Joining the Great Majority: An Analysis of Senate Deaths, 1919–2015*

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Objective. In this article, we explore the deaths in office of U.S. senators between 1919 and 2015, examining both historical trends at the aggregate level and at the individual level searching for partisan and other patterns in mortality rates. *Methods.* We employ Cox proportional hazard models to examine the effects of factors such as age, tenure in office, electoral factors, and legislative engagement, as well as partisanship and ideology. *Results.* Notably, we find no significant partisan or ideological effects. When we examine the parties separately, we find that other institutional factors (tenure in office, vote share, bill sponsorship) matter for Democrats, while expectation of who would replace them in office matters for Republicans. *Conclusion.* Our findings contribute to previous work on legislative turnover in Congress by taking the first step to analyze deaths among U.S. senators from almost the entire history of the elected Senate.

> Life is the desert, life the solitude, death joins us to the great majority.
>
> Edward Young (1683–1765)

Legislative turnover is driven by three dynamics: electoral defeats, voluntary retirements (either to pursue other, usually higher, offices or retirement from public life), and deaths.[1] While there is a voluminous scholarly literature on the causes and consequences of electoral defeats and a growing literature on retirements, congressional deaths have been largely ignored. This is unfortunate because deaths in office have constituted a nontrivial source of congressional turnover. Indeed, Maltzman, Sigelman, and Binder (1996) calculated that between 1789 and 1996, 1,084 members of Congress (MCs) and senators had died in office, over 9 percent of the approximately 11,500 individuals who had served in the two chambers up to that point. While Maltzman, Sigelman, and Binder provide some interesting findings about patterns in congressional mortality, their data and analysis are aggregated, providing little insight into the individual characteristics that might correlate with demise in office. In itself, that might not be problematic, if deaths were more or less randomly distributed across members, at least within general bands of demographic expectations. However, there is a reason to suspect that is not necessarily the case. In their innovative study of vacancies

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[1] A fourth category, expulsions, has been important at various points in American history, but is less relevant to the time period of our study of the Senate. Since 1919, eight senators have been charged with expellable offenses (ranging from disloyalty to sexual misconduct). Of those, five were acquitted and the remaining three resigned before being subjected to an official expulsion vote; we treat those three as retirements.

on the Supreme Court, Zorn and van Winkle (2000), for instance, found that—even after controlling for age—deaths on the bench were significantly and negatively correlated with judicial output (as measured by total number of opinions justices had written in the preceding year), suggesting that less active, less engaged justices are more likely die with their proverbial robes on. More relevantly, recent studies have found, though not fully explored, that in both the modern House (Ang and Overby, 2012) and the modern Senate (Masthay and Overby, 2015) Democrats were more likely to die in office than Republicans. If there is, in fact, a significant and durable mortality differential between Republicans and Democrats that would be of interest since it could affect partisan control of the legislature.

Most previous literature on this topic has taken a humorous (though sometimes macabre) approach. In their pun-filled article, Maltzman, Sigelman, and Binder (1996:669) title their concluding section the "post-mortem," note that their "ghoulish" next step is to try to predict which members will die in office, and note that further research on the topic "will require much digging." Similarly, Wuffle, Brunell, and Koetzle (1997:58) note that the r^2 between time and mortality rates among sitting senators is 0.87, extend the regression line into the future, and conclude with tongue in cheek that "[s]enators who manage to retain office will be nearly immortal." Gaddie (2004:7) concludes that the expansion of Major League Baseball from "ten cities through the 1940s to almost 30 cities in the 1990s" provides the best explanation of declining Senate mortality rates because the two institutions look alike: "slow to integrate, begrudging of letting girls play the game, and generally speaking, . . . wedded to old-fashioned rules and working in arcane and ancient looking venues."

In this article, we take a more serious tack. Believing that a fuller understanding of legislative turnover requires a better understanding of *all* routes of exit from the Congress, we will examine the correlates and consequences of deaths in the U.S. Senate between 1919 and 2015. While at the individual level death can be a highly idiosyncratic event, in the aggregate it can be and is studied in a systematic fashion. Indeed, the entire field of actuarial science is based on the proposition that contingent events, such as death, can be more fully understood and modeled. To be clear, we are not interested in predicting the likelihood of death of any given senator, but rather in determining what individual, institutional, and political factors may be associated with death in office (or conversely, and to put it more positively, associated with longer careers in the institution).

