of how human beings process information (Murre and Dros 2015; Averell and Heathcote 2011; Ariely and Carmon 2000).

Presumably, this is even more true for complex topics like the economy. Not only are there no end of figures to remember, these figures also change value, are subject to revision, and relate to each other in all manner of different ways (Stevenson and Duch 2013). To make matters worse, most people receive little to no formal education in economics. Thus, they must rely on folk theory and the information that they glean from the news and their day-to-day lives to make sense of what is going on. No wonder then that they seem not to know how the economy is really doing (Paldam and Nannestad 2000), or at least not without a little help (Ansolabehere, Meredith, and Snowberg 2013).

If this assumption is correct, it would seem very unusual to expect voters to retain far-reaching and detailed memories of the economy's every ebb and flow. But, though the economic voting literature now includes more than 600 articles and books (Lewis-Beck and Costa Lobo 2017), research on voter myopia remains limited. Most economic voting scholars simply assume it away. The few pieces of research that do engage with the 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. Each approach has its own strengths and weaknesses, and comparing findings from one to the other can be difficult. Still, both tend to come to the same conclusion: that voters' economic time frames are short. Yet just how short they are remains a mystery.

Voter-Centric Research

Stiers, Dassonneville, and Lewis-Beck (2019) provide a useful starting point as they make perhaps the most forceful case that voters are "attentive to the government's performance in

the long run as well as the short" (2019, 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 burdensome and perhaps beyond what we might expect of the average voter. Instead, they contend that voters rely on online processing and update their beliefs as though maintaining a running tally[1].

My own view is that it is not clear why information processing style should affect 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 for retrospective voters. As Fiorina (1981) argues, when deciding how to vote "citizens need only calculate *the changes* in their own welfare" (p.5, emphasis own). Thus, 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 retain either two specific memories (if we assume memory-based processing) or two running tallies (if we assume online processing). Both 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 with the economy in another. But there is now much evidence that these attitudinal items come with serious health warnings. For instance, voters' personal characteristics affect how they respond to these items (Conover, Feldman, and Knight 1987). New evidence also suggests that such items exhibit trait-like stability (Kiley and

[1]Note that Green, Palmquist, and Schickler (2002) argue in favour of a similar model, according to which voters update their opinions as if engaging in Bayesian updating. That is, they have some prior belief, encounter some new information, which they then use to update their prior so as to arrive at some new posterior belief. In making their argument, Green, Palmquist, and Schickler (2002) touch upon how informative voters' past beliefs are of their present ones. Though similar, this is not the same issue that I contend with in this article. Green, Palmquist, and Schickler (2002) look forward and ask how voters use new information to update their opinions. Voter myopia, instead, looks backwards and asks, given that learning has already occurred, for how long does old information continue to influence current behaviours.

Vaisey 2020). As such, we cannot rule out the possibility that both current and past items really tap into some stable latent trait and not distinct and independent evaluations of real material conditions. This is why some claim that perceptual items are "so badly and unpredictably biased as to be essentially unrelated to the underlying individual-level behavioral relationship we are trying to estimate" (Kramer 1983, 93). Thus, while Stiers, Dassonneville, and Lewis-Beck (2019) provide a useful opening salvo, it is not clear that they provide the final word.

The remaining voter-centric work on voter myopia relies on experimental methods and not observational data. Huber, Hill, and Lenz (2012), for example, note that psychological evidence suggests that people use a heuristic called the "peak-end rule" to keep track of their utility over time: they rate an experience based on either 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 and vary when they make their subjects aware of the upcoming "election." They find that those subjects who they made aware later tended also to overweight incumbent performance closer to the event. This, they argue, suggests that voter myopia arises due to fundamental limits in people's ability to make retrospective judgements, not only as a result of real world complexity.

Healy and Lenz (2014) conduct a similar study, again drawing on the peak-end rule. Their design allows their subjects to explain how they intend to weight the economy in each year of the incumbent's term before they conduct 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. But, just like Huber, Hill, and Lenz (2012), Healy and Lenz (2014) show that their subjects do not. Rather, they "substitute the end for the whole" and focus their attention on election year performance alone.

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[2]. Hibbs' approach

[2]Note that while some discuss "memory" with regards to fractionally integrated aggregate-level data (see, for example, Matthew J. Lebo, Walker, and D. Clarke 2000; Matthew J. Lebo and Clarke 2000), this research concerns the degree of memory across a time series of one single indicator (e.g. the consumer confidence index) and not the topic of discussion here: the decay in the effect of one indicator (GDP) on another (voting behaviour)

is as follows. First, he assumes that voters' memories of the economy decay at some known exponential rate. Next, he takes past estimates of year-on-year real income growth, weights them according to his exponential function, and then uses them to predict incumbent vote share at past US presidential elections. This, he claims, shows that voters are myopic. Achen and Bartels (2016) come to a similar conclusion using Hibbs' approach but with a longer time series. But they also show that a more limited model which assumes that voters respond only to economic growth in the two quarters before an election performs just as well.

