Changing Seats Changes Minds: Randomized Seating and U.S. Legislative Outcomes*

LAUREN COHEN
Harvard Business School and NBER

BO LI
Peking University

This Draft: November 19, 2025

We find that randomly assigned peers play a sizable and unique role in shaping political economy. Closely seated, and exogenously assigned, US Senate peers have a significant impact on Congressional voting, shifting votes by 11.8 percentage points (t=7.34). Physical distance is the largest and most consistent of any characteristic outside of party or state impacting voting behavior. The distance effect is concentrated in the closest peers, existing for up to 19.6 feet on the Senate floor, then dissipating. Close peers additionally increase the probability of aisle-crossing (voting with the opposite party), with the aisle-crossing impact being roughly eight times larger on the final votes on bills. By conducting counterfactuals through randomized Senate seating, 59 consequential bills would switch outcomes over our 30-year sample period. We utilize a frontier, state-of-the-art AI-enhanced computer vision model based on real-time interactions observed at every 10-second interval amongst Congressional members. Using these observed interactions, we find that face-to-face interactions are associated with significant impacts on immediately pending votes. The interactions are largely driven by distance, with aisle-seated Senators from both parties being amongst the most likely to engage in face-to-face interactions across party lines.

JEL Classification: C53, C82, D72, D82

Keywords: Randomized seating, depolarization, visual interaction coding.

* *Acknowledgements*: We thank Tor-Erik Bakke, Lucian Bebchuk, Maxime Thibault Couvert, Oliver Hart, Jiekun Huang, Louis Kaplow, Joan Farre-Mensa, Dermot Murphy, Aileen Nielsen, Vincent Pons, Kathryn Spiers, Roberto Tallarita, and seminar participants at the Bayes Business School, Harvard Law School, University of Illinois at Chicago, Harvard Business School, Peking University, University of Massachusetts at Lowell, Conference on Empirical Legal Studies at Emory University, China International Conference in Finance, for helpful comments and suggestions. We are extremely grateful to Leon Wang for superb research assistance. Please send correspondence to Lauren Cohen (Harvard Business School, Baker Library 279, Soldiers Field, Boston, MA 02163, phone: 617-495-3888, email: lcohen@hbs.edu). Bo Li (Guanghua School of Management, Peking University, No.5, Yiheyuan Road, Haidian District Beijing, 100871, P. R. China, email: boli@gsm.pku.edu.cn).

Introduction

In-group and out-group biases are some of the most established behavioral regularities within organizations (CITE sociology early work). This is true politically - as seen in the past 50 years of rising polarization seen in both the United States and other OECD countries (Gentzkow (2016), McCarty, Poole, and Rosenthal (2006)). Further, it has also been documented amongst firm executives (Fos, Kempf, and Tsoutsoura (2024)), large investors (Hong and Kostovetsky (2012)), and employees and workplaces more broadly (Colonnelli, Pinho Neto, and Teso (2022)). The root causes of this increasing trend are not fully understood, along with low-cost solution-sets being sparse.

In this paper we exploit exogenous variation in the random assignment of Senator and Representative seating locations to observe novel evidence of Aisle-Crossing, and its surprisingly large moderating effect on polarization. Namely, we find that exogenously assigned seating assignments of Senators and Representatives have sizable impacts on the manner in which they vote, who they interact with, and how they subsequently craft legislation. Seating on the Senate Chamber floor, and of House Members offices, are done through pre-defined Seniority systems. First, "freshmen" Senators get the last choice of open seats. In particular, the most "junior" by their seniority rules gets forcibly assigned the last remaining open desk (removing any endogenous component of their choice). Second, the "freshmen" House class has a historically well-known "lottery" for choosing offices, with the last Representative again getting no choice by whom they sit.

We use these exogenously placed politicians over the last 30 years to show that their choices and voting behaviors are profoundly impacted by their 'randomly assigned' neighboring legislators. Moreover, we show that exogenous seating proximate to depolarizing forces – in terms of more moderate political beliefs, or even opposing party members – significantly moves a given Senator or Representative toward that depolarized viewpoint.

A strength of our setting is that it combines random assignment (aiding in identification), with a high stakes outcome, in the form of crafting legislation. Moreover, as the behaviors we study are publicly observable (i.e., the voting on, and crafting of bills), verifiable, and frequently observed – this provides an ideal setting to identify these potential effects on behavior. In particular, we observe over one million individual votes by legislators, and even exploit variation in voting behavior within given pieces of legislation (as the same bill is often voted upon in numerous versions, by the same set of legislators).

Going further, we analyze years of video evidence (2,000 hours) of Senate Chamber interactions amongst Congressional members to granularly define the micro-foundation of this mechanism. We observe bi-lateral and multi-lateral interactions, capturing both the frequency and duration of these interactions, along with their empirical dynamics (e.g., spikes before the passage of contentious legislation).

Turning to empirical design, we use a unique setting to study the interaction of high-profile politicians in decision making. In each congress, Senators and Representatives spend much of their time surrounded by – and working with – other legislators. This is a necessary aspect of their jobs, given the ability to affect and pass legislation requires coordinated action. We then draw on the literature on in-group and out-group biases in economics and decision-making, with resultant impacts on agents' beliefs and choices. These examples range from soldiers' exposure to varying beliefs and ideologies when randomly assigned to military regimens (Wardinger and Schulz (2023)), to college roommates (Sacerdote (2001)), to neighbors (Bursztyn et al. (2024)), even to the political context for voters' cross-group exposures (Balietti et al. (2021)). Senators can substantially influence the preference of peers given their diverse technical backgrounds, expertise, and experience. With these as a backdrop, we measure the impact of peers' ideology, expertise, and voting on the voting of other legislators.

Our data set includes the entire roll call voting records within congressional sessions and congressional members in the rulemaking process in the House and Senate – representing rich data on over one million votes. The complexity regarding inference in this context is the extent to which endogenous matching to peer-exposures within the legislative framework impact votes observed, as opposed to exogenous exposures. We overcome this by utilizing the incredibly rigid and precise seniority mechanisms that congress abides by for seat (and office) location in the Senate (House) for incoming congressional members.

In the context of the U.S. Senate, seniority rules apply for Senators' seat allocations on the chamber floor. For incoming freshmen, Senate seating is assigned by seniority, starting with the date on which a lawmaker is elected. For freshmen – all elected on the same date - the ranking is then determined by a precise hierarchy of previous government experience (former Senator > former Vice President > former Representative…), even then breaking all remaining ties by state population in the last US Census). We then use this regimented hierarchy and take advantage of the fact that the most junior Senator by this ranking – much like the game of musical chairs – does not get to choose whom to sit by, but instead is forced into a set of peers.

We use solely these exogenously placed politicians over the last 30 years to show that their choices and voting behavior are significantly impacted by their 'randomly assigned' neighboring legislators. Namely, a one standard deviation increase in the percentage of randomly assigned 'forced neighbors' that vote yes (or no) on a bill increases the probability of the exogenously placed legislator voting in that same direction by 5 percentage points (t=7.34). From a mean of 63 percentage points on yes votes, this represents an 8% increase in directional voting. This is controlling for commonly known correlates of voting, such as party, state, education networks, etc. Moreover, it even takes into account high-dimensional fixed effects for Congress-Session (to control for sessions at which the votes might have been especially consensus-eliciting or divisive), Vote (votes upon which the chamber as a whole is

excessively positive or negative), and Senate member (to control for each member's average proclivity to vote in favor or against legislation).

In order to establish the true exogeneity of this most junior freshman seat assignment versus all other endogenously-chosen seating selections of Senators, we run a hedonic model of assortative seating choice on both sets of Senators. For Senior Senators, they assortatively match on a rich number of characteristics. In particular they are significantly more likely to locate close to other Senators who are: the same age, same Seniority in Congress, same gender, same college attended, same college major, same religion, and same professional background (e.g., law, finance, or military). For the most junior freshman Senator, each of these characteristics have a statistically insignificant and close to zero impact on their seating location, providing empirical support for the random assignment mechanism.

We then move on to explore this mechanism in more depth by examining situations in which the impact of "exogenous" peers on voting decisions is especially large or modest. In each of these settings, there are both the supply of - and the demand for - a given vote to consider. Namely, the demand of legislators to convince a given Senator of a position, along with that Senator's willingness, ability, and incentive to supply that vote. We report the average equilibrium of these effects on voting behavior. To begin, we examine close votes in passage (i.e., within 5 percent of passing), as the incremental value of votes are expected to be larger. We find that exogenous peers' impacts are significantly larger precisely on these marginal votes. Namely, in both economic and statistical significance, the impact of exogenously assigned peers is 15-20% larger than the average effect (t=3.03).

We next move on to explore the impact of exposure to the network. Namely, as the Senator spends more time (gets more exposure) to the exogenous peer group, the impact on voting is significantly larger – with the impact roughly 30% larger (t=2.54) in the second year of the most junior Senator's congressional term vs. their first term. Going further, we find that the exogenously assigned peers remain important allies of the given Senator even after they move apart from each other in the Chamber. This

persists for roughly 3 Congresses post their initial seating together (6 years), and then decays over time to an insignificant effect.

Turning to the spatial dimension, our main result highlights the importance of forced neighbors for voting behavior of the most junior freshman. We estimate that this spatial impact is largest for the closest neighbors, persisting for neighbors within roughly 19.6 feet, and then dissipating. Motivated by this, we explore in particular those Senators that are seated closest to their out-group (the opposing party): those with aisle seats. In particular, we explore the extent to which Senators are willing to deviate from their party's vote on a bill given exposure to opposing viewpoints from the alternate party (i.e., aisle-crossing). We find that these Senators are significantly more likely to deviate from their own party when their cross-aisle peers are more in favor of a given bill. This aisle-crossing effect is non-trivial: when all cross-aisle peers are in favor of a bill, this increases the chance of deviating from the party by 5% (t=5.93). Moreover, although we have only one most junior freshman assigned to the aisle over our sample period, the point estimate on the impact of their cross-aisle peers is roughly four times larger, and marginally statistically significant.

Cross-aisle impact also provides a laboratory in which we test whether out-group peers appear to exert more influence in certain settings. In particular, the same bill is voted on numerous times during its life before final passage (failure). First, as the final vote is the most consequential for legislation, we might expect to see exerted influence significantly higher for these higher stakes final votes. We find exactly this to be true. Cross-aisle peers in favor of a bill increase the probability of passage of a final vote by 13% (0.0243 (t=4.19)), nearly 3 times the size for the average non-final vote.

Next, we explore the impact in particular of having cross-aisle peers that sit on the Senate's most powerful committees. We find that these powerful politicians have a larger impact in convincing opposing party Senators to switch votes, with this impact increasing in the ranking of the committee.

Lastly, we examine whether this influence varies by the topics of the bills themselves. Using Natural Language Processing (NLP) of the abstract description of the bills, we classify each piece of legislation into the topics used by Gentzkow et al. (2019). Examples of these topics include Alcohol, Budget, Healthcare, Immigration, Trade, etc. We then test whether there is heterogeneity in the strength of aisle-crossing across topics. We find this to be the case - bills covering topics surrounding Minorities, Immigration, and Crime are amongst those in which aisle-crossing dynamics appear most strongly.

Relatedly, given that our exogenous identification comes from the most junior freshman Senator's forced neighbors, one might be concerned that we are simply measuring a "freshman cohort" effect (e.g., all incoming freshmen vote in a similar (cohort) manner). We split the most junior freshman's forced neighbors into junior and senior Senators, and find that both groups independently have an impact – with senior peers impact even slightly larger.

Turning to ideological influence, we begin by exploring whether a Senator's more extreme or moderate ideology exogenously assigned peers have a stronger association with their voting. We find that more moderate peers have larger estimated impacts on the most junior Senator's voting than the more extreme ideological peers. This split (with moderate having the larger impact) is especially true and strong for Republican Senators relative to Democrats.

While we find strong evidence of the importance of distance in shaping behavior, one central contribution of our paper is the exploration of the microfoundation of distance's impact. Namely, we examine over 2,000 hours of video of the Senate floor to categorize and quantify person-to-person interactions. This data allows us to observe not only the evolution of interactions, but their subsequent relations to voting behavior. We find a number of strong empirical patterns in this interaction data. First, Senators spend significantly more time interacting within their own parties. 91% of their Senate floor interactions are with their own party, and they spend over three times as long in same-party interactions as cross-party (149 sec vs 43 sec). Second,

distance arises as a large - in fact the largest outside of same-party and state - driver of observed one-on-one interactions. This holds true for cross-party interactions. Even though aisle Senators only make up 8% of the Senate floor, they account for 60% (3 out of 5) of the top cross-party interactors in the sample. Lastly, these face-to-face interactions have a strong association with vote-alignment between Senators. We find large and separate effects of both number of interactions, and duration of those interactions, on subsequent voting behavior. For instance, voting alignment increases by 2.96% (t=12.00) for each additional interaction (minute of duration) between Senators before a given vote.

Lastly, to provide out-of-sample evidence with a separate random assignment, we use the House of Representatives allocation of new Representatives' offices. This: i.) is determined independently of the Senate, and, ii.) uses a completely different mechanism (i.e., not a ranking system), with the incoming Freshman class in the House actually taking part in a well-known random lottery (Figure A4) to decide in which order they will be allowed to choose their office locations.[1] An advantage of this empirical setting is that the lottery assignment again rules out the selection of peers. We find that when a Representative is exogenously exposed to a larger fraction of the opposing party through close office neighbors, they are significantly more likely to aisle-cross and deviate from their own party's vote. Moreover, this aisle-crossing effect is again particularly strong for close votes: up to a 25% (t=10.37) increase in voting against one's party if neighboring opposing party congressional members are in favor of the bill.