We begin in 1919 because the 66th Congress (1919–1920) marked the first in which all senators had been elected (rather than appointed) to office; this time series allows us to explore mortality dynamics across the entire history of the elected Senate. We focus on the Senate, rather than the House, for several reasons. First, recent analysis (by Masthay and Overby, 2017; Masthay et al., 2016) has found no retirement differential between Republicans and Democrats in the Senate. A significant death differential would be more unusual there than in the House, where differences between the parties in willingness to serve have been long noted (Gilmour and Rothstein, 1993; Ang and Overby, 2008; Murakami, 2009). Second, unlike in the House, where every vacancy triggers a by-election, or on the federal bench, where a vacancy prompts a nomination process determined (in large measure, at least) by the president, Senate vacancies lie somewhere in between. Eventually, every Senate vacancy is filled by an election, but the 17th Amendment (and 2 USC Section 8) stipulates that a vacancy "may also be filled temporarily, if authorized under state law, by a gubernatorial appointee who serves in the Senate until 'the people' fill the vacancy for the remainder of the term 'by election'" (Maskell, 2010).[2] At least in some circumstances,

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[2]We provide more details below regarding the extent and limitations of this gubernatorial appointment power.

FIGURE 1

Senate Deaths by Year, 1919–2015
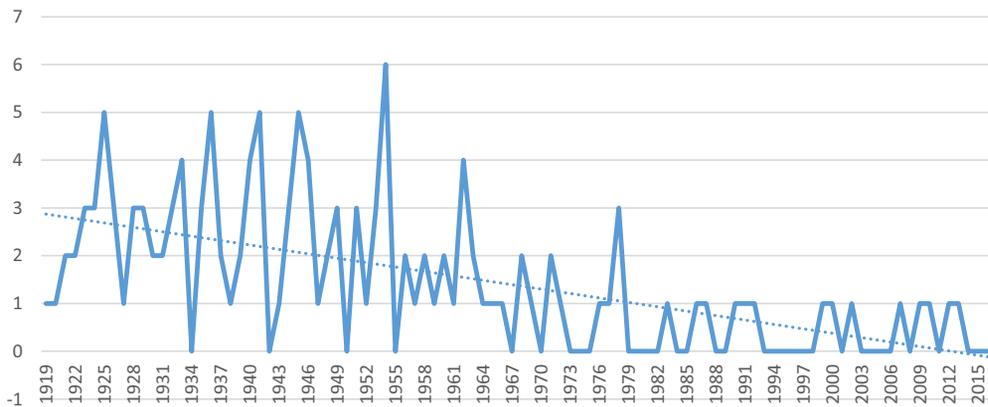
as in the case of the judiciary (Zorn and van Winkle, 2000), this might reasonably provide some senators with incentives to delay resignation (and increase the odds of mortality in office) based on who holds the state's governorship.

We proceed as follows. First, in the next section, we outline the issue of senators' deaths in office since 1919, detailing temporal patterns and other, aggregate, descriptive data. Second, we briefly review the limited research on Senate careers, as well as the (also limited) research on mortality of government officials. Third, we describe our individual-level data and modeling strategy. Fourth, we present our empirical results and, finally, in a concluding section, we discuss their substantive implications.

Senate Deaths in Office, 1919–2015

Between 1919 and 2015, 135 senators died in office. The overall temporal trend is displayed in Figure 1, which shows a clear downward movement in mortality in office, with the correlation between mortality in office and time registering at 0.71. Several facts highlight this, including that four times before the end of World War II five senators died in office in a single year, whereas that has happened only once since 1945. Indeed, over the past decade a total of only five senators have died in office; the last year to see multiple Senate deaths was 1978.