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 function like Hibbs, Wlezien uses a logistic one. Due to its shape, the logistic function is less conservative and allows voters some time to reflect on the recent past. Wlezien's results imply that voters are myopic, though less so than often thought: they do not respond to economic growth at the very start of the incumbent's term, but they do respond to it over at least the past few years.

These approaches requires two assumptions. The first is that voter myopia takes some known form, whether exponential or otherwise. Of course, to do so reliably requires prior knowledge of how myopic voters really are. But if this knowledge were available, there would be no need to conduct the research at all. The second is that these models assume that voters in the present should care about economic growth over the past year, but also, for example, between one year ago and two years ago or between 6 months ago and 18 months ago. While there might be arguments in favour of such a lag structure, it is not consistent with the retrospective voting theory that underpins most economic voting research. If they engage in retrospective voting, voters should not care about lagged year-on-year economic growth, but instead the difference between economic conditions *now* and at each point in the past (Fiorina 1981).

Towards a Hybrid Approach

Much uncertainty remains in our understanding of voter myopia. Existing research concludes both that voters are and are not myopic and cannot decide on what form their myopia takes.

Ultimately, this uncertainty arises because estimating voters' retrospective economic time frames is difficult. Voter-centric approaches have had to deal with items that suffer from known biases (Bailey 2021; Kiley and Vaisey 2020; 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 make ad-hoc assumptions about how voters forget and have often suffered with problems of ecological inference (Stewart and Clarke 2017).

The most sensible way forward would seem to be to combine the strengths of each approach. To avoid problems of ecological inference, I draw on individual-level voting intention data. And to avoid problems of systematic perceptual bias, I draw on aggregate-level economic statistics. Such a hybrid approach is rare in the economic voting literature. The reason being that it is hard to find individual-level data sets that one can match to aggregate-level economic data that result in a sufficient amount of aggregate-level economic variation. But where these data do exist, they offer the possibility of estimating voters' retrospective time frames in a way that avoids many of the literature's prevailing pitfalls.

Data

My individual-level voting intention data come from the Comparative Study of Electoral Systems Integrated Module Dataset (Quinlan et al. 2018). The CSES comprise a series of modules appended to many national election studies. These cover elections from the mid-1990s to the present day across a range of countries, themselves nested within a range of continents.

I endeavour to include as much of the CSES data as possible in my analysis. That said, circumstances force me to limit my cases selection in two particular ways. First, I omit any countries that the V-Dem Institute deems not to be democratic (Coppedge et al. 2020). In particular, I remove any elections that occurred where a country received an electoral democracy score from V-Dem of less than 0.5. Second, I include only those countries for which I can obtain comparable economic data. As I discuss below, I limit my focus to those countries either in the OECD or for which there are economic statistics available in the OECD's database of Quarterly National Accounts (2021).

After removing any problem cases, the resulting data include information on 151,822 voters at 116 elections in 34 countries. The first election in my data took place on 2 March 1996 in Australia and the most recent on 19 October 2015 in Canada. What's more, cases include the usual suspects in North America and Europe, but also countries in Oceania (Australia, New Zealand), Asia (South Korea, Japan), Latin America (Brazil, Chile), and the Middle East (Israel). As such, there is good reason to believe that my results should be widely generalisable[3].

My aggregate-level economic data come from the OECD's Quarterly National Accounts (OECD 2021). The economic voting literature most often uses GDP as its indicator of choice. Indeed, some even call it "the most general objective measure of economic welfare" (Kayser and Wlezien 2011, 376). I follow suit. Fortunately, the OECD obliges its members to provide quarterly economic data in a range of comparable formats. I use quarterly, expenditure-based, seasonally-adjusted GDP in national currency, and at chained volume measures to account for any potential inflation.

I match each case in the CSES to the most recent quarter's GDP on the date of the election, plus all other quarters between the date of the most election and the date of the last election. I then compute GDP growth between the election and all previous quarters. As term limits and data availability vary from one country to the next, so too do the number of quarters that I allocate to each case. The number of quarters ranged from a low of 1 (Czech Republic, 31 May 1996) to a high of 28 (France, 21 April 2002). As such, my GDP estimates showed much variation: it included 1,612 different values, ranging from -23.1% to 43.3%.