The paper proceeds as follows. Section I gives background on the setting, including institutional context surrounding in-group and out-group voting dynamics in the US legislative process. Section II describes the data, including the detailed roll-call voting, seating and office location maps, and detailed biographical data on each

[1] Namely, a ceremony is held (in the Canon Building), run by the Architect of the Capitol House Superintendent's Office, and in which each new Representative draws a numbered chip out of a silk-lined box. Many Representatives do scouting of offices beforehand, as they have only 5 minutes after the lottery is completed to choose their office location. See https://rollcall.com/2018/11/29/high-stakes-lottery-will-land-new-members-in-capitol-hill-offices/.

congress person. Section III presents the identification strategy, with first-stage verification of the seniority mechanism and exogenous assignment of the most junior legislators' peers. Section IV presents the main results on these exogenously assigned peers' influence on Senator voting, while Section V explores aisle-crossing, its determinants, and impact on end-vote realizations across topics. Section VI explores the mechanism in more detail, using novel video interactions, while Section VII provides a counterfactual of randomized seating assignment, exhibiting its potential policy implications. Section VII concludes.

I. Institutional Context on In-group and Out-group Voting

A. Congressional Voting over Time

Figure 1 shows the history of polarization in Senate voting across time. From Panel A, this has been rising steadily beginning in the 1990s through the 2010s (Gentzkow and Shapiro (2006)), which we extend through the present-day, observing a continuing rise in political polarization. In Panel A, we illustrate this through calculating the absolute value of the difference in percentage of votes in favor of a given bill for (Republican – Democrats) for each bill. Panel B further shows that the increase in polarization is accompanied by a marked clustering in ideology across the two parties. The graph in Panel B plots for each Senator their own DW-Nominate Score[2] on the x-axis, plotted against the average DW-Nominate Score of the Senators they sit beside. The two tightly packed clouds (with no overlap) are the Democratic Party (lower left) and the Republican Party (upper right).

Figure 2 illustrates the average disagreement between parties across bill types, sorted and ranked by the sponsoring committee of the bill. From Figure 2, bills originating from the: Budget; Rules and Administration; Homeland Security and

[2] DW-Nominate is a score given to each Congressional member based upon their voting record (created by Poole and Rosenthal through a series of works beginning in the 1980s, and continuing through the present (e.g., Poole and Rosenthal (1985),Poole and Rosenthal (1991)). It's primary dimension through our period captures liberal versus conservative, with the second dimension capturing issues generating large fissures historically between the two parties (for instance, civil rights, nativism, currency, etc.).

Government Affairs; and Finance Committees are associated with the most disagreement between parties.

Appendix Table A3 explores the text of the bills' themselves. We first label a bill as Republican or Democrat by calculating a divergence index that compares the proportion of Republican yay votes to Democratic yay votes (R-D/R+D), classifying bills with an index ≥ 0.5 as Republican bills and those with an index ≤ -0.5 as Democratic bills, then parsing the summary of each bill into bigrams, and ranking meaningful bigrams by their frequency mentioned within and across legislation. We find that, consistent with Gentzkow et al. (2019), the topics that generate the most disagreement between parties are changing substantially across time. For instance, the topic of a balanced budget dominated polarized voting in the mid-1990s, switching to homeland security and intelligence in the mid-2000s, and shifting again to healthcare and the Affordable Care Act in the mid-2010s.

B. Crafting Legislation: An Example from the Debt Ceiling

We illustrate the role of personal interactions in legislative determination using an influential government funding and the debt ceiling bill: *H.R.5305 - Extending Government Funding and Delivering Emergency Assistance Act*. The bill was introduced by Representative Rosa L. DeLauro on 09/21/2021 and jointly by the US House Committees on Appropriations, Budget, and Ways and Means. The goal of the bill was to provide continuing FY2022 appropriations for federal agencies, supplemental appropriations, and to extend several expiring programs and authorities. The bill supported a continuing resolution and prevented a government shutdown that would otherwise have occurred had a FY2022 appropriations bill not been enacted by FY2022 (beginning October 1, 2021).[3]

[3] The proposed bill also included the extension of many expiring programs and authorities, including: the National Flood Insurance Program, the Temporary Assistance for Needy Families (TANF) program, the National Advisory Committee on Institutional Quality and Integrity, the United States Advisory Commission on Public Diplomacy, the temporary scheduling order issued by the Drug Enforcement Administration to place fentanyl-related substances in Schedule I of the Controlled Substances Act, and the authority for the Department of Agriculture to waive certain requirements for the school meal programs.

Despite the potential gains in welfare for a Senator's home constituency and other states, the vote was split largely along party lines and the bill did not reach an agreement in the Senate by September 27, 2021, with a (Yea-Nay) Vote against passing of 48 – 50 (Record Vote Number: 385 - CR S6693). With little time to reach a deal, legislators were forced to enact a solution or face the risk of default, with independent analysts warning that the U.S. Treasury Department was likely to exhaust its borrowing authority fully sometime between October 15 and November 4.

In the 48-50 vote, all Republican Senators opposed advancing the legislation. In particular, the Democratic voting bloc needed to curry sufficient votes from the Republicans to reach the 60 vote filibuster-proof threshold needed to push the bill ahead. On September 30, the Senate passed a bipartisan bill, *Extending Government Funding and Delivering Emergency Assistance Act*, in a (Yea-Nay) Vote of 65 - 35 (Record Vote Number: 397) to avoid default. The Democratic Senators won the support of 15 Republicans to join every Democrat in attendance (along with 2 independents). It was the product of negotiations between Senate Majority Leader Chuck Schumer, D-N.Y., and Minority Leader Mitch McConnell, R-Ky. (consequently two neighboring Senators, as seen in Figure 3), balancing demands from both parties to lift the debt ceiling.

Specifically, from the voting record, the 15 Republican senators who joined Democrats in the vote were: Roy Blunt of Missouri, Richard Burr of North Carolina, Shelley Capito of West Virginia, Bill Cassidy of Louisiana, Susan Collins of Maine, John Cornyn of Texas, Lindsey Graham of South Carolina, John Kennedy of Louisiana, Lisa Murkowski of Alaska, Mitt Romney of Utah, Mike Rounds of South Dakota, Richard Shelby of Alabama, Thom Tillis of North Carolina, Todd Young of Indiana, and McConnell. This group sat significantly closer to Democrats, on average, than would be expected by random chance (t=2.13).

We show in the paper that this aisle-crossing behavior of switching votes to the alternate party's viewpoint is a systematic and robust effect of neighbors (even

exogenously assigned neighbors) on legislator voting behavior throughout our sample period and through the present-day.

II. Data

A. Senate Seating, House Offices, and Voting Records

a. Voting Records from the House and Senate

Our primary data comes from the Library of Congress raw bill data. First, we collect the universe of the full text of bills being voted upon in the Senate and House from the 101st to 117th Congresses. Each Congress spans two years, comprised of two one-year-long Sessions. Our sample represents over 30 years of legislation data from 1989 to 2022. We hand-collect detailed information from the full text of all bills, including the bill number, bill title, summary of the bill, bill detailed description, voting date, bill sponsors (cosponsors if any), committees in the Senate and House, and voting outcome. To illustrate, Panel A of Figure B1 shows the bill information associated with (House Resolution) H.R. 5305 - *Extending Government Funding and Delivering Emergency Assistance Act*.

We then use a number of measures to both assign congressional members to expertise areas, along with assigning bills to the topic areas to which each respective bill applies. First, we construct a measure of Congressional member expertise area based upon committee experience. For our tests, this measure captures the variation in committee service by a given congressional member over time and the issue area over which the member is most likely to be influential. Second, we measure committee expertise by assigning each bill and its corresponding committee origin to a congressional member's committee service based on Charles Stewart's congressional data.[4]

Second, we turn to the text of the bill itself. As mentioned above, we use NLP, and in particular a machine learning method to process each bill abstract, and identify and classify into bi-grams (2 word long phrases), counting the number times

[4] This congressional data can be sourced from https://web.mit.edu/cstewart/www/data/data_page.html.

each of these key topical bi-gram phrases appear. For example, "middle class" is the most common bi-gram in Democrat-favored bills in Congress 114, appearing 32 times in Democrat-sponsored bills.

A second key source of data is the comprehensive roll call voting records of all Senators and House Representatives from the 101st to 117th Congresses. We collect these floor votes through the Legislative Information System, under the direction of the Secretary of the Senate and the House. For the Senate and House, we collect the detailed roll call voting record for every congressional member on each bill ("Yea", "Nay", or abstaining) for the forty-year period. In the analysis, the unit of observation is the congressional member-vote level. We match the voting data with the bill-level data based on the corresponding bill number by cross checking the matching accuracy using the bill title, bill description, and the time of vote.

To further explore Senator beliefs and preferences, we extract the discussions by Senators on each bill and the arguments they bring prior to voting from the compressive Congressional Record. In particular, we link all voting records, bill numbers and titles to the corresponding speeches and discussions by Senators. For example, in the *Extending Government Funding and Delivering Emergency Assistance Act*, Senator McConnell made the following remarks as shown in Figure A2:

"*Mr. MCCONNELL*: Madam President, today the Senate will consider and pass a government funding bill and do our part to avoid a shutdown. The continuing resolution contains a number of key items that Republicans called for… But, overall, this is encouraging progress. The Democratic majority has begun to realize that the way forward on basic governing duties matches the roadmap that Republicans have been laying out for months. On government funding, what Republicans laid out all along was a clean continuing resolution without the poison pill of a debt limit increase. That is exactly what we will pass today."

b. Detailed Senate Chamber and Capitol House Blueprint Maps

We use novel data to identify the location and distance across congressional members for both the House and Senate. We include a detailed description of the Senate Seating Distance calculations, data collected, and estimation in Appendix C, and show the output of these in Figure 4. For each Senate Congress-Session, we extract the historic Chamber Maps from the Senate website to identify the seating location of every Senator in each of the 101-117th Congresses.[5] Seat maps are displayed in images and videos, and we use Optical Character Recognition (OCR) on files to parse and assign chamber seats into numerical seat locations. We further use these seat locations to construct our measures of Senate seat-based networks.

Moreover, as exact distances are not listed in any of the blueprints, we use Computer-Aided Design (CAD) mechanisms from architecture on both still images and videos of the Senate Chamber. Using various angles from each, we are able to estimate the precise distances between desks, along with precise widths of each aisle in the chamber. For instance, from the mid-point of one desk to the mid-point of the exact adjacent desk is 45 inches (1.1 meters). The full calculations are shown in Table C2 of Appendix C.

Moving to the House, we hand-collect the office buildings and room numbers from the complete biographical record of all representatives from the 105th to the 117th Congresses.[6] Representatives are located in a number of buildings on Capital Hill: Cannon House Office Building (CHOB), Longworth House Office Building (LHOB), and Rayburn House Office Building (RHOB). To construct a precise measure of physical distance between Representatives, we assign each office number to detailed floor maps from the archival Congressional Record on the Architect of Congress.[7] Figure A4 shows the archival floor maps for the Cannon building as an example.

[5] Detailed Senate Chamber desk location is shown in https://www.senate.gov/art-artifacts/decorative-art/furniture/senate-chamber-desks/chambermap.htm.

[6] Detailed information on House office room assignment: https://www.govinfo.gov/app/collection/cdir

[7] Given the Congressional office floor maps are no longer available, we match the office number to its closest location using the historical archives given the room numbers change less frequently.

B. Precise Seating Assignments & Distance Measures

We begin by identifying the physical distance for each pairwise combination of Senators within each Congress-Session using precise Senate seating data. Figure 3 illustrates the Senate chamber distance measure for the 117th Congress, Session 1. The numbers indicate the physical distance between Senator Tommy Tuberville (R-AL), the most junior freshman (Seat 78), to all other senators. Distance is measured as the minimum number of seat units from Seat A to Seat B. It equals one if two senators are adjacent to each other without any other Senator in between. For example, Seat 2 (Senator Blunt), Seat 60 (Senator Wicker), Seat 6 (Senator Rounds), and Seat 22 (Senator Young) are the closest to Seat 78 (Senator Tuberville). The distance equals three between Seat 78 and Seat 88 (Senator Brown), Seat 44 (Senator Wyden), Seat 20 (Senator Murray), Seat 10 (Senator Schumer), Seat 9 (Senator McConnell), Seat 65 (Senator Thune), Seat 27 (Senator Collins), Seat 74 (Senator Crapo), and Seat 95 (Senator Rubio). This figure also highlights that certain Senators have close-distance pairings both across- and within-party.

C. Summary Statistics

Table 1 shows a number of descriptive statistics of Senator peer group characteristics. From Panel A, on the average Roll Call Vote that is taken, 63% of votes are Yea votes - stemming from the endogeneity of when votes are strategically brought to the floor given the 60 vote filibuster-proof threshold. This percentage, unsurprisingly is roughly identical, on average, across each Senator's close-distance peer groups, given that it is averaged across each Senator for each vote. *AbsDeviationfromOwnParty* is measured as the Senator's vote minus the party's percent voting yes. Thus, the absolute value of a member's vote (1 if Yes, 0 if No) minus the fraction of yes votes within same party. For example if 39 democrats voted yea and 50 democrats voted in total, then the *AbsDeviationfromOwnParty* of a democrat with a yes vote would be $|1-(39/50)| = 0.22$. From Table 1, this

AbsDeviationfromOwnParty has been decreasing over time, with an average of 0.1931 for the 101st-110th Congresses, and 0.1460. This represents a sizable 25% drop in this within-party metric of disagreement over the sample period.