Of the 135 total, most were related to natural causes, but a dozen were not, including six accidents (three automobiles, three airplanes; four Republicans, two Democrats), four suicides (three Republicans, one Democrat), and two assassinations (Huey P. Long [D-LA] and Robert F. Kennedy [D-NY]) (see Amer, 2002).

Deaths in office sometimes have had immediate political effects for the Senate. For instance, Theodore Bilbo's (D-MS) death from cancer in August 1947 ended a bitter and prolonged floor battle over whether to seat him following a 1946 reelection campaign in which he was accused of inciting racial riots and illegally converting campaign donations for personal use (Green, 1976). In September 1969, the death of minority leader Everett Dirksen (R-IL) triggered a contentious leadership battle within the Republican Party eventually won by "The Elder" Hugh Scott of Pennsylvania over "The Upstart" Howard

Baker of Tennessee.[3] And it was a spike in congressional deaths in the late 1920s that led to the creation of the Office of Attending Physician (first for the House in 1929, later extended in 1930 to the Senate, and later still to the Supreme Court), coordinated through the Navy.[4]

More importantly, there could be patterns in mortality in office that might have significant political implications. For instance and as noted above, at least at first blush it appears that there is a partisan differential to mortality rates. More particularly, since 1919, 77 Democratic senators died in office, roughly 16.8 percent of all Democrats served in this period, versus 58 Republicans, or 14.3 percent of their party total, even though on average Republican senators in our sample were marginally older than their Democratic counterparts. Across the 49 Congresses included in our data, there was at least one Democratic death in 35 of them, whereas there were Republican deaths in only 24. If this (or other differentials) were to hold up in multivariate analysis, deaths in office could prove to have substantial implications for control over the Senate.

Previous Research

Empirical research on deaths in office is rare. The best study available on congressional mortality (Maltzman, Sigelman, and Binder, 1996) is aggregate rather than individual in its analysis. The best individual-level analyses (Zorn and van Winkle, 2000; see also Iqbal and Zorn, 2006) do not focus on the Congress. In their analysis, Maltzman, Sigelman, and Binder (1996) examine deaths in office between the 57th and 103rd Congresses (1901–1994), treating members of the House and senators in the same model. The pun-filled article includes many interesting individual anecdotes, but takes a broad, aggregate, longitudinal view in its empirical enquiry, concluding that the "age composition" in the chambers and the introduction of better ventilation (including air conditioning) on Capitol Hill in the 1930s significantly influenced mortality in office. In contrast, changes in job stress (measured as the number of bills introduced per legislative day) demonstrated no significant effect. Zorn and van Winkle (2000) consider the impact of various "personal considerations, institutional influences, and political factors" associated with vacancies on the Supreme Court due to either retirement or death between 1789 and 1992. While their retirement model indicates that factors in all three categories influence voluntary departures (specifically, pension eligibility, years of service on the Court, participation in Court activities in drafting opinions, rates of dissent, and serving in the second term of a president), only opinion writing was associated with mortality; interestingly, once other factors are taken into account, age per se is not significantly associated with either retirement or death on the bench.[5]

In terms of Senate careers more generally, research in this area has lagged that found in the House. To date, only five studies have empirically analyzed Senate retirement

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[3]See ⟨senate.gov/artandhistory/history/minute/Dirksens_Death_Prompts_Leadership_Race.htm⟩. On the other side of Capitol Hill, as Maltzman, Sigelman, and Binder (1996:665) note: "It was the untimely passing of 14 members, including Speaker Nicholas Longworth (R-OH), that enabled Democrats to elect of their own as Speaker during the 72nd Congress (1931–1933) even though Republicans had won a majority of House seats in the 1930 election."

[4]See ⟨senate.gov/artandhistory/history/minute/A_Doctors_Warning.htm⟩.