Methods

Estimating both the economic vote and voter myopia is difficult using Frequentist methods. Thus, I use a Bayesian approach instead. As the resulting model is complex, I begin with a simpler model, then build each element step-by-step. Consider the following retrospective voting model:

[3]Unfortunately, my data include no cases from Africa. This is in part due to a paucity of African national election studies in the CSES data and the fact that no African nations are part of the OECD

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

$$logit(\pi_i) = \alpha + \beta(C_0 - C_t) \quad \text{Linear model on } \pi_i$$

Here, the change in some condition, C, predicts voter i's willingness to vote for the incumbent, $Vote_i$. The dependent variable takes two values. Where voter i votes for the incumbent, it takes the value 1. Otherwise, it takes the value 0. Rather than some abstract condition, I use the percentage change in GDP at the time of the election versus all other quarters up to the last election. As the CSES data span many countries, there is also country- and time-specific variation to account for. To this end, I allow the intercept, α, to vary over countries and include a time-tracking covariate, $Years_i$[4]:

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

$$logit(\pi_i) = \alpha_{\text{country}[i]} + \beta(\frac{GDP_0 - GDP_{t[i]}}{GDP_{t[i]}} \times 100) + \delta Years_i \quad \text{Linear model on } \pi_i$$

$$\alpha_j \sim \text{Normal}(\overline{\alpha}, \sigma_\alpha) \text{ for } j \text{ in } 1..J \quad \text{Adaptive prior on varying intercepts}$$

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

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

$$\beta \sim \text{Normal}(0, 0.5) \quad \text{Prior on } \beta$$

$$\delta \sim \text{Normal}(0, 0.5) \quad \text{Prior on } \delta$$

The economic voting effect, β, is currently fixed for all values of t. Whether concerning GDP change over the past quarter or, say, over the past 10 quarters, the estimate is the same. This makes little sense. Instead, the economic voting effect should decay as t increases to reflect the fact that people are more likely to forget events that took place a longer time ago.

[4] This is important, as secular changes can confound one's estimates (Mellon and Prosser 2020; Woolridge 2012).

One way to conceive of voter myopia is as a process of exponential decay[5]. In fact, an entire literature in psychology shows that human memory exhibits a similar "forgetting curve" (see, for example, Murre and Dros 2015; Averell and Heathcote 2011). Where a quantity undergoes exponential decay, it begins at some initial value then diminishes quickly before levelling out as it approaches zero. Processes like this are common in the physical sciences where they are used to measure the decay in substances over time. I borrow the relevant equation (Rösch 2014):

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

Here, $N(t)$ represents the quantity of some substance N at time t. When $t = 0$, the equation simplifies such that $N(t) = N_0$, the substance's initial quantity. As time passes, the substance decays according to the value of its "decay constant," λ. The larger the decay constant, the faster the substance decays. The amount of time that it takes for the substance to decay by half is known as its "half-life," $t_{1/2}$. Note that the decay constant, λ, and the half-life parameter, $t_{1/2}$, share a deterministic relationship such that:

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

Of course, in the present case, the quantity of interest is not a substance. Instead, it is a *parameter*: the economic voting effect itself. Given this, we can substitute N for the economic voting effect, β, to allow our model to estimate the economic vote while also permitting its effect to decay according to the time interval, t:

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

[5]This is similar to Hibbs' (1987) approach. Note, however, that unlike Hibbs, I do not fix the degree of exponential decay a-priori. Instead, I use my model to estimate it from the CSES and OECD data.

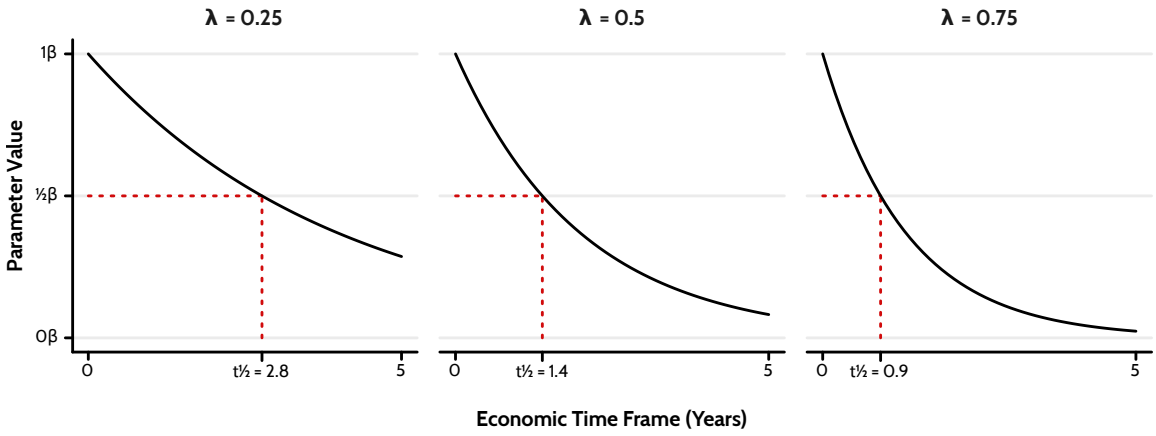

Figure 1: The decay constant and half-life are related. When the former increases, the latter decreases. This is because their relationship is deterministic. More specifically, $t½ = \log(2)/\lambda$.

It is worth pausing to consider how the decay constant and the half-life parameter are related in greater detail. Figure 1 shows how changes in the former affect changes in the latter. Moving from the left- to the right-most panel, the decay constant increases from 0.25, to 0.5, to 0.75. As it does, two things occur. First, the economic voting effect decays more quickly. Second, the value of the half-life parameter, $t_{1/2}$, decreases to account for the increased rate of decay.