Panel B of Table 1 then presents a rich set of biographical and demographic characteristics of the Senator sample. We measure these at the Senator level, with 301 unique Senators over the sample period. From Panel B, the average entry age of a Senator is roughly 51 years old. The average age has been increasing over the sample period, with the Senior Senators on average beginning at age 47, while the Freshmen in the sample on average begin at age 53. The percentage of female Senators has also been greatly increasing over time, with only 2.75% of Senior Senators being female, while 20% of incoming Freshmen classes are female. Other interesting patterns that arise are that the percentage of Senior Senators with past Academic Experience, Law Experience, and especially Military Experience are significantly higher. For instance, 28% of Senior Senators had military experience, while only 7% of incoming Freshmen classes did. Similarly, roughly 61% of Senior Senators studied law and received law degrees, while only 27% of Freshmen had law degrees.

In Panel C, we then turn to the characteristics of Senators' close-seated neighbors across the sample period. We show statistics of the *Closest*, *Close3*, and *Close5* networks: comprising seating networks of varying levels of distance for each Senator. Examining characteristics of those by whom a Senator chooses to sit provides a first picture at which characteristics matter most to Senators by revealed preference, so on which they endogenously select when choosing their seating positions. Not surprisingly, the strongest shared characteristic of closest seating neighbors is party. As seen in Figure 3, the Senate Chamber is separated into Democrats (seated on the left) and Republicans (sitting on the right). As the distance of the neighbor-group expands for each Senator, they are significantly more likely to include a larger percentage of the opposite party (Columns 7 and 8 in Panel C). Senators are also significantly more likely to sit closer to other Senators their same

age (*PctSameGeneration*), and their same gender (*PctSameGender*), though gender differences are small in economic magnitude. All other differences are small in economic magnitude, and largely insignificant.

III. Identification Strategy

Identifying peer effects is empirically challenging, given confounding inference concerns such as endogenous selection, reflection effects, and correlated unobservable variables identified by the literature (Manski (1993)). This extends to the realm of congressional voting, as well. An ideal setting requires the random assignment of a congressional member's peer exposure, and the evaluation of behavior conditional on this randomly assigned peer-exposure.

In this section, we discuss the unique features of Senatorial Chamber seating assignment and the House Office allocation mechanism that allow portions of this population to experience random assignment to peer groups. This allows for identification exploiting this exogenous assignment of peers in order to explore their impact on congressional members' behaviors.

A. Senate Seat Assignment

Our central method of random assignment relies on the exogenous assignment rule codified into Senatorial seating assignment for incoming freshmen Senators. Specifically, while Chamber seat assignments are broadly allocated through a system of seniority, newly elected Senators all ostensibly have the same seniority (having just been voted together into Congress). To address this, for freshmen, the Senate has codified an explicit set of ranking priority as follows: the highest ranking goes — in descending order — to:[8] i.) previous Senatorial experience; ii.) former Vice President of the United States; iii.) former member of the United States House of Representatives; iv.) former Cabinet Secretary; v.) former Governor; and vi.) if tied

[8] Senate document that lists seniority rules: https://www.periodicalpress.senate.gov/senate-facts/senate-seniority/.

on all of the above, population of the state in the most recent United States Census that has taken place.[9]

The chamber seating rule provides a natural source of quasi-random assignment of the most junior incoming freshman Senator. In particular, the most junior freshman has no discretion regarding which seat they are assigned, given that they are forced to sit in whatever seat is left over after all other Senators have chosen their seats. Matching detailed Senate Chamber seating data with the Biographical Directory of the United States Congress, and the Congressional Directory, detailing past work experience we identify the *most junior* freshman Senator in each entering class. Using solely this most junior Senator in each Congress-Session, we explore the impact of their exogenous assigned peer set on their decision-making and behavior. Together, our specification identifies 35 most junior freshman Senators entering the Senate from the 101st to the 117th Congress-Sessions. The reason this is greater than 17, is that there are a number of instances of retirements, deaths, and other special appointments that retain this exogenous seat assignment feature. Figure 5 details these Senators, the timeline of their appointments, and the seats they represent.

B. Exogeneity of Most Junior Freshman's Seating Assignment

A critical feature of identification and analysis is the random assignment of the most junior Freshman Senator's seat. In order to establish this more formally, we run a seat-determination for all members of the Senate. We report the results of this estimation in Table 2. Column 1 of Table 2 is run for all Senior members of Congress

[9] Examples of this, from the 117th Congress in 2021:
"Former Colorado Gov. John Hickenlooper will also get a seniority boost among his (freshman) colleagues. Prestige in other arenas doesn't rank, which will leave a political newcomer like Tommy Tuberville, despite his fame in Alabama as the former head coach of the Auburn University football team, near the back of the pack. For new senators without those roles on their resume, seniority is determined by state population, from largest to smallest."
(https://rollcall.com/2020/12/03/no-cheers-or-jeers-at-the-mostly-virtual-house-office-lottery/). A further example in which two Senators tied on all six criteria, and so it came down to a seventh tie-breaking criterion occurred in the 117th Congress. In particular, Senators Jon Ossoff and Raphael Warnock, both from Georgia, were each elected in 2021 with no former experience, and tying on state Census population. The tie was broken as even though Osoff is 17 years younger than Warnock, "O" comes before "W" alphabetically, and so Osoff was named the senior senator from Georgia.

(i.e., Senators who are not members of the incoming Freshman cohort). From Column 1, we observe strong evidence of assortative matching across a number of dimensions in seat location choice relative to neighboring Senators. For instance, these Senators are significantly more likely to choose to sit by Senators who are: the same age (Generation), the same seniority cohort (Rank), same gender, state, religion, and even college major. In contrast, Column 2 shows that many fewer of these variables are available to Freshman Senators to endogenously match upon, with party (as all members of the same party sit on the same respective side of the chamber), and seniority (Rank) being the largest and most significant determinants. When we look even more closely at the just the most junior Freshman (which we use for identification throughout the paper), Columns 4 and 5 present the result of subset of freshman and most junior freshman who were elected or appointed following the surprise opening of a seat mid-session (following Senator death, retirement, or resignation). These two columns show that essentially no characteristics show up as significant associations or determinants outside of party, and to a lesser extent seniority.

We further provide evidence that the freshman senator's seating assignment is uncorrelated with senator characteristics that affect voting decisions. Panel B of Table 2 shows a number of senator characteristics of each senators' closest-seated peers. Columns 1-3 provide evidence that is consistent with endogenous seating choices among senior senators in the chamber, where they have a level of choice on whom they sit next to. These senior senators, on average, select to sit near close peers with similar ideology, a similar level of seniority, and who also sit on powerful senate committees. In contrast, from Columns 4-6, none of these characteristics are significantly related to the most junior freshman senator's seating choices - who has no choice on seating, and is exogenously assigned the only remaining seat in their party's half of the chamber. This is particularly strong for seniority and powerful committees, where the F-test on the difference in coefficients is highly significant.

C. House Office Lottery Assignment

Every two years, there is an official lottery for offices amongst all new incoming House of Representatives members. It is a pure, random lottery in which a computerized algorithm chooses the order in which House members physically pull numbered disks with their office choice position from a wooden box. In fact, the House office lottery has created its own spectacle: with media and others tuning in on a livestream as freshmen House members enter the chamber - often with entry songs and entourages of staffers - to pick the circular chips determining their position (Figure D4). The members then choose offices based on this position order from those offices remaining following the senior members of the House already laying claim to most of the prime office real estate.

This tradition of office lottery dates back to the House Office Building opening in 1908. Some of the characteristics that new members demand for an office are space, picturesque views, a spacious lobby, or the quickest commute to votes and access to House buildings. The remaining quirk of the lottery is that freshmen members only have five minutes to choose, so often enter the lottery with multiple plans (based on where they end up being positioned in the choice-group, and what offices remain), and even send staffers running from building to building to do final checks in the five-minute cap before final choice.

Our identification exploits the House office lotteries which provides randomness in the formation of a senator's peer group that is uncorrelated with confounding characteristics. Specifically, the office lottery creates exogenous variation in the Congressional member's office assignment across buildings: Cannon House Office Building (CHOB), Longworth House Office Building (LHOB), and Rayburn House Office Building (RHOB). Furthermore, the office lottery creates exogenous variation *within* a building across floors and across office locations in the formation of peer groups.

IV. Main Results: The Impact of Peer Influence on Voting Behavior

A. Baseline Results in the Senate

The literature on networks focuses on whether an individual's behavior is influenced by their social network, such as alumni networks' influence on legislative voting behavior (Cohen and Malloy 2014). We examine this setting, given its high-stakes realization implications, such as impacts on redistribution policies (e.g., appropriation bills) and eligibility of firms and individuals to receive government transfers. Despite its importance, identification in this setting has remained a barrier to studying the impact of peer influence, which we address with exogenous seating and office locations in this paper.

B. Specification at the Congress-Senator-Votes

In our main empirical specification, we examine voting behavior using granular voting and biographical data over the 101st-117th Congresses. We focus on the impact of peers in close distance on the voting behavior of each senator by estimating the following model, and in particular exploit the exogenous assignment mentioned above, using the specification:

$$\text{I(VoteYes)}_{\text{itb}} = \beta_1 CloseYes_{itb} + \delta X_{itb} + \theta_i + \theta_t + \theta_b + \theta_{itb} + \epsilon_{itb} \quad (1)$$

The unit of observation in our analysis is the senator-congress-session-bill vote level. i indexes senator, t indexes the Congress-Session in which a senator serves, and b indexes the specific bill that is considered for voting. The main dependent variable is an indicator for whether a given Senator votes yes or no on the bill. The primary measure, $CloseYes_{itb}$, is the percentage of senators in a given Senator i's peer group that votes yes on a bill b in Congress-Session t. For instance, *ClosestYes* proxies for the fraction of Senators who sit in the closest seats to a Senator (e.g. the neighbors) who vote yes for the given bill. To provide estimates across different measures of distance, we also construct orthogonalized versions of the *next* closest distance peer-groups, as well. *Close3Yes* is then those Senators that sit in one of the closest three

seats to the Senator (as seen in Figure 3), excluding the Senators' closest seated peers. Equivalently, *Close5Yes* is the next closest set of peers, those sitting 4- or 5-seats from the Senator (again excluding the Senators sitting in the three closest seats). These measures are constructed at the Senator-vote observation and reflect only the voting behavior of *other* Senators who are physically close in distance, after removing the impact of each Senator's *own* votes. X_{itb} is a vector of time-varying individual characteristics (Senator's party affiliation, state) to separate peer effects from other potential determinants. All standard errors are clustered at the Senator level as Senators may vote similarly on related bills or issues.

To address concerns regarding Senator-level unobserved characteristics, such as time-invariant attributes of senators, we include Senator-fixed effects $\theta_{\square}$. The fixed effect for a given Senator captures her average propensity to vote for a given bill, which can vary across Senators. Further, our specification includes Congress-session fixed effects to control for unobserved, time-varying effects across Congress-sessions as different Congresses often focus on different legislations (e.g., healthcare. fiscal policy, trade). The Congress-session fixed effects also capture different potential legislative agendas under consideration when a president is from the Republican or Democratic party. In some specifications, we even include fine fixed effects at the Congress-session-vote level to capture the voting decision for the same bill (e.g., average positivity or negativity across Congress on the given bill).

In the baseline analysis, we first estimate the peer effect β_1 for all Senators, across all Congress-sessions and bills. Our sample includes over 1 million vote-level observations across 300 senators in 35 Congress-sessions and more than 10,960 bills. To further control for the influence from the party in determining a Senator's voting patterns, *Same Party Votes* is the fraction of the Senator's party voting in favor of the given bill. In addition, we control the effect of home constituents' preferences on bills using *Same State Votes*, capturing the vote of the other state's Senator from the same state on the given bill.

Table 3 presents estimates of the effect of peer influence on a Senator's own voting behavior. The unit of observation is a senator's own vote on a Congress-session and roll call. The variable of interest in Columns 1-3 is $CloseYes$, which captures the percentage of senators that are within five-, three-, and the closest-neighbor seats, respectively, in distance as shown in Figure 3. In this regression, to control for granular, fine fixed effects, we run different model specifications. Specifically, we include Congress fixed effects, Session fixed effects, Senator fixed effects, and Vote fixed effects. Congress fixed effects control for the impact of different types of legislation (e.g., healthcare vs. tax policy) being focused upon during different Congressional sessions. Session fixed effects (1 vs. 2), control for the dynamic that Senators might vote differently across sessions, as for instance, a third of the Senators will be up for re-election during each second session of a Congress. Senator fixed effects control for any general proclivity of a Senator to vote more positively or negatively on average. While Vote fixed effects (vote number within the given Congress) then control finely for the placement of bills within the given Congressional voting period (e.g., easier types of votes or votes on appointments may take place at the beginning of the Congress). All specifications additionally include the fraction of peer senators from the same party and from the same state that vote in favor of the bill to remove the impact associated with party- and state-level voting motives.

In Columns 1 of Table 3, the positive coefficient estimate on $CloseYes$ indicates that a senator's own vote is significantly related to the voting behavior of the Senators closest in distance to that Senator. This is after controlling for the general party effects, state effects, and the high dimensional fixed effects described above. From Column 1, the significant coefficient estimate of 0.1017 ($p<.001$) implies that if all neighboring peers move from voting no to yes for a given bill, the Senator's own likelihood of voting yes on the given bill increases by 10.17 percentage points. This represents a 16% increase from the unconditional mean (63.08%). From Column 2, the coefficient on the next closest set of neighbors Close3Yes (those seated two or three seats from the Senator, excluding the closest neighbors) is still significant, but

roughly half the size at 0.0456 (p<.001), implying a decaying effect of close-distance peers. Column 3 then shows a further decay from even further distance Senators, with the coefficient even becoming negative (-0.0453, p<.001), controlling for general party voting preference on the bill, state voting preference on the bill, along with the high dimensional fixed effects.