[5]In their analysis of the "widow effect," or wives succeeding husbands who die while serving in Congress, Solowiej and Brunell (2003) find House members' age is positively associated with dying in office and the husband's seniority is positively related to the probability of his wife replacing him in office. The author's note: "The same factors that lead a House member to die in office are positively associated to the factors that lead his widow to serve in his seat after his death" (Solowiej and Brunell, 2003:289).

patterns. Livington and Friedman (1993) were motivated by the surge in congressional retirements observed during the 1970s. Inspecting retirement data from both chambers in the 1980s, they concluded that the previous decade's spike had been an "aberration." Largely descriptive in nature, their analysis did show a slightly (roughly 1 percent) greater tendency toward retirement on the part of both House and Senate Republicans compared to their Democratic colleagues. However, their limited time series made it difficult for them to determine whether this was a partisan or a minority difference (1993:247). Brunell and Koetzle (1999) examine Senate resignations from 1834 to 1996 and find that senators are more likely to leave office when they are certain their successor will be of the same party. However, while the incentive to resign when a successor will be a co-partisan has remained constant, the likelihood of this occurrence has decreased over time. Bernstein and Wolak (2002) deployed data from a more extensive time series to examine Senate retirements between 1962 and 2000, concluding that only two variables were significantly related to retirements: age and membership in the minority party. Unfortunately, they did not test for an effect of partisanship itself.

Most recently, Masthay and Overby (2017) have analyzed retirements in the "modern Senate" (dated from the campaign finance and filibuster reforms of the early 1970s), and Masthay et al. (2016) extended this analysis back to 1919. In the more modern study, they uncovered no evidence of any significant partisan differential in either full retirements from public life or among progressively ambitious senators (contrary to findings from Ang and Overby, 2008 for the House), nor did they find any significant ideological effects (contrary to Murakami, 2009, for the House). Rather, full retirements were influenced positively by age, being up for reelection, length of service in the chamber, being an appointed (rather than elected) senator, and (counterintuitively for such an anti-majoritarian institution) being in the minority, and negatively by prior legislative service; the only significant correlates to progressive ambition were tenure in the chamber (positively) and previous legislative experience (negatively). In the longer historical analysis, Masthay et al. (2016) report very similar findings over the past (near) century.

Data and Methods

Motivated by our interest in Senate deaths generally and a possible partisan differential in those deaths specifically, and guided by previous research on congressional careers (especially their termination), we examine Senate careers between 1919 and the present. Our dependent variable is binary, indicating whether in any given Congress a given senator died in office (coded 1) or not (coded 0).[6]

On the right-hand side of the equation, we include party (coded 0 for Democrats and 1 for Republicans, with "independents" coded according to the party with which they caucused), ideology (measured by first dimension DW-NOMINATE scores), and whether in that Congress a senator was in the chamber's minority (0) or majority party (1). These variables will permit us to see whether deaths in office have disproportionate political consequences, affecting one party, one ideology, or one side of the aisle more than the other. There are certainly reasons to expect that they might. Numerous scholars have noted substantial differences between the two parties that might have repercussions for the desire to remain in office and, ultimately, for morbidity in office. Freeman (1986:336–37) phrased

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[6]We treat all 135 deaths in office, the result of natural causes or not, the same. Excluding the dozen due to nonnatural causes does not significantly affect our results.

her descriptions in terms of cultural differences between the party of the "center" and the party of the "periphery," noting:

> The Republican center does not include the state, that is, the major organs of the national government. Republicans have always felt a tension between the state and have viewed the former with suspicion even when in power. Since Republicans as individuals control most of the major private institutions, particularly economics ones, a strong central government is seen as a threat to their power. The Democratic periphery feels a strong government is necessary in order to counterbalance private economic domination.

In his examination of divided governments of the latter half of the 20th century, Jacobson (1990:122; see also Ehrenhalt, 1992) relied more heavily on data to conclude "that the activities that comprise and sustain a congressional career are, other things equal, more congenial . . . to Democrats than Republicans." As noted above, Murakami (2009) found that ideological belief in smaller, less intrusive government was associated with earlier voluntary departures from the House in both parties. And, most recently, Grossman and Hopkins have detailed numerous differences between the parties at both mass and elite levels, with Republicans more likely to identify themselves as ideologues, while Democrats tend to orient party affiliation around seeking and securing group benefits (2015:123–26, 2016:Ch. 2). Based on these lines of reasoning, our data will permit us to determine if Democrats more than Republicans remain in the Senate long enough to die there.