The simulation in figure 2 shows how this process would affect a voter's probability of voting for the incumbent across different time frames holding all else constant. In the left-most panel, the time interval between the election date and the reference date is zero. In effect, the voter evaluates the state of the economy in the immediate present. In this scenario, there is a strong economic voting effect: as GDP change increases, voters become more likely to vote for the incumbent party. This is true also in the centre-most and right-most panels, though, in both cases, the economic voting effect diminishes due to voter myopia. In the centre-most panel, where the time frame equals one year, some effect persists, though it is now more modest than when the time interval was zero. In the right-most panel, where the economic time frame equals two years, the economic vote has decayed such that it is difficult to distinguish from zero.

We can now use these insight to complete the model-building process. All that is left for us to do is to substitute the exponential decay model into the retrospective voting model[6]:

[6]Note that I include a prior distribution for each parameter. In all cases, I use conservative, non-informative priors that gently regularise my estimates towards zero.

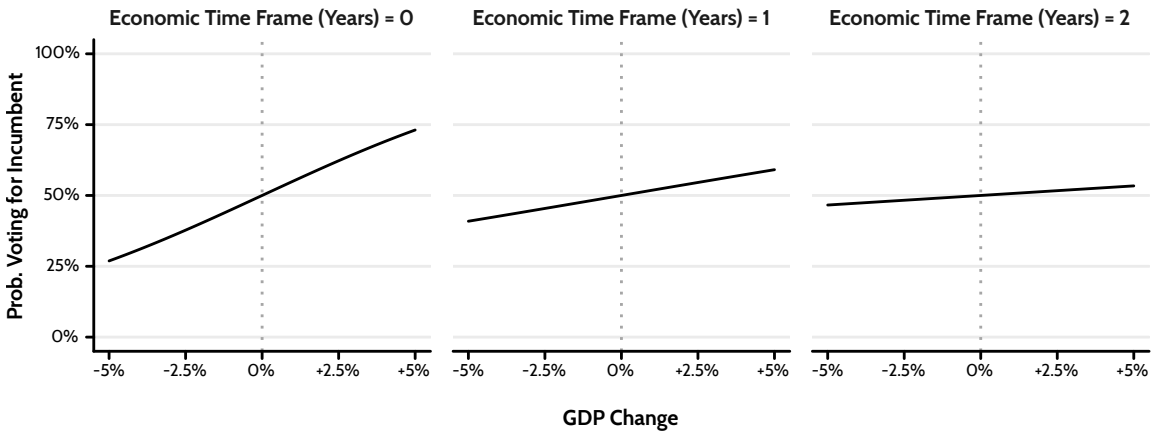

Figure 2: The slope is related to the time interval that voters use. As the interval increases, the slope decays. In this example, the slope at time 0 is held at 0.2 and the decay constant is held at 1.

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

$$logit(\pi_i) = \alpha_{\text{country}[i]} + \beta_t(\frac{GDP_0 - GDP_{t[i]}}{GDP_{t[i]}} \times 100) + \delta Years_i \qquad \text{Linear model on } \pi_i$$

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

$$\alpha_j \sim \text{Normal}(\overline{\alpha}, \sigma_\alpha) \text{ for } j \text{ in } 1..J \qquad \text{Adaptive prior on varying intercepts}$$

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

$$\sigma_\alpha \sim \text{Exponential}(2) \qquad \text{Prior on standard deviation of intercepts}$$

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

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

$$\delta \sim \text{Normal}(0, 0.5) \qquad \text{Prior on } \delta$$

Table 1: Parameter estimates from the half-life model predicting incumbent voting intention. Data come from the Comparative Study of Electoral Systems' Integrated Module Dataset.

	Half-Life Model			
	Estimate	Error	2.5%	97.5%
Intercept, α	-0.59	0.07	-0.73	-0.45
GDP (t = 0), β_0	0.04	0.01	0.03	0.05
Decay Constant, λ	0.50	0.07	0.37	0.63
Years Passed, δ	0.14	0.01	0.12	0.16
N (Individuals)				$151,822$
N (Countries)				34
LOOIC				$203,050.0$
WAIC				$203,222.3$

Results

Table 1 shows the resulting parameter estimates from my fitted model. In all cases, the model's parameters show relationships consistent with economic voting theory and voter myopia.

Contrary to the large effects often found in individual-level economic voting research, the economic voting effect that I identify is only small (0.04, 95% CI: 0.03 to 0.05). Note that this is not due to how I specify my model. As I show in my appendix, a conventional economic voting model comes to much the same conclusion (see table A1). Instead, the smaller effect size that I identify likely reflects two things. First, unlike subjective economic perception items, voters' own personal characteristics do not confound the effect that GDP data have on their willingness to vote for the incumbent party. Thus, there is little endogeneity to inflate them. Second, GDP change has a large range, so small effects can multiply to create much larger ones.