We further take advantage of our detailed seating data and examine the robustness of our results to specific seating assignment. In Table A5, our specification controls for seat-fixed effects using the seat number in each Congress-session. The use of within seat variation mitigates the concern that influential senators select specific seats to convince other senators in voting decisions (e.g., candy desks). The results remain largely the same in terms of economic magnitudes and statistical significance. Overall, our supporting evidence confirms the previous findings that peer Senators are significantly correlated with an individual Senator's voting decision.

C. Exogenous Variation using Freshman Senators[10]

The granular fixed effects at the Senator-, Congress-, Session-, and Vote-level help to alleviate the time-varying unobservable factors that may affect a given Senator's voting decisions - even on a given bill. That said, the results in Table 3 on strong correlations in voting patterns of close neighbors may still suffer from endogenous matching of peers, and the general reflection and contextual problems of inference in social network settings (Manski (1993)).

To address this concern, we are the first paper to use the exogenous formation of peer groups from Freshman Senators as identification of peer effects in US Congressional voting. The advantage of our identification comes from the fact that Freshman Senators take the last seat available in each Congress-Session, and have no choice ability regarding its location, or the resultant set of close peers that are exogenously assigned by this final remaining seat. Further, the location of the final

[10] We discuss the parallel voting results for exogenously assigned House peers using the House Office Location Lottery as identification in Appendix D.

seat is unknown in advance, as can be seen in Figure 4, where the Freshman Senator's seat is located throughout the chamber across different Congress-Sessions. To illustrate an example, the freshman senator Tommy Tuberville (R-AL) took the last available Seat 78 in Congress 117 session 1, the closeness to other senators is exogenously assigned as shown in Figure 3. As described in Section III, we test this exogeneity more formally, and find that while Senior Senators appear to assortatively match their seating based on a number of characteristics (e.g., age, gender, college attended, previous professional experience), the exogenous final Freshman Senator each Session loads insignificantly on all of these characteristics with respect to close peers.

Columns 4-6 of Table 3 use the identical specification as for all Senators, but now running solely on the exogenously assigned Freshman Senators in each Congress. We find, consistent with the full sample, that now exogenously assigned close peer Senators have a strong impact on Freshman Senator voting, even controlling for party and state interests on the given bill, along with all high dimensional fixed effects described above. In particular, the 0.1189 ($p<.001$) coefficient on *ClosestYes* implies an 11.89 percentage point increase in the Freshman Senator's likelihood of voting yes if all neighboring exogenously assigned peers move from voting no to yes for a given bill (18.85% increase from the unconditional mean).

Moreover, the impact of exogenously assigned peers decreases as they become further away from the most Junior Freshman Senator. In particular, the coefficient of *Close3Yes* is positive and significant, while the estimated effect becomes statistically zero (negative, but insignificant) for Close5Yes. When translating this to physical distance, this implies that the impact of exogenously placed peers continues for roughly 19.7 feet (6 meters), and dissipates thereafter - shown in Figure 4, and Appendix B.

D. Importance of Exogenous Distance Effect vs. Other Vote Determinants

Given the significance of exogenous distance in Table 3, in Table A2 we explore the relative importance of exogenously assigned close peers versus other Senator and Congressional characteristics in the voting process. In Table 4, we split the most Junior Freshmen sample into two groups: those who entered as the most Junior Freshman in election years (and so had no choice of their seating location), and those Junior Freshman who were elected or appointed following the surprise opening of a seat mid-session (following Senator death, retirement, or resignation). From all columns in Table A2, exogenously assigned peers remain a large and significant driver of voting behavior. While other characteristics show correlations unevenly across the sub-samples, voting of close peers remains the largest determinant of voting outside of Party and State. For example, from Column 1, even controlling for all other rich characteristics and potential drivers of voting behavior, the coefficient on *ClosestYes* is 0.2312 ($p<.001$).

E. Persistence of Exogenous Peers' Impact Over Time

Tables 3 and A2 have shown the impact of exogenously assigned peers' impact on voting during the initial Session in which the two Senators are seated beside each other. However, given the relatively small and somewhat static nature of the Congressional network -- only 100 members at any given time, and quite autocorrelated over years and even decades -- the two Senators will likely remain together in the network and interact even after moving apart from each other in subsequent Sessions. In Table 4, we test for the persistence of the originally exogenously assigned close peer set on Senators' voting over time. We split this into the first 3 Congresses (Years 1-6) of a most Junior Senator's tenure, versus the next 3 Congresses (Years 7-12). From Table 5, while the impact of exogenously assigned peers remains significant in the first 3 Congresses, the effect dissipates, and becomes statistically zero, on average, by 7-12 years into the Congressional member's tenure.

F. Exogenous Peers' Impact on Final Votes

While we have examined the average effect across all bill-voting in the sample, it could be that certain votes hold an especially large incremental value in terms of impact on legislative realizations. We explore this in the context of the final votes on a given bill (shown in Table 6), which decide the ultimate passage (or failure to pass) of the given piece of legislation. From Table 6, Columns 1-3 show the impact of exogenous peers on final votes, while Columns 4-6 show the impact on all other intermediate votes. From Table 6, the impact of these randomly assigned peers are significantly larger for final votes. For instance, for *ClosestYes* and *Close3Yes*, the coefficients are roughly twice as large for final votes, increasing the chance of the Freshman Senator voting yes on the given vote by 15-16% ($p<.001$). For *Close5Yes*, consistent with the full sample evidence from Table 3, the estimated impact of this further distance group is statistically zero for both sets of votes.

G. Freshman Cohort Effect, Same Committee Members, Absent Senators, Extreme vs. Moderate

In this section, we explore a number of other Senator characteristics and vote dynamics that impact the exogenously assigned peers' influence on the most junior Freshman's voting behavior.

a. Freshman Cohort Effect

Across all Senators that are part of the most junior Freshman's exogenously assigned closely seated peers, some may be closer in assortative characteristics than others. These have been shown to be strongly correlated with increased exposure and interaction amongst individuals (McPherson et al. (2001)). The first we explore is the starting year. There are many post-election orientation programs that are attended only by Freshmen Senators - increasing within-group exposure - along with Freshmen more likely to be closer in age (which has been shown to be a strong characteristic in assortative matching (McPherson et al. (2001)). In Appendix Table A2, we split each most junior Freshman's exogenously assigned closely seated cohort into Freshmen and Non-Freshmen. Table A2 shows that the impact of exogenously

assigned other Freshmen voting is considerably larger on the most junior Senator. For instance, comparing Columns 2 and 4, the effect of other Freshmen (0.2449 ($p<.001$)), is roughly four times the size of Non-Freshman.

b. Same Committee, Senate Absentees, and Seat Fixed Effects

Testing another margin of increased exposure, we also explore the subset of the most junior Freshman's exogenous close peers who happen to also serve on the same Congressional Committee as that Freshman. From Table A3, serving on the same committee also increases the impact of that randomly assigned Senator on the Senator's voting decisions.

We also examine what happens in the instances where members of the exogenously assigned Freshman's close peers are absent for a given vote. Senate absenteeism is not uncommon, and can occur because of personal reasons (sickness or death of a close family member), because the Senator is attending to a local issue (e.g., natural disaster in their state), or because the Senator is campaigning for an upcoming election. There is a list of the most absent Senators linked here (https://www.govtrack.us/congress/members/report-cards/2024/senate/missed-votes), and for instance in 2024 Senator Schiff was absent for 47.8% of votes. From Table A4, when more of your randomly assigned peer-set is absent, the impact of peers is significantly lower (the negative interaction terms between absenteeism and close peer set voting).

From Figure 4, the most junior Freshman is seated across the Senate Chamber throughout our sample period. To control for any seating fixed effect in potential voting dynamics, in Table A5 we include a seat fixed to see if this affects the impact of exogenously assigned peers on the most junior Freshman's voting behavior. From Table A4, the estimated effects for close peers on the Freshman's voting are nearly identical in magnitude and significance when we include this seat fixed effect, suggesting that the impact of exogenous peers is independent of where on the Senate floor the Freshman is seated.

c. Extreme vs. Moderate Peers' Impacts

Lastly, we compare the relative impact - within the set of exogenously assigned close peers - of moderate vs. extreme viewpoints on the Freshman Senators' voting behavior. We classify moderate vs. extreme Senators based upon their DW-Nominate Score (Poole and Rosenthal (1985)). We define Extreme as having the most extreme, top quartile score on the "liberal-conservative" dimension, with all others being classified as Moderate. We then split each Freshman Senators' peer set into Extreme and Moderate sub-groups, and estimate the impact of each separately on that Senator's voting. We report the results in Table A6. From Table A6, Extreme Senator views appear to have a significantly larger impact on the given Freshman Senator than Moderate views. The estimated effect of Extreme Senators is roughly 4 times as large when comparing the closest peer group (*ClosestYes* coefficients of 0.0817 ($p<.01$) vs. 0.0206 ($p<.1$)). For *Close3Yes* the difference is even larger, with the only economically large and significant impact coming from Extreme peers (*Close3Yes* coefficients of 0.1525 ($p<.001$) vs. -0.0016 (insignificant)).

V. Aisle Crossing Impacts on Senator Voting Behavior

Sections IV and V found consistent and strong evidence of close distance peers - even exogenous, randomly assigned peers - on legislative voting behavior. Moreover, far from being only on inconsequential votes, these behavioral effects appeared strongest for bottom-line final votes, shaping enacted legislation. That said, many of the close distance peers we identify - given the spatial geography of the Senate Chamber - were those members of the legislator's own party. In this Section, particularly in the context of rising political polarization (e.g., Figure 1), we explore the potential impact of these close distance peers on cross-party voting behavior.

A. The Impact of Cross Aisle Senators on Party Line Deviation

In Table 6, we explore the impact of cross-aisle peers on legislator voting behavior. In this setting, we examine only those Senators who sit on the aisle on each side of the chamber. *ClosestYesAisle* is then constructed to include only the closest

seated Senators on the opposite side of the aisle to the given aisle-seated Senator. The regression set-up is identical to Tables 3-5, with the exception that the dependent variable now measures whether or not the given legislator crossed party lines to vote with the opposing party. This is parameterized as the absolute deviation of the given legislator's vote from the majority of her party's vote on the given bill.

From Table 6, cross-aisle close distance peers appear to have a significant impact on legislator's aisle-crossing behavior. In particular, from Columns 1-4, the larger the percentage of a Senator's cross-aisle peer set that votes in favor of a bill, the higher the likelihood that the Senator crosses party lines to vote with the opposing party. From Column 4, the coefficient on *ClosestYesAisle* of 0.0084 ($p<.01$) implies a 5% increase in likelihood of crossing the aisle to vote with the opposing party. Columns 5 and 6 then run this same test focusing on the exogenously assigned Freshman Senators who did not choose to sit on the aisle, but were assigned there (as the last remaining seat). Even though the power is significantly reduced, the estimated impact of cross-aisle peers is marginally significant without controls, and an order of magnitude larger in point estimate of impact.

B. Powerful Committees and Impacts Across Policies

In Table 7, Panel A we then move to explore the heterogeneity of the impact of cross-aisle close peers depending on how powerful the opposite party peer is. From Panel A, the more powerful the committee to which the cross-aisle peer belongs, the larger the association of that peer's voting with prompting the given Senator to cross-party lines and vote with the opposing party. The coefficient on *ClosestYesAisle*, over doubles moving from membership in one of the 10 most powerful Senate committees, to the cross-aisle peer being a member of one of the top 3 most powerful committees.

In Panel B of Table 7, we split the impact of cross-aisle peers in prompting the Senator to cross party lines across policy areas of the given bill. We classify each piece of legislation using the bill summary, into the topics used by Gentzkow et al. (2019). Bills in the topic areas of Immigration, Crime, Racial, Religious, and other Minority

Concerns appear amongst those policy areas subject to the most aisle-crossing influence.

V. Mechanisms of Influence: Face-to-face Interactions

A. Introduction of the Video Data and Model Training

We obtained senate chamber videos from CSPAN website. We filter the videos by titles with "Senate Sessions" as other debate or speech videos often only include shots of individual senators giving speech and not including frames with senate discussion, whereas "Senate Session" video often capture senator interactions during voting or non-presentation periods. We also filter "Senate Pro Forma Session" as they are very short in length and often only include procedural items. To further maximize efficiency, we run all videos with YOLO v11, the latest generation of object detection model that is widely used in the computer vision domain and in the computer science literature, to identify the number of individual in each frame. Figure 9 presents an example of the YOLO v11 detection process, and we filter parts of video with less than or equal to 1 individual as they will not include any pairs of interacting senators.

One challenge that prevents us from using existing human-identification models is the low resolution of senate videos. CSPAN senate chamber videos all have a maximum resolution of 576p (1024×576 pixels). At this resolution, facial features critical for person identification become severely degraded, with individual faces often occupying fewer than 20×20 pixels after detection cropping. This presents significant challenges for feature extraction, as standard pre-trained models like FaceNet or ArcFace are typically trained on higher-resolution images (112×112 pixels or larger). The limited pixel information reduces the discriminative power of facial embeddings and increases inter-class similarity, making senator identification considerably more difficult than in standard surveillance or identification tasks.

To identify interacting senators, we trained our YOLOv11 model to detect both individual senators and interaction zones as distinct object classes. Figure 10 illustrates the annotation process, which includes: (1) Senator classes that contains

individual senator identities with standard bounding boxes and (2) Interaction zone class that contains spatial regions where Senators are engaged in discussions, handshakes, or other interactions. We randomly sampled 20% of the frame for manual annotation, and fine-tuned YOLO-v11 model with our manually labeled dataset. Training hyper parameters were set as follows: initial learning rate of 0.01 with cosine annealing scheduler, batch size of 16, and 300 epochs with early stopping based on validation mAP@0.5. We then tackle the interaction identification: After inference, we apply geometric intersection analysis between senator detections and interaction zones. A Senator is considered part of an interaction if their detection box centroid falls within any interaction zone bounding box. This geometric relationship is computed using simple point-in-rectangle tests, making the post-processing computationally efficient.