We also include two measures of each senator's engagement in the institution, proxied as the number of bills he or she introduced that Congress and in the preceding Congress.[7] These variables are similar to the "opinion output" measure used by Zorn and van Winkle (2000) in their study of Supreme Court vacancies. Like them, we treat these as something of mixed measures of overall job satisfaction and general physical vitality. As Putnam summarized the research on social engagement: "The more integrated we are with our community, the less likely we are to experience colds, heart attacks, strokes, cancer, depression *and premature death of all sorts*" (2000:326 emphasis added). We include both current and lagged measures to account for the fact that declines in health (and, of course, death itself) might attenuate productivity for those senators dying in a given Congress, while the lagged variable gives us a better estimate of longer-run health and engagement. Similarly, we include a measure of electoral security, measured as vote share in the most recent election.[8] Our expectation is that senators who more easily win reelection will be more likely to stay in office long enough to increase their odds of dying on the job. We also include a measure of whether the senator was up for reelection in that Congress (1) or not (0). As Fenno (1982) has pointed out, unlike House members who are in a more or less "constant campaign" for reelection, with their longer terms senators tend to move back into the full rigors (and related stress) of campaign mode only in the final two years of each six-year term.

In addition, we include a variable indicating whether a senator would expect to be replaced by someone of his or her own party (1) or not (0) (see Brunell and Koetzle, 1999). This expectation varies by state, according to state law. A large majority of states (46) permit the governor to make an interim appointment until an election is held to fill the vacancy (either in the next scheduled general election or in a special election). In four of those 46 states (i.e., Arizona, Hawaii, Utah, and Wyoming), the interim appointee must

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[7]We have comprehensive sponsorship data (from the Congressional Bills Project) only back to 1947, so in the complete model including this variable we cannot make full use of our time series.

[8]In the case of appointed senators, we use the vote margin for the party's candidate in the most recent election.

be of the same party as the vacating senator.[9] We code as 1 senators from states where the governor has interim appointment powers and either is of the same party of the senator or is bound by law to make interim appointments of the same party; all other cases are 0. We also include two other personal factors, age and tenure in the Senate, that are either strongly associated with mortality rates or have been used in previous research on mortality and retirements.

Notably, we do not include several variables that have been included in previous work on political careers (e.g., Squire, 1988) and Senate retirements (see, e.g., Masthay and Overby, 2017) including infirmity, prior legislative experience, being a member of the president's party (especially in a midterm), being a southern Democrat, appointment status, and gender. Unfortunately, given the large number of cases involved, we have no good measure of health in general or infirmity in particular.[10] In addition, several of these variables (e.g., southern Democrats, being a member of the president's party) would seem to have no logical association with mortality. And, finally, neither appointment status nor gender can be modeled in our equations since there are no examples in our data of either nonelected or female senators dying while in office.

Since our data are in the form of event histories and we are interested in the "time until the occurrence" of death, we model our analysis using a Cox proportional hazard estimator (Jones, 1994). This does not require that we assume what the underlying baseline hazard function looks like or require us to make a priori judgments about the probability distributions at work.[11] To compensate for the probable correlation of error terms across repeated observations of senators, we employ robust standard errors clustered by senators.

Results

We summarize the results from our most general multivariate analyses in Table 1, with the middle column displaying results from the full time series and the right column showing those from the 80th to 113th Congresses for which we have bill sponsorship data.

The most obvious finding is perhaps the least provocative: age is a significant predictor of mortality in both models.[12] While this is entirely in line with expectations based on data on Senate retirement decisions (see Bernstein and Wolak, 2002; Masthay and Overby, 2017), it is worth noting that Zorn and van Winkle (2000) did not find a relationship between age and deaths on the Supreme Court.

In the full model (1919–2015), two other variables emerge as statistically significant: a senator's percentage of the vote in the previous election and tenure in the Senate (at the more generous 0.10 threshold). Both generate coefficients greater than 1, indicating that longer terms of Senate service and larger previous vote shares are associated with greater odds of dying in office. Notably, there is no observable partisan effect (nor ideological effect) on deaths in office in the Senate. As with retirements (Masthay and Overby, 2017),

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[9]For more details, see the summary on the webpage of the National Conference of State Legislatures ⟨www.ncsl.org/research/elections-and-campaigns/vacancies-in-the-united-states-senate.aspx⟩.