As past research on voter myopia would lead us to expect, the decay constant that controls voter myopia is positive (0.50, 95% CI: 0.37 to 0.63). As I discuss above, there is a simple transformation that converts between this and the half-life parameter. Doing so reveals that the economic vote has a half-life of 1.40 years (95% CI: 1.10 to 1.86), or about a year and a half[7]. Thus, the economic vote is half as strong when voters compare the state of the economy now

[7] I compute this figure by transforming the entire posterior distribution of the decay constant, λ, before taking its median and not simply transforming the point estimate shown in table 1. As such, there may be a small discrepancy between the values that one arrives at using these two approaches.

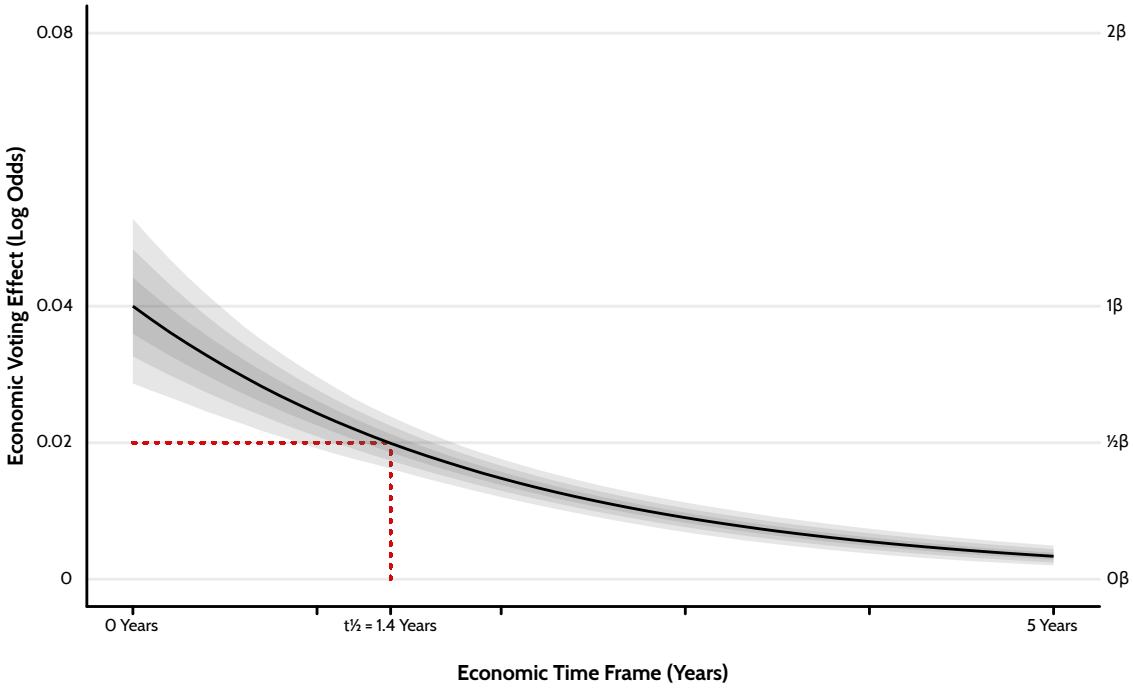

Figure 3: The economic vote diminishes as the time interval between the survey and reference date increases. At a time interval of 1.4 years, the economic voting effect decays to half of its initial value. Here light, medium, and dark areas reflect 95%, 80%, and 50% credible intervals, respectively.

to the state of the economy 1.4 years ago than when they consider instantaneous change in the state of the economy.

It can be difficult to know how to interpret these parameters given that the model has so many moving parts. Accordingly, figure 3 shows how the economic voting effect decays as the economic time frame increases. Where the time frame is equal to zero, the economic voting effect is the same effect as shown in table 1. As the time interval increases, the economic voting effect recedes, before it then approaches zero at a time frame of around five years.

Note that as the economic voting effect diminishes, the uncertainty interval around its true value *decreases*. This might seem unusual: why should the model be more certain about the effect of GDP growth over five years than, say, over one year or even over one month? To understand why, consider the nature of exponential decay. Any quantity that undergoes this process will decay to such a small value that it is, for all intents and purposes, equal to zero. This is an informative constraint: we know that the larger the time interval, the more certain we should be that the parameter equals zero. Thus, our uncertainty narrows as time goes on.