Another challenge that prevents us from effectively identifying interacting senators is that senators often have their backs towards the camera. To tackle this issue, we utilized homographic matrix transformations to establish geometric correspondence between front-facing and rear-facing senator positions within the fixed Senate chamber layout. By computing a homography matrix H through manual annotation of key point correspondences between the two viewing perspectives, we can apply inverse transformations to normalize rear-facing detections to a canonical front-facing view, effectively augmenting our training data while maintaining spatial consistency. This approach not only doubles the effective training samples for each senator but also enables cross-perspective validation during inference, where detections in one view can be geometrically verified against predicted positions in the complementary perspective.

B. Video Evidence on Senator Interactions

Table 10 reports the effects of seating distance and senator characteristics on interaction duration. Columns (1) and (2) show that seating distance is a strong predictor of interaction in the live recordings, even after accounting for party and state affiliation. Closest Senator peers interacts 9.51 seconds ($p<0.01$) longer than

non-Closest Senator peers, corresponding to an 6.82% increasing from the unconditional mean interaction time (139.52 seconds).

Tables 11 examines the characteristics cross-party senatorial interactions. Table 11 reveals that senator pairs with the most frequent cross-party interaction rates are seated significantly closer together in the Senate chamber (8.03 vs. 9.30 seats apart, $p<0.001$) and are substantially more likely to serve on the same committee (47.2% vs. 27.3%, $p<0.001$). Notably, these high-interaction pairs show no significant differences in ideological distance (as measured by DW-NOMINATE scores) or Senate cohort membership compared to other senator pairs, suggesting that physical proximity, rather than ideological similarity, facilitates cross-party communications.

Table 12 further demonstrates that these interactions have meaningful voting consequences: recent interactions (within the past seven days) are associated with a statistically significant increase in vote alignment of 0.34 percentage points ($p<0.05$) after controlling for party affiliation, shared state representation, and various demographic and institutional similarities. While this effect is modest compared to the dominant influence of party membership (which increases vote alignment by 46.2 percentage points), it persists across all model specifications and suggests that informal interpersonal contact serves as a mechanism for fostering legislative cooperation across partisan lines.

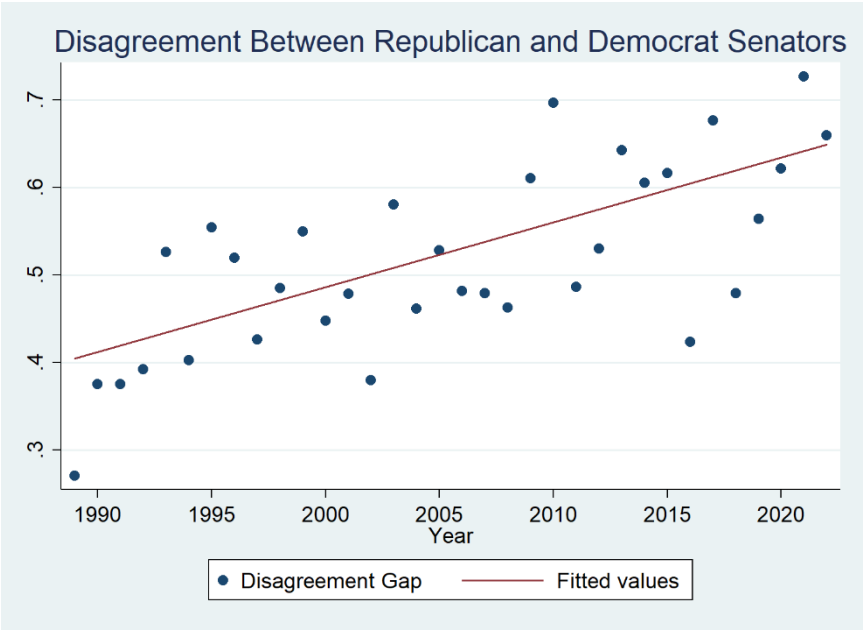
VIII. Conclusion

We exploit exogenous variation in Senator and Representative seating locations to present novel evidence of forced-peers leading to a reduction in polarization. Namely, for incoming freshman legislators, using the rigid seniority rule-based system of seat choice on the Senate chamber floor, and freshman lottery of House Members offices, we identify a set of legislators without choice over nearby neighboring legislators surrounding them. We show that these legislators are nonetheless significantly impacted by their exogenously assigned peers.

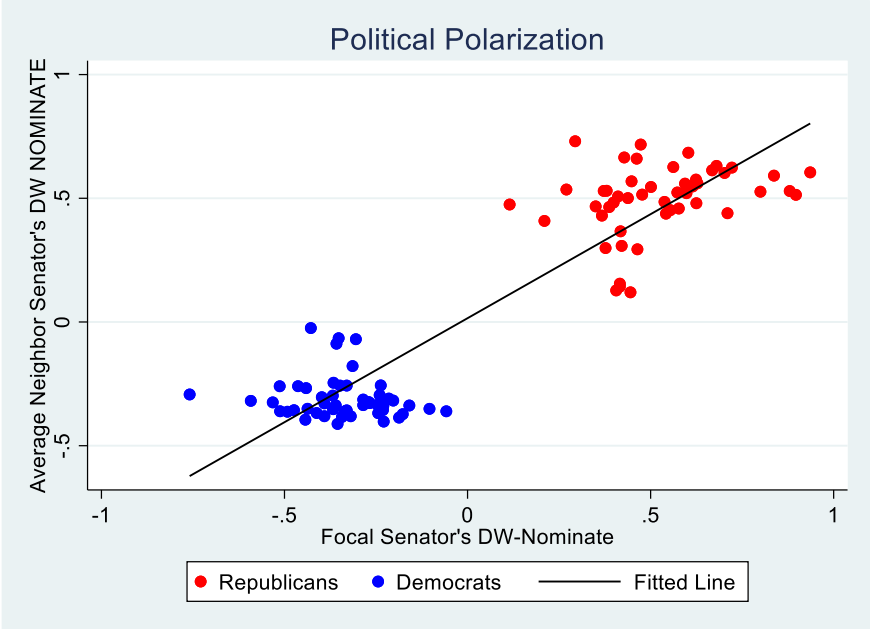
Using the last 30 years of seating choice data and the complete roll-call of over 1 million votes of legislators, we find, for instance, that a one standard deviation increase in the percentage of randomly assigned 'forced neighbors' that vote yes (or no) on a bill increases the probability of the exogenously placed legislator of voting in that same direction by 10.17 percentage points ($p<0.001$). From a mean of 63 percentage points on yes votes, this represents over a 16.14% increase in directional voting.

We find that the effect of exogenously assigned peers is especially large in a number of contexts. For instance, on close bills (with a roughly 15-20% larger effect size); on bills that are less important to the given Senator's economic interests; on bills from the most polarized bill topics (across all bills voted upon); on the later round votes of a given bill (when votes are more consequential for bill passage). and as the Senator spends more time (gets more exposure) to the peer group. Furthermore, the effect is larger when the exogenously assigned close peer is a member of the committee that originated the bill being voted upon.

Going further, we observe depolarizing directly within, and even across parties, as Congressional members appear most influenced by the moderate members within their exogenously assigned close neighbors, and are significantly more likely to switch votes (and cross party lines) when they are more exposed to members of the opposite party. Stepping back, the fact that plausibly exogenous exposure through forced "random" assignment and exposure to colleagues has such a large impact on consequential voting-behavior implies that there remain potentially plausible, low-cost, tools at hand to counterweight the polarization observed.

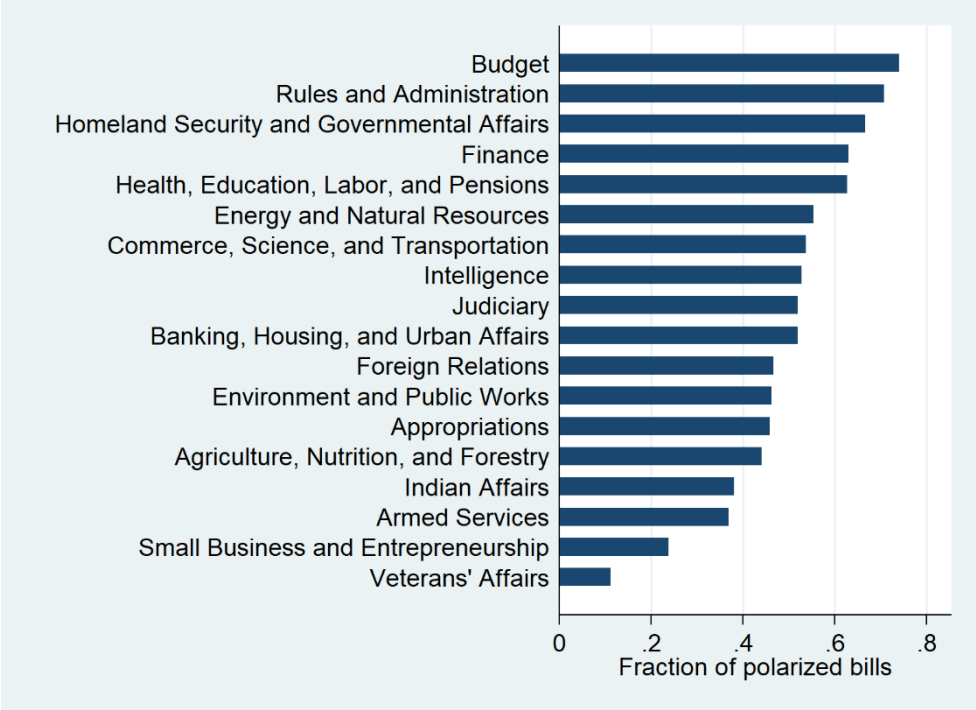


Panel A Annual Average Absolute Party Difference in Percentage of "Yea" Votes for each Bills

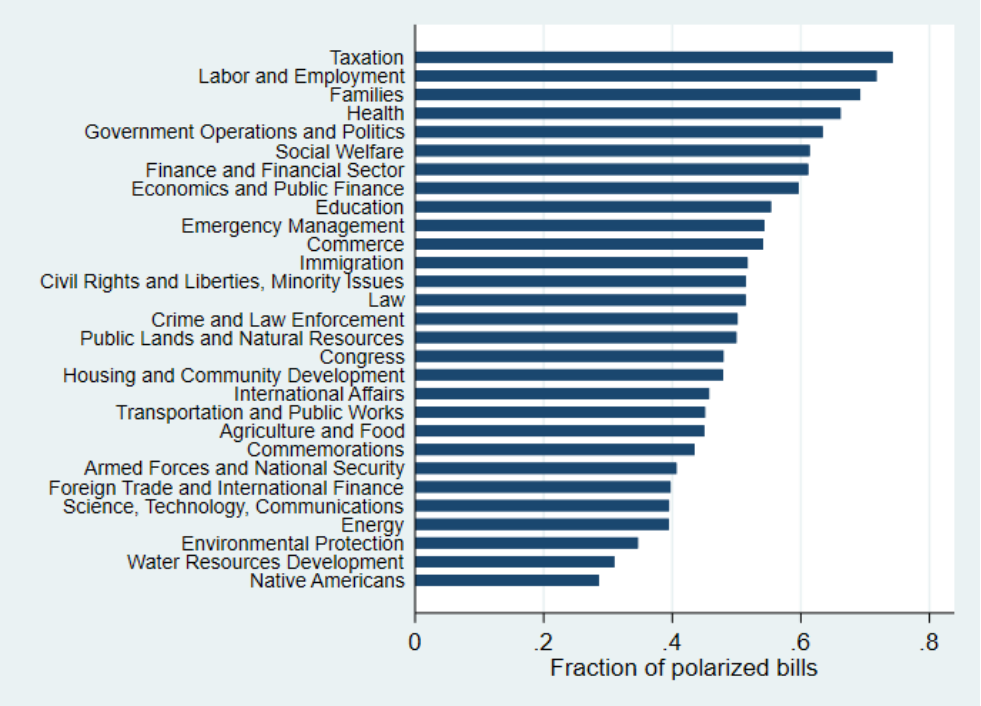


Panel B Polarization in Senate Seating Arrangements in the 117th Congress

Figure 1: The US Congress became more polarized over time This figure demonstrates the increasing polarization in the US Congress through two complementary measures. Panel A tracks the growing partisan divide in Senate voting from 1990-2022, showing the average absolute difference between the proportion of Democrats and Republicans voting "Yea" on bills has risen from approximately 27% to 73%, with a consistent upward trend highlighted by the fitted line. Panel B examines the spatial manifestation of this polarization through Senate seating arrangements in the 117th Congress (2021-2023), showing distinct ideological clustering. Senators' ideology scores strongly correlating with the average scores of neighboring senators.



Panel A Fraction of Polarized Bills by Sponsor Committee



Panel B Fraction of Polarized Bills by Policy Area

Figure 2: The Fraction of Polarized Bills. These graphs plot the fraction of polarized bills by congressional committees and policy areas, which is calculated as the difference in "Yea" votes between the Democrats and the Republicans for bills sponsored by each of the committee.