[10]See Squire (1988:185–86) on some of the difficulties encountered when trying to measure and categorize health.

[11]Most works on congressional retirements (e.g., Bernstein and Wolak, 2002; Murakami, 2009; Masthay and Overby, 2017) have modeled retirement decisions using either probit or logistical regression estimators. We ran our death models using logistical regression as well and found results substantively very similar to those produced by the Cox hazard model.

[12]In Cox proportional hazard models, ratios greater than 1 indicate a positive relationship, those less than 1 a negative relationship.

TABLE 1

Cox Proportional Hazard Estimates of U.S. Senate Deaths 1919–2015

	Full Model (1919–2015)	Model Including Bill Sponsorship (1947–2015)
Age	1.102***	1.076***
	(0.013)	(0.018)
Tenure in Senate	1.000*	1.000
	(0.00005)	(0.0007)
Reelection Congress	1.109	1.057
	(0.227)	(0.324)
Party	1.000	0.996
	(0.002)	(0.004)
Previous vote share	1.016***	0.999
	(0.006)	(0.012)
Majority party	1.215	1.288
	(0.250)	(0.495)
Ideology	1.390	1.349
	(0.317)	(0.466)
Expectation of partisan replacement	1.307	1.335
	(0.273)	(0.421)
Bill sponsorship	–	0.971***
		(0.009)
Lagged bill sponsorship		1.019***
		(0.004)
N	4,871	2,873

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$; two-tailed tests. Robust standard errors clustered by senator.

once we control for other relevant factors, morbidity data indicate no differences between Republican and Democratic careers in the upper chamber.

For the later 1947 to the present period, for which we have bill introduction data, the results in the right-hand column of Table 1 indicate that age remains robustly significant. While vote share and tenure in office decline to insignificance, both bill sponsorship variables are robustly associated with mortality in office. However, their operations confound our expectations, with greater activity in the current Congress associated with lower odds of dying in office, while lagged activity is associated with higher probabilities of death in office. And again party displays no appreciable effect.

To delve further into the correlates of death in office, we follow the lead of Murakami (2009) to examine Democrats and Republicans separately. Results for Democrats are summarized in Table 2, those for Republicans in Table 3.

Comparing the results is interesting. While we do not find the ideological effect that Murakami (2009) found for retirements,[13] we do observe differences between the parties. Among Democrats, previous vote share in the fuller models and bill sponsorship in the more attenuated model are significantly associated with mortality in office (along with age). As in the bipartisan models, larger vote margins and more legislative activity in the previous Congress correlate with greater odds of death in office, while legislative activity in the current Congress has a negative association. However, other than age (which appears quite modest in the bill sponsorship model) and a marginal effect for lagged legislative activity,

[13]It is worth noting that in the Democratic model including bill sponsorships, the ideology measure comes close to at least the more generous threshold for statistical significance ($p \leq 0.011$), with its ratio indicating that more conservative Democrats might have been modestly more likely to die in office.

TABLE 2

Cox Proportional Hazard Estimates of U.S. Senate Deaths, Democrats 1919–2015

	Full Model (1919–2015)	Model Including Bill Sponsorship (1947–2015)
Age	1.106***	1.077***
	(0.016)	(0.020)
Tenure in Senate	1.000	1.000
	(0.0001)	(0.0009)
Reelection Congress	0.986	1.176
	(0.267)	(0.492)
Previous vote share	1.022***	1.009
	(0.007)	(0.014)
Majority party	1.217	1.131
	(0.391)	(0.663)
Ideology	1.237	2.078
	(0.351)	(0.952)
Expectation of partisan replacement	1.065	0.914
	(0.315)	(0.363)
Bill sponsorship	–	0.974***
		(0.009)
Lagged bill sponsorship	–	1.024***
		(0.005)
N	2,686	1,576

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$; two-tailed tests. Robust standard errors clustered by senator.