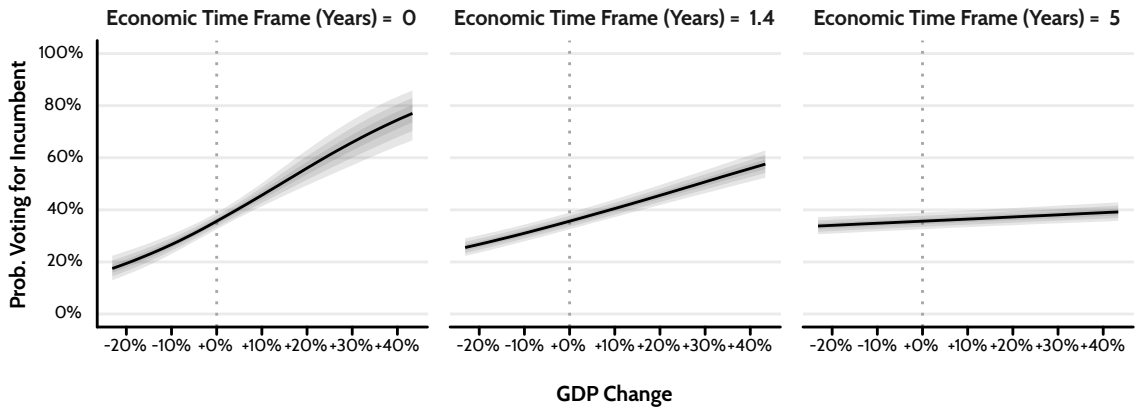

Figure 4: At t = 0, the economic vote shifts the probability of voting for the incumbent a good deal. After 1.4 years have passed, this effect lessens. And after 5 years, it lessens even further. Again, light, medium, and dark areas reflect 95%, 80%, and 50% credible intervals.

Figure 4 shows how economic myopia conditions voters' support for the incumbent party at three different time intervals. The left-most panel shows how the probability of supporting the incumbent changes where voters consider the state of the economy in the immediate present. The effect is reasonable in size, if uncertain: voters are a few percentage points more likely to support the incumbent where the economy is growing than where it is not. Their level of support then diminishes as their retrospective time frames increase in the centre- and right-most panels. This implies that comparing the state of the economy now to what it was, say, five years ago has only a small effect on the probability of voting for the incumbent party. But it is worth noting that economic time frames and the rate of economic growth will often have a strong positive correlation. After all, economies almost always grow over time[8].

If we are to understand how voter myopia and economic conditions interact to determine the effect of economic change on incumbent support, we need to compute the average economic voting effect for each time frame. I do this in figure 5, which shows the estimated economic voting effect from figure 3 multiplied by the average rate of economic growth for each time frame across all of the countries in my data. This figures tells a rather interesting story. While the economic vote undergoes much decay over time, accumulating levels of economic growth mean that there remains a persistent economic voting effect nonetheless. These figures show

[8]Still, as the coronavirus pandemic has demonstrated, it is perfectly possible for a country to experience double-digit negative growth in only a very short period of time. That Irish GDP grew 26% in a single year (OECD 2016; Halpin 2016) shows that the opposite case is also possible, if rare.

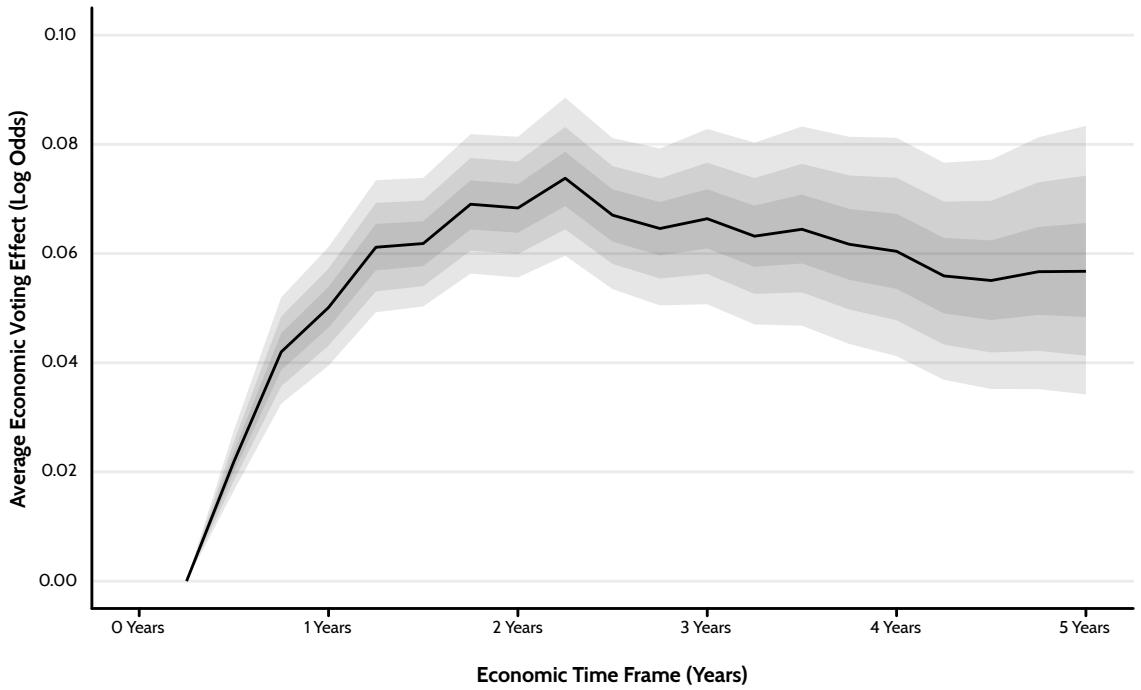

Figure 5: Economic time frames and economic growth share a positive correlation. This means that even though the effect declines in size, the average economic voting effect remains large. Indeed, economic change continues to influence incumbent support even over a 5 year time frame. Here light, medium, and dark areas reflect 95%, 80%, and 50% credible intervals, respectively.