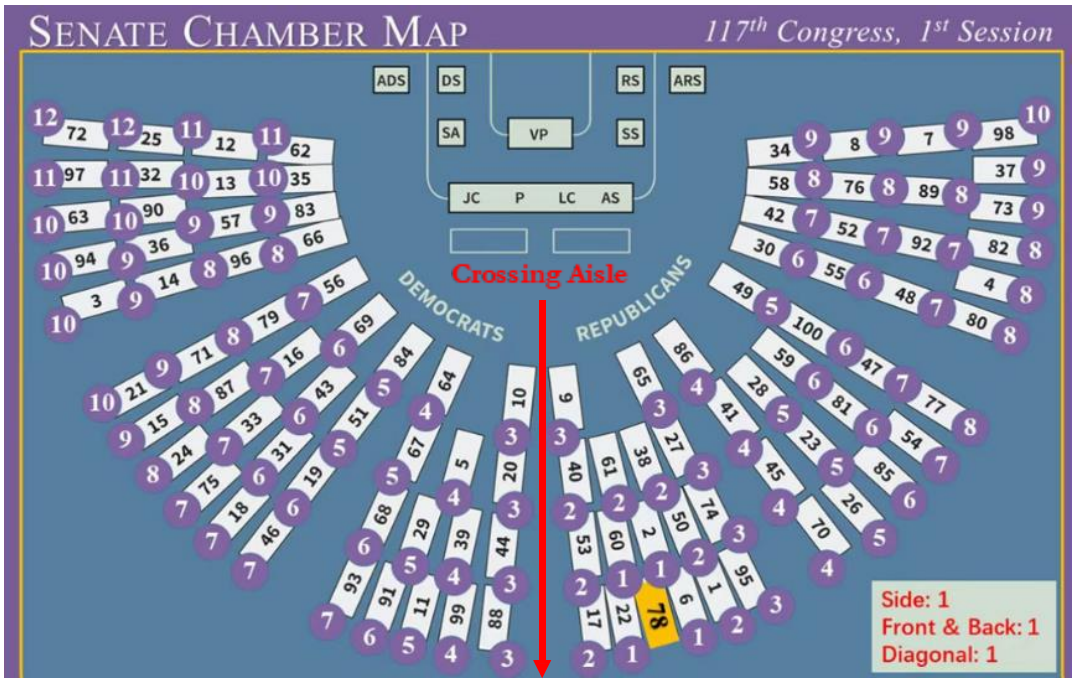


Figure 3: An Example Seat Distance Construction from Seat 78 in Congress 117 session 1: Senator Tommy Tuberville (R-AL). This figure provided graphical illustration of distance measure. Distance between senators is quantified using a path-length approach: any immediately adjacent senators—whether to the side, front, back, or diagonal—are assigned a distance value of 1, as indicated in the legend. This distance metric reflects the physical proximity that potentially facilitates face-to-face interactions. The red arrow highlights the "Crossing Aisle," the boundary where the two parties meet at the chamber's center.

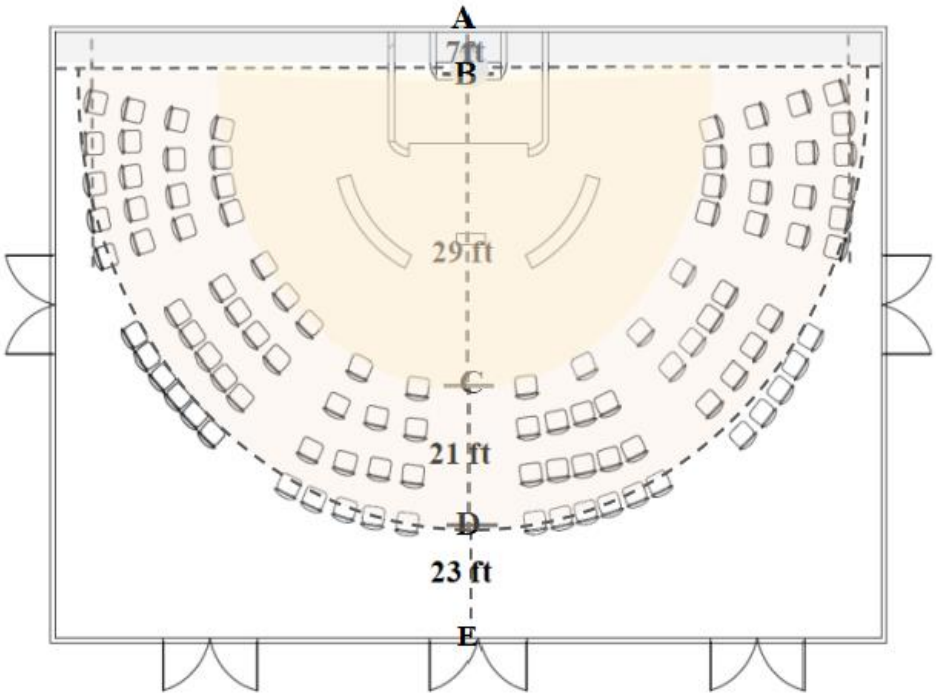


Figure 4 Estimated Blueprint of the Senator Chamber The Senator chamber is arranged in semicircle with 7 narrower aisles near the podium, measuring 114 feet long by 80 feet wide. We found the dimension of senator desk to be h. 35.37 x w. 28 x d. 20.37 in. (h. 89.85 x w. 71.12 x d. 51.75 cm). Base on the live recording of the senate floor, we estimate the space between senator desks in the same column to be 40 in. (102 cm) and space between senator desks in the same row to be 10 in. (25 cm).

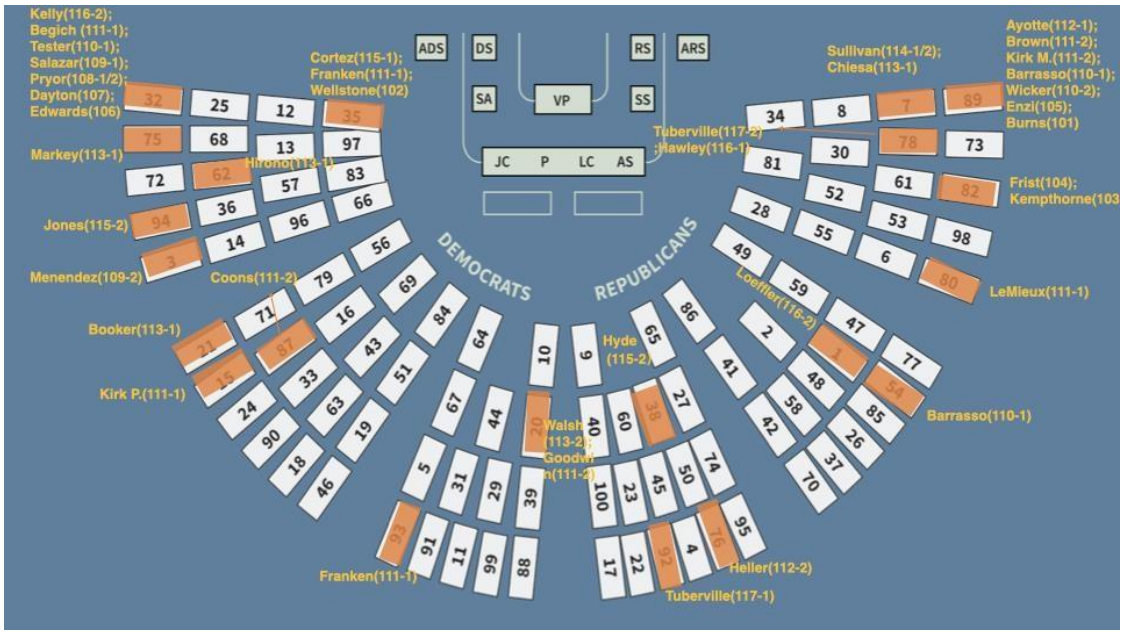
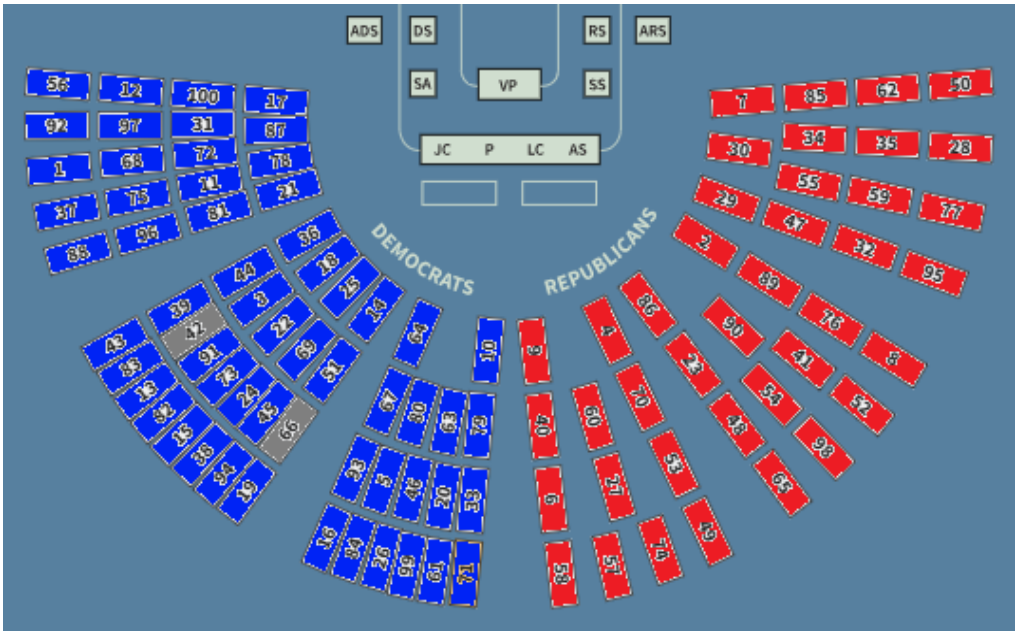


Figure 5: Senate Chamber Seating Arrangement of Most Junior Freshman Senators (101st-117th Congress) This figure displays the Senate chamber seating distribution of most junior freshman senators across 101st to 117th Congresses. The orange highlight indicates where the most junior freshman has seated during each of the session seating.

Panel A Observed Distribution



Panel B Simulated Random Seating Assignment (1 of 100 Simulations)

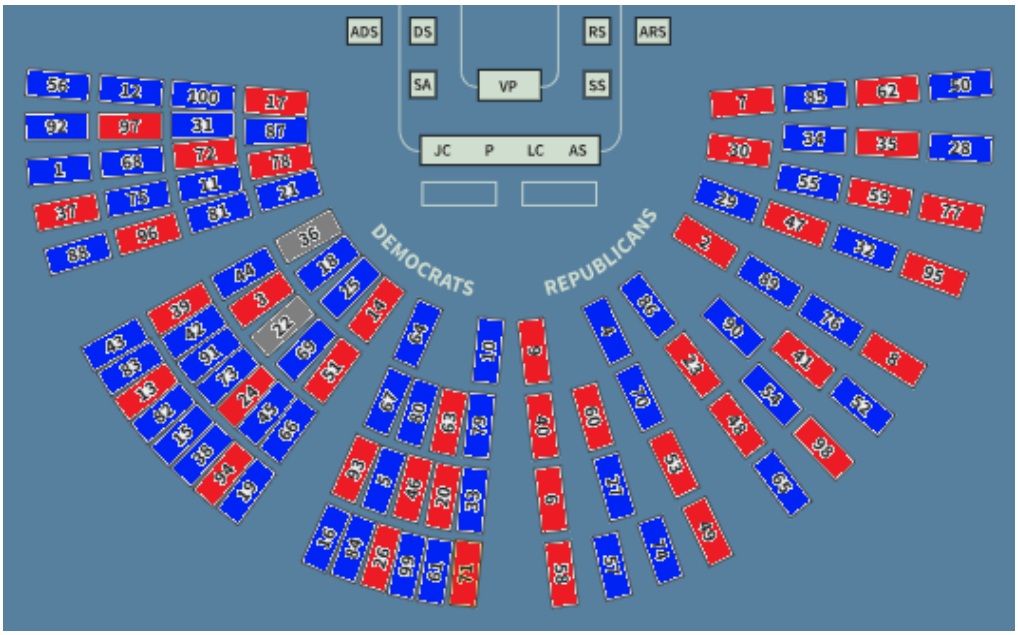
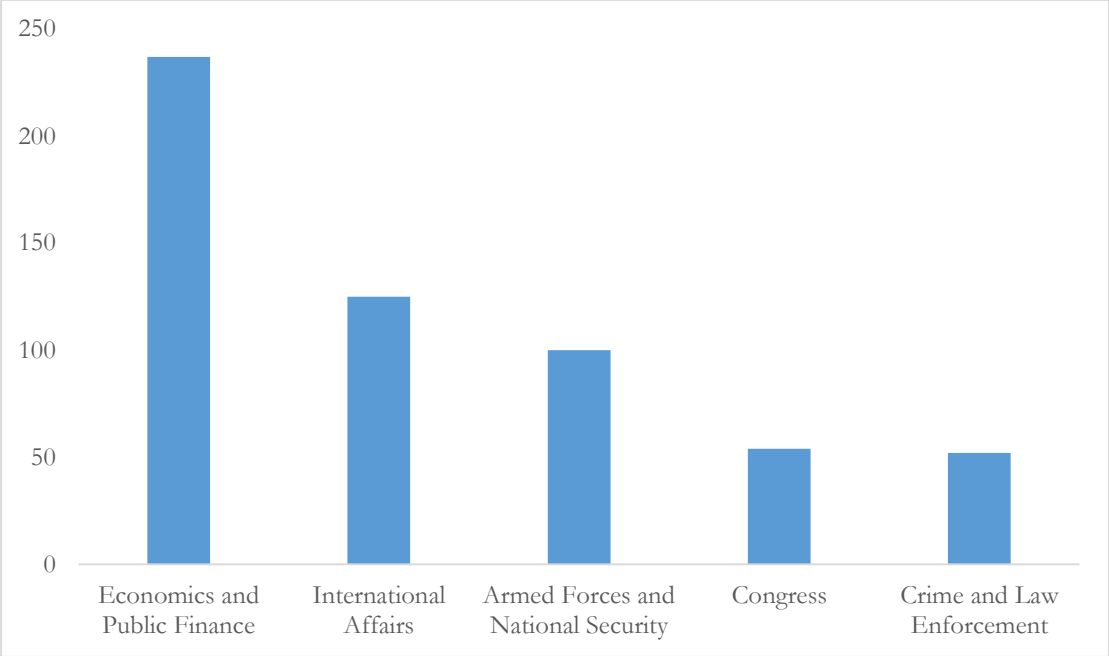
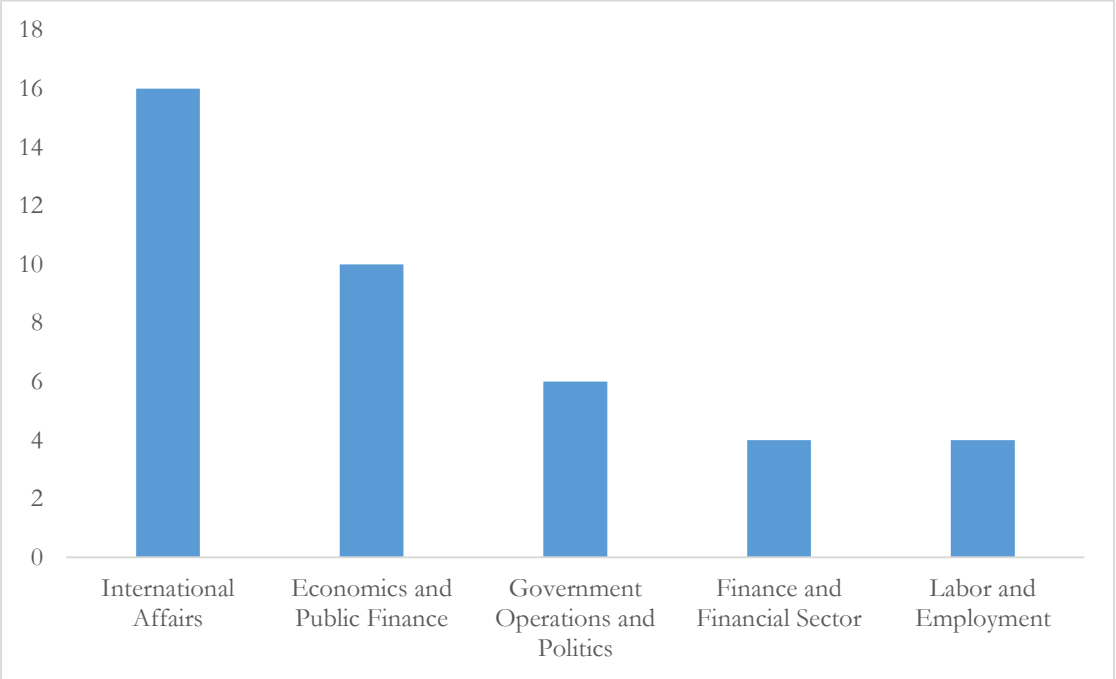