TABLE 3

Cox Proportional Hazard Estimates of U.S. Senate Deaths, Republicans 1919–2015

	Full Model (1919–2015)	Model Including Bill Sponsorship (1947–2015)
Age	1.103***	1.077*
	(0.023)	(0.034)
Tenure in Senate	1.000	1.000
	(0.0001)	(0.0003)
Reelection Congress	1.323	1.004
	(0.410)	(0.605)
Previous vote share	1.002	0.964
	(0.014)	(0.028)
Majority party	1.231	1.321
	(0.354)	(0.772)
Ideology	1.746	0.890
	(0.763)	(0.505)
Expectation of partisan replacement	1.795**	2.552
	(0.315)	(1.491)
Bill sponsorship	–	0.970
		(0.025)
Lagged bill sponsorship		1.014*
		(0.008)
N	2,185	1,297

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$; two-tailed tests. Standard errors clustered by senator.

among Republicans only the expectation of a co-partisan replacement is significantly associated with death in office. While the effects (as would be expected) are relatively modest,[14] they suggest that at least around the margins Democrats are more responsive to institutional factors inside the chamber, whereas Republicans are more responsive to broader political dynamics away from Capitol Hill.[15] Although we do not want to hyperbolize the differences, they do seem consistent with an asymmetric view of the parties in which Democrats are more intrinsically fulfilled by government service, while Republicans are more ideologically instrumental in their motivations (Ehrenhalt, 1992; Jacobson, 1990; Grossmann and Hopkins, 2015, 2016).[16]

Summary and Discussion

This article was motivated by, generally, a curiosity regarding an underexplored source of Senate turnover and, more specifically, an interest in whether death in office is patterned in politically significant ways. Using data from 1919 to 2015 and guided by research on both death in other offices and retirements from the Senate, we find that after controlling for other relevant factors, there is no significant partisan difference in deaths in office. Not surprisingly, in our multivariate models, age emerges as the single most conspicuous predictor of death in office, for members of both parties. And, overall, our full model performs about as well as Zorn and van Winkle's (2000) efforts to account for deaths on the Supreme Court. When we examine the parties separately, we find that other institutional factors (tenure in office, vote share, bill sponsorship) matter for Democrats, while expectation of who would replace them in office matters for Republicans.

Given similar nonsignificant results in terms of Senate retirements, failure to find a partisan differential in Senate deaths is not surprising. The same reasons (e.g., greater negative powers such as the filibuster, more executive functions) that Masthay and Overby (2017) cite as lowering GOP eagerness to retire from the Senate presumably also contribute to Republican senators remaining in the chamber long enough to die there. However, the interparty differences are interesting and deserve a bit more discussion. While several of the effects are decidedly marginal, the fact that Democratic morbidity is sensitive to legislative activity while Republican mortality rates are more strongly associated with replacement may indicate at least a slight Democratic preference for serving in the Senate.

In subsequent research, we hope to explore this matter in some greater detail. Among our plans are to revise and extend the time series back into the 19th century, to extend (back to 1919) and refine (including using percentage of introductions) the bill sponsorship proxy for legislative engagement, explore for period effects within the time series, and consider the subsequent electoral effects of deaths in office.

Though deaths in office have decreased in frequency in recent decades, historically they have accounted for a nontrivial proportion of turnover on Capitol Hill, which suggests that understanding their dynamics might provide us with some important insights into

[14]In the GOP model including bill sponsorships, the partisan replacement expectation ratio is significant at the $p < 0.109$ level.

[15]In this regard, it is perhaps also worth noting that previous studies have found Republicans to be more successful than Democrats in retaining open seats in both chambers, suggesting greater coordination in terms of legislative careers. For the House, see Ang and Overby (2008); for the Senate, see Brant, Masthay, and Overby (2017).

[16]The fact that we notice such differences across a time series of almost a century also supports Grossmann and Hopkins's claim that the differences between the parties are "enduring" (Grossmann and Hopkins, 2015:121).

the composition and control of the Congress. In this article, we have taken a step in that direction by providing some initial analysis of deaths among U.S. senators from almost the entire history of the elected Senate.

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