that economic change over the past 2.25 years has the largest effect on support for the incumbent party (0.07, 95% CI: 0.06 to 0.09). Yet there is still a sizeable economic voting effect of economic growth over the past 5 years (0.06, 95% CI: 0.03 to 0.08), even if this effect size is far less certain.

Robustness Checks

Sceptics might argue that I have little evidence that economic voting effects undergo exponential decay. If some other functional form were better able to characterise it, then my results might not be correct. To be clear, my choice is a theoretical one. As I mention above, there is an extensive literature on the psychology of memory that finds that they undergo a similar decay process (Murre and Dros 2015; Averell and Heathcote 2011). Further, the half-life equation that I borrow from the physical sciences serves only to provide a useful way of describing this process. That is to say, it does not require any assumptions beyond those of a typical exponential curve.

The only real challenger to the exponential decay function in the literature is the logistic decay function that Wlezien (2015) proposes. In practice, the two functions are very similar.

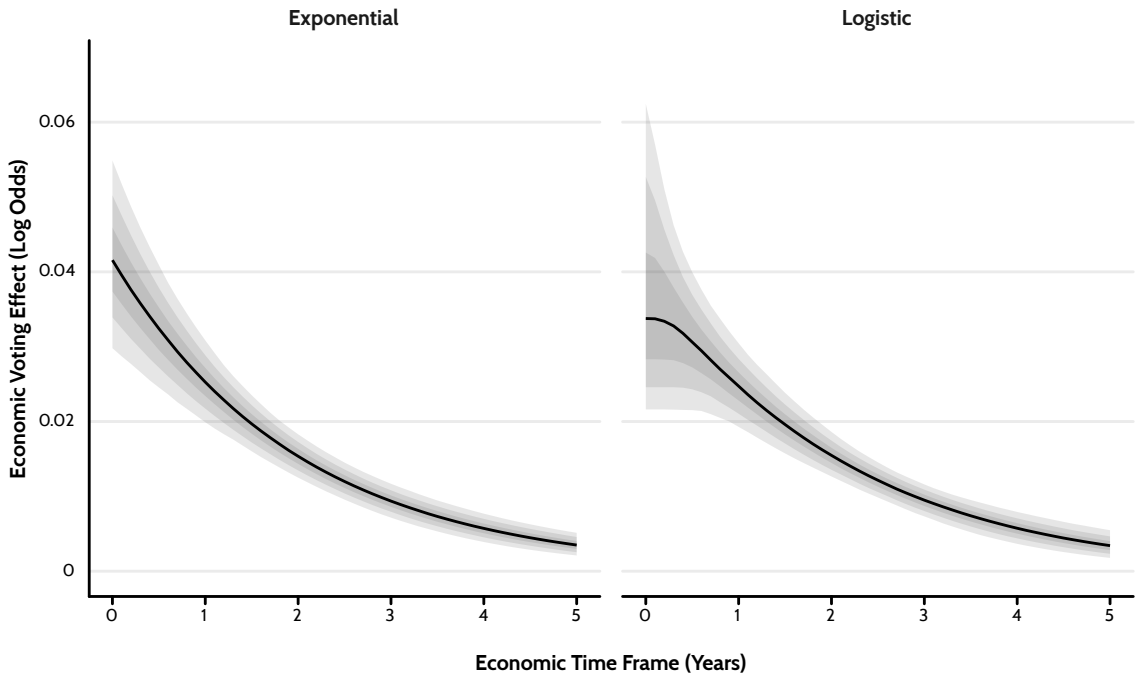

Figure 6: Assuming either an exponential or a logistic decay function results in almost exactly the same findings. The exponential function, however, shows a better fit to the data. Here light, medium, and dark areas reflect 95%, 80%, and 50% credible intervals, respectively.

Both start at some initial value, undergo a process of decay, then eventually approach zero. Their primary difference is that unlike the exponential function, the logistic function shows an initial plateau before any decay occurs. This would make sense if we expected voters to vote based on a broad consideration of economic change over, say, the past two years before the date of the election. Whether they do so is debatable and, again, requires that we estimate the necessary parameters from the data.