Figure 6: Graphical Illustration of Randomized Seating in 111st Congress, Session 1 (Sept 10, 2009)
This figure demonstrates how seating arrangements could influence voting patterns in the Senate through a counterfactual analysis. Panel A shows the actual Senate seating while Panel B displays one example out of 100 rounds of simulation for each session. The counterfactual analysis randomly reassigned senators to seats 100 times while maintaining the chamber's layout, simulated votes using modified deviation probabilities based on new seating adjacencies, and compared these counterfactual results to actual voting records to measure the potential impact of seating arrangements on legislative outcomes.

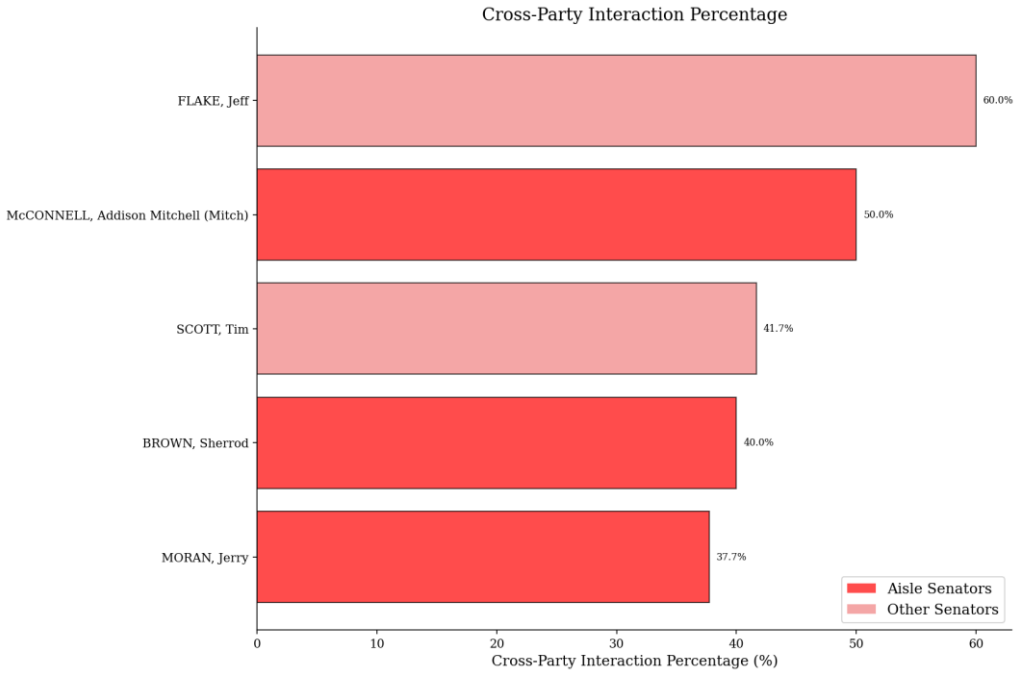


Panel A Top 5 Most common policy area of all bills

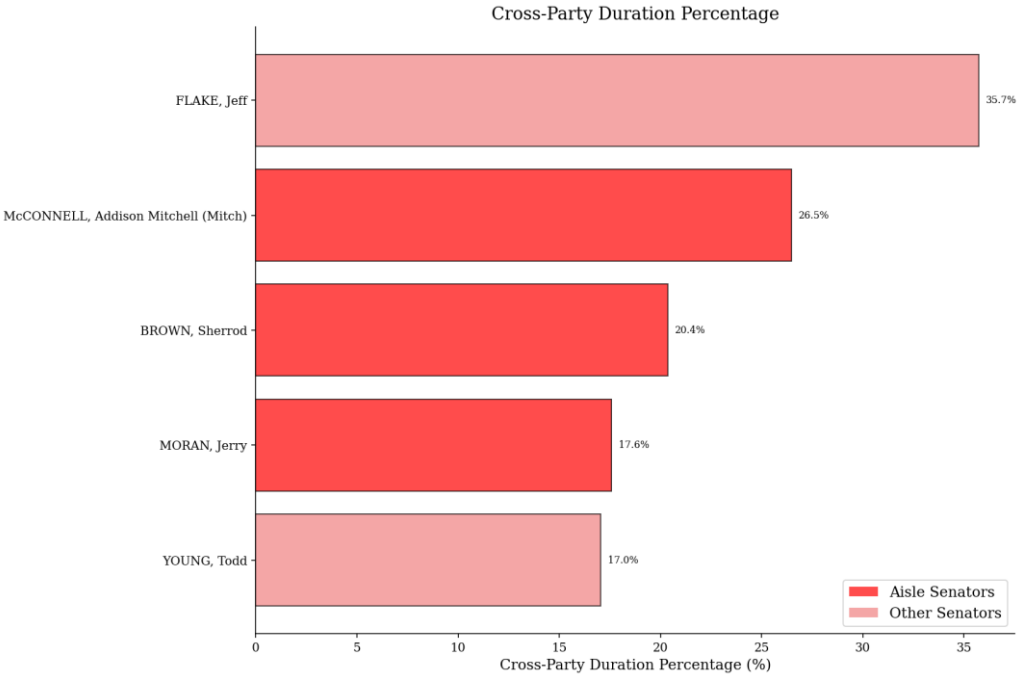


Panel B Top 5 Most common policy area of flipped bills

Figure 7 Distribution of Flipped Bills by Most Frequent Policy Areas This figure compares the policy areas between all bills introduced and bills that flipped in the randomized seating simulations. Panel A presents the five most common policy areas among all bills introduced in Congress, and Panel B displays the corresponding distribution for flipped bills. Policy areas of the bills are assigned by the legislative analysts from the Congressional Research Service (CRS) and obtained from Congress.gov



Panel A Distribution of Senators by Percentage of Cross-Party Interaction



Panel B Distribution of Senators by Percentage of Cross-Party Interaction Durations

Figure 8 Distribution of Cross-Party Interactions This figure presents the distribution of senators by percentage of cross-party interactions in panel A and by percentage of cross-party interactions durations in panel B. Cross-party interactions are interactions between two senators from different parties, and cross-party interaction durations is the duration of cross-party interaction measured in seconds. The darker red bar highlights senators that seat on the party aisle.

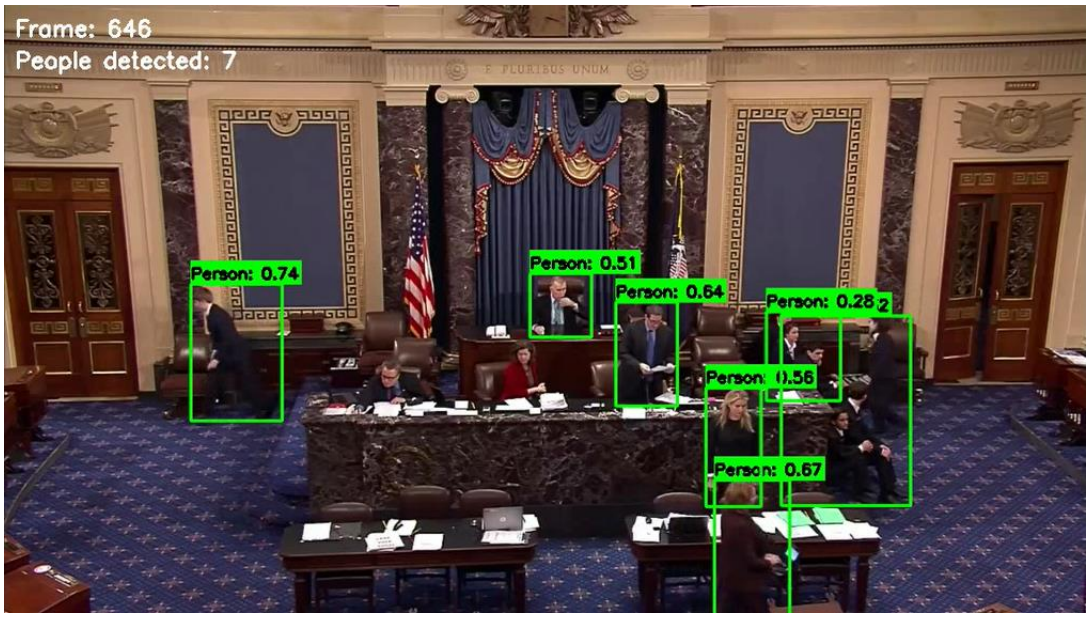


Figure 9 Capturing Senator Interactions Frames This figure illustrates the detection results produced by YOLOv11 on C-SPAN Senate floor recordings. Green bounding boxes indicate instances where the model has identified a person, and the accompanying numbers represent the model's confidence scores. We select frames containing more than two detected individuals in order to analyze potential interactions.



Figure 10 An Example of Labeled Senator Interactions from the Video This figure illustrates the labeling of Senator interactions during a roll call voting from CSPAN Senate Floor Recording on November 13rd, 2017.

Table 1 Summary Statistics

This table presents summary statistics of Senate voting behavior, senator demographics, and shared characteristics among different proximity groups. Panel A reports statistics at the Congress, Session, Session Seating, Senator, Vote level, divided into full sample (101st-117th Congress) and two sub-periods (101st-110th and 111st-117th). Variables include *Vote(Yes/No)*, an indicator for affirmative votes, and measures of peer influence categorized by physical proximity (*ClosestYes*, *Close3Yes*, *Close5Yes*) and shared characteristics (*SamePartyYes*, *SameStatesYes*). *AbsDeviationfromOwnParty*, measuring senators' voting deviations from their party, and *ClosestYesAisle* is the fraction of yes votes casted by closest senators across the party aisle. Panel B presents senator-level characteristics for different seniority groups, including demographics, generational cohorts, and professional backgrounds and educational qualifications. Panel C compares shared characteristics between senators at different proximity levels, reporting the percentage of neighboring senators sharing attributes such as generation, gender, party, state, educational background, and professional experience, with statistical tests for differences between proximity groups. Congress, Session, Vote and Senator fixed effect is included as where indicated. Precise variable definitions are presented in Appendix Table A1.