This presents us with two competing hypotheses. The first, that voter myopia undergoes a process of exponential decay. The second, that voter myopia undergoes a process of logistic decay instead. To test my model's robustness to this potential challenger, I refit it with a logistic decay function (for the corresponding parameter estimates, see table A2). As figure 6 shows, the resulting logistic decay model (right-hand panel) implies voter myopia of almost exactly the same nature as the exponential decay model (left-hand panel). Yet the logistic model showed a worse fit to the data when compared based on a range of information criteria. For example, it had a larger LOOIC score (Logistic = 203,086.1, Exponential = 203,050) and a much smaller model

weight[9] (Logistic = 0.09%, Exponential = 99.91%). As such, my model appears to characterise voter myopia well, at least compared to its most prominent competitor.

Conclusion

My findings show that voter myopia is real. The economic voting effect itself decays over time. But, as Wlezien (2015) argues, it does not decay as quickly as past research would suggest. My results show that the economic voting effect does not last only the election year (Healy and Lenz 2014) or even just the past few months (Achen and Bartels 2016). Rather, the economic voting effect is strongest where economic time frames are shortest, decays to half its value after around a year and a half, then continues to decay thereafter. Some suggest that this pattern might reflect a rational decision on the part of the electorate (Achen and Bartels 2016; Wlezien 2015): it makes sense to ignore the first view years of economic change if decisions that the incumbent's predecessor made continue to reverberate through the system. I am not so sure. Given that forgetting is a natural part of information processing I, like Huber, Hill, and Lenz (2012), suspect that the pattern I find arises due to fundamental limits on human cognition.

Though the economic voting effect itself decays over time, my findings show that the effective influence of the economy on how people vote does not (at least over the 4-to-5 year time span associated with most terms in office). This is because though longer economic time frames bring smaller economic voting effects, they also tend to bring greater amounts of economic growth on average. As such, voter myopia and economic growth counterbalance each other, thereby producing a sustained influence of the economy on support for the incumbent party. This is a positive and reassuring outcome. That voters respond to economic change over a long period of time means that governments must contend with the consequences of more of their actions. It may be for this reason that Fieldhouse et al. (2020), for example, find that economic downturns can have lasting consequences beyond the direct effect that they have on jobs and living standards.

That said, my findings do raise some problems. For instance, that the economic voting effect is strongest when economic time frames are shortest suggests that "myopic policies for myopic

[9]Model weights reflect the probability that one model will show the best fit to the data versus any other models it is compared to Wagenmakers and Farrell (2004)

voters" (Tufte 1978, 143) remain a real concern. A nefarious government might try to engineer rapid economic growth in the period before an election in order to bolster their prospect of holding on to power. That this does not play out in the average economic voting effect shown in figure 5 is reassuring. But that does not mean that it does not occur at all. Thankfully, even if economic manipulators do attempt such a feat, that the cumulative change that voters say they consider most important (Healy and Lenz 2014) continues to affect their vote suggests that its influence might only be negligible.

There are many opportunities to extend my analysis. One possible extension would be to engage with the literature on the apparent grievance asymmetry in economic voting (Park 2019; Soroka 2006; Bloom and Price 1975). Given the serious ramifications that economic downturns have for voters' material well-being, it seems reasonable to expect their memories of bad times to outlast those of good ones. Allowing the decay constant, $lambda$, and the initial economic voting effect, β_0 to vary, say, pre- and post-crash would allow us to test for this. Finally, we might expect voters' economic time frames to differ according to their own personal characteristics. Though some voters do not pay attention to politics, some do. As such, more attentive voters might also be less myopic. Again, allowing the parameters to vary over these characteristics would allow one to test this hypothesis. In doing so, we might finally come to understand how voter myopia shapes democratic countries and the governments that they elect.

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Table A1: Parameter estimates from my conventional economic voting model. Here, year-on-year GDP change data come from the OECD's Quarterly National Accounts individual-level voting intention data come from the Comparative Study of Electoral Systems' Integrated Module Dataset

	Standard Year-on-Year Model			
	Estimate	Error	2.5%	97.5%
Intercept, α	-0.59	0.08	-0.75	-0.45
GDP (Year-on-Year), β_0	0.02	0.00	0.01	0.02
Years Passed, δ	0.16	0.01	0.14	0.18
N (Individuals)				$151,822$
N (Countries)				34
LOOIC				$211,646.2$
WAIC				$235,399.2$

Table A2: Parameter estimates from the logistic decay model predicting incumbent voting intention. Data come from the Comparative Study of Electoral Systems' Integrated Module Dataset.

	Logistic Model			
	Estimate	Error	2.5%	97.5%
Intercept, α	-0.60	0.07	-0.75	-0.47
GDP (t = 0), β_0	0.04	0.01	0.02	0.06
Decay Constant, λ	0.52	0.08	0.37	0.68
Slope Concentration, ϕ	0.96	0.86	-1.25	2.04
Years Passed, δ	0.14	0.01	0.12	0.16
N (Individuals)				$151,822$
N (Countries)				34
LOOIC				$203,086.1$
WAIC				$203,202.1$