Panel A Summary Statistics at Congress-Session-Session Seating-Senator-Vote Level

	101st - 117th			101st - 110th		111st - 117th	
	Obs	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Vote(Yes/No)	1,084,691	0.6308	0.4826	0.6319	0.4823	0.6290	0.4831
ClosestYes	1,084,691	0.6297	0.2167	0.6303	0.2281	0.6287	0.1972
Close3Yes	1,084,691	0.6312	0.2178	0.6325	0.2293	0.6293	0.1983
Close5Yes	1,084,691	0.6321	0.2187	0.6332	0.2298	0.6304	0.2000
SamePartyYes	1,084,691	0.6358	0.2209	0.6346	0.2318	0.6377	0.2023
SameStatesYes	1,084,691	0.6306	0.2171	0.6317	0.2286	0.6290	0.1975
AbsDeviationfromOwnParty	166,198	0.1668	0.2516	0.1931	0.2504	0.1460	0.2506
ClosestYesAisle	166,198	0.6137	0.4538	0.6388	0.4307	0.5935	0.4706

Panel B Summary Statistics at Senator Level

	101st - 117th Congress			101st - 117th Senior Senator			101st - 117th Freshman Senator			101st - 117th Most Junior Freshman Senator			101st - 117th Exogenous Senator		
	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation
EntryAge	301	51.0066	8.8005	108	47.0275	7.9015	193	53.2539	8.4989	23	52.5909	7.3979	29	53.2414	10.0415
Female	301	0.1391	0.3466	108	0.0275	0.1644	193	0.2021	0.4026	23	0.0909	0.2942	29	0.1379	0.3509
GreatestGen.	301	0.1921	0.3946	108	0.2936	0.4575	193	0.1347	0.3423	23	0.0909	0.2942	29	0.2414	0.4355
Silent	301	0.3709	0.4838	108	0.6147	0.4889	193	0.2332	0.4239	23	0.2273	0.4289	29	0.1724	0.3844
Boomer	301	0.4338	0.4964	108	0.0917	0.2900	193	0.6269	0.4849	23	0.6818	0.4767	29	0.5517	0.5061
GenX	301	0.0894	0.2858	108	0.0183	0.1348	193	0.1295	0.3367	23	0.0909	0.2942	29	0.2414	0.4355
Millennial	301	0.0033	0.0575	108	0.0000	0.0000	193	0.0052	0.0720	23	0.0000	0.0000	29	0.0345	0.1857
AcademicExp	301	0.1093	0.3125	108	0.1651	0.3730	193	0.0777	0.2684	23	0.0000	0.0000	29	0.0345	0.1857
LawExp	301	0.3013	0.4596	108	0.3486	0.4787	193	0.2746	0.4475	23	0.3182	0.4767	29	0.3448	0.4837
FinExp	301	0.1424	0.3500	108	0.1743	0.3811	193	0.1244	0.3308	23	0.0909	0.2942	29	0.0690	0.2579
PubServExp	301	0.0364	0.1877	108	0.0459	0.2102	193	0.0311	0.1740	23	0.0909	0.2942	29	0.1034	0.3099
MilitaryExp	301	0.1490	0.3567	108	0.2844	0.4532	193	0.0725	0.2601	23	0.0909	0.2942	29	0.0345	0.1857
PoliticalExp	301	0.8245	0.3810	108	0.8624	0.3461	193	0.8031	0.3987	23	0.6818	0.4767	29	0.7241	0.4549
ScienceDegree	301	0.0265	0.1609	108	0.0275	0.1644	193	0.0259	0.1593	23	0.0455	0.2132	29	0.0000	0.0000
EconDegree	301	0.0166	0.1278	108	0.0092	0.0958	193	0.0207	0.1428	23	0.0909	0.2942	29	0.1034	0.3099
LawDegree	301	0.3907	0.4887	108	0.6055	0.4910	193	0.2694	0.4448	23	0.2273	0.4289	29	0.2759	0.4549
BusinessDegree	301	0.0464	0.2106	108	0.0550	0.2291	193	0.0415	0.1998	23	0.0455	0.2132	29	0.0000	0.0000
MedicalDegree	301	0.0232	0.1507	108	0.0000	0.0000	193	0.0363	0.1874	23	0.0909	0.2942	29	0.0345	0.1857

Panel C: Summary Statistics of Senators' Shared Characteristics by Proximity Group

	Closest		Close 3		Close 5		Diff Closest – Close3		Diff Closest – Close5	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Diff in Mean	T-stat	Diff in Mean	T-stat
PctSameGeneration	0.5983	0.3354	0.5567	0.2348	0.5266	0.2084	0.0416	12.6310	0.0717	19.5386
PctSameGender	0.7543	0.3276	0.7460	0.2682	0.7492	0.2615	0.0083	3.1175	0.0051	1.8220
PctSameParty	0.9490	0.1540	0.9150	0.1613	0.8743	0.1806	0.0340	27.0042	0.0747	42.3906
PctSameState	0.0168	0.0800	0.0152	0.0279	0.0142	0.0167	0.0016	1.5870	0.0026	2.4486
PctSameMajor	0.1805	0.3039	0.1795	0.2491	0.1753	0.2352	0.0010	0.8370	0.0052	2.5536
PctSameReligion	0.0662	0.1502	0.0667	0.0835	0.0620	0.0697	-0.0005	0.0625	0.0042	2.4815
PctSameCommittee	0.5986	0.3083	0.5968	0.1601	0.5851	0.1335	0.0018	0.3442	0.0135	3.3590
PctSameSchool	0.0292	0.1076	0.0277	0.0532	0.0256	0.0449	0.0015	1.5460	0.0036	2.9291
PctSameLawExp	0.1045	0.2245	0.1014	0.1674	0.1002	0.1584	0.0031	1.4478	0.0043	1.9868
PctSamePoliticalExp	0.4409	0.3690	0.4490	0.2792	0.4444	0.2693	-0.0081	-2.5932	-0.0035	-1.0265
PctSameFinExp	0.0863	0.2045	0.0848	0.1480	0.0834	0.1375	0.0015	0.3883	0.0029	1.0641
PctSameAcademicExp	0.0078	0.0611	0.0080	0.0321	0.0080	0.0303	-0.0002	-0.2114	-0.0002	-0.3663
PctSamePubServExp	0.0008	0.0186	0.0014	0.0112	0.0012	0.0084	-0.0006	-2.1906	-0.0004	-1.5331
PctSameMilitaryExp	0.0102	0.0684	0.0102	0.0429	0.0093	0.0354	0.0000	0.0664	0.0009	1.4930

Table 2 Determinants of Senate Seating Choices

This table analyzes the determinants of seating choices by senators of different tenure groups and the characteristics of their closest neighbors. Panel A examines factors affecting seating proximity. *Close3* is an indicator variable that equals 1 if the senator is within the three seats of the focal senator, and 0 otherwise. Independent variables measure similarities between senators including whether they are from the same generation (born within 10 years), their difference in seniority ranking, shared gender, party affiliation, state representation, educational background (including same major field of study and attendance at the same educational institution), religious affiliation, committee membership, and common professional experiences, precise variable definitions are presented in Appendix Table A1. Columns (1)-(5) present results for different seniority groups. *Senior* senators are all non-freshman senators. *Freshman* are senators in their first term who joined at the beginning of a Congress through regular elections. *Freshman (Abnormal Leaves and Joins)* are first-term senators who entered mid-Congress to fill vacancies caused by exogenous departures (e.g., death or resignation). *Most Junior Freshman* are the freshman senators with the lowest seniority ranking in each year. *Most Junior Freshman (Abnormal Leaves and Joins)* are the subset of most junior freshman who entered the Senate in odd-numbered years through special elections or appointments rather than through regular elections. All seniority classifications are determined annually. Panel B examines characteristics of senators' nearest neighbors, comparing senior senators to freshman senators. Dependent variables include *Difference in Ideology Scores*, measured by DW-NOMINATE score, *Seniority of closest senators*, and percentage of closest senators in the powerful committees. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Panel A Determinants of Senate Seating Across Different Tenure Groups

Sample	Senior	Freshman	Most Junior Freshman	Freshman (Abnormal Leaves and Joins)	Most Junior Freshman (Abnormal Leaves and Joins)
Dependent Variable	Close3				
	(1)	(2)	(3)	(4)	(5)
SameGeneration	0.012***	0.006	-0.004	0.008	0.007
	(0.001)	(0.003)	(0.015)	(0.009)	(0.031)
RankDiff	-0.004***	-0.004***	-0.002***	-0.002***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
SameGender	0.008***	-0.010*	-0.043*	0.003	-0.017
	(0.001)	(0.004)	(0.017)	(0.010)	(0.036)
SameParty	0.274***	0.232***	0.223***	0.217***	0.268***
	(0.001)	(0.003)	(0.013)	(0.008)	(0.028)
SameState	0.030***	-0.014	0.140*	0.149***	0.234
	(0.005)	(0.015)	(0.063)	(0.038)	(0.141)
SameMajor	0.024***	0.015*	0.012	0.016	-0.014
	(0.002)	(0.007)	(0.028)	(0.018)	(0.050)
SameReligion	0.018***	-0.018*	-0.028	-0.045*	-0.009
	(0.002)	(0.008)	(0.035)	(0.022)	(0.072)
SameCommittee	0.004***	-0.002	0.009	0.012	0.102*
	(0.001)	(0.003)	(0.014)	(0.009)	(0.040)
SameSchool	0.012***	0.018	0.066	0.046	0.234
	(0.003)	(0.011)	(0.042)	(0.032)	(0.156)
SameLegalExp	0.006**	0.035***	-0.036	0.013	0.007
	(0.002)	(0.006)	(0.023)	(0.015)	(0.038)
SamePoliticalExp	0.004***	-0.017***	0.007	-0.008	-0.013
	(0.001)	(0.004)	(0.017)	(0.009)	(0.032)
SameMilitaryExp	0.023***	-0.012	-0.108	-0.129	-0.095
	(0.005)	(0.030)	(0.116)	(0.160)	(0.171)
SameFinExp	0.008***	-0.005	0.028	-0.014	0.036
	(0.002)	(0.007)	(0.027)	(0.017)	(0.054)
SameAcademicExp	0.016**	0.054**		0.250***	
	(0.006)	(0.021)		(0.055)	
SamePubServExp	-0.020	0.085	0.269	0.249	-0.235
	(0.013)	(0.064)	(0.152)	(0.158)	(0.240)
N	497,591	36,810	2,276	6,727	593
R-squared	0.208	0.241	0.175	0.143	0.182

Panel B: Impact of Ideology, Tenure, and Power on Senator Seating Decisions

Sample	Closest Senators					
Dependent Variable	Difference in Ideology Scores	Seniority	% in Powerful Committees	Difference in Ideology Scores	Seniority	% in Powerful Committees
	(1)	(2)	(3)	(4)	(5)	(6)
Senior Senators	-0.0047**	2.2109***	0.0422***			
	(0.0021)	(0.0810)	(0.0047)			
Freshman Senators				-0.0042	-0.4174	0.0076
				(0.0086)	(0.3388)	(0.0193)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28,578	28,578	28,578	28,578	28,578	28,578
R-squared	0.3298	0.4528	0.0895	0.3296	0.4384	0.0868

Table 3 Peer Influence on Voting Behaviors

This table presents regression analysis of peer influence on Senate voting behavior. Vote (Yea/Nay) is an indicator variable, coded as 1 for "Yea" and 0 for "Nay", of the focal senator's vote. *ClosestYes* (senators at distance of 1), *Close3Yes* (senators at distance 2-3), and *Close5Yes* (senators at distance 4-5) measure the fraction of neighboring senators who voted "Yea", categorized by physical proximity. *SameStateYes* and *SamePartyYes*, which capture the fraction of senators from the same state and party voting "Yea", respectively. Precise variable definitions are presented in Appendix Table A1. Columns (1)-(3) present results for all senators, and columns (4)-(6) focus on the most junior freshman senators with exogenously assigned seats. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Sample	All Senators			Most Junior Freshman		
Dependent Variable	Vote (Yea / Nay)					
	(1)	(2)	(3)	(4)	(5)	(6)
ClosestYes	0.1017***			0.1189***		
	(0.0019)			(0.0162)		
Close3Yes		0.0456***			0.1008***	
		(0.0017)			(0.0258)	
Close5Yes			-0.0453***			-0.0297
			(0.0016)			(0.0198)
SameStateYes	0.1280***	0.1245***	0.1235***	0.1527***	0.1520***	0.1471***
	(0.0007)	(0.0007)	(0.0007)	(0.0066)	(0.0065)	(0.0066)
SamePartyYes	0.9181***	0.9089***	0.8106***	0.9762***	0.8506***	0.8297***
	(0.0009)	(0.0009)	(0.0020)	(0.0202)	(0.0265)	(0.0183)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,084,691	1,084,691	1,084,691	10,812	10,812	10,812
R-squared	0.6279	0.6269	0.6271	0.7005	0.6993	0.6989

Table 4 The Dynamics of Voting Decisions over the Senator's Term

This table analyzes how the influence of peer senators on voting behavior persists over time for freshman senators. The dependent variable *Vote(Yea/Nay)* is an indicator variable that equals 1 for "Yea" votes and 0 for "Nay" votes. *ClosestYes* (senators at distance of 1) measure the fraction of neighboring senators who voted "Yea", categorized by physical proximity. *SameStateYes* and *SamePartyYes*, which capture the fraction of senators from the same state and party voting "Yea", respectively. Columns (1)-(3) examine the persistence of peer effects during 1-3 Congresses (2-6 years) of their relationship, while columns (4)-(6) examine effects during 4-6 Congresses (8-12 years) of their relationship. Congress session, Senator, and Vote fixed effect is included as where indicated. *** p<0.01, ** p<0.05, * p<0.1.

Sample	During 1-3 Congresses			During 4-6 Congresses		
Dependent Variable	Vote (Yea/Nay)					
	(1)	(2)	(3)	(4)	(5)	(6)
ClosestYes	0.0775***	0.0827***	0.0858***	0.0384	-0.0025	-0.0106
	(0.0199)	(0.0200)	(0.0207)	(0.0305)	(0.0334)	(0.0363)
SameStateVotes	0.1427***	0.1370***	0.1373***	0.1608***	0.1391***	0.1355***
	(0.0100)	(0.0102)	(0.0105)	(0.0154)	(0.0160)	(0.0173)
SamePartyVotes	0.8263***	0.8281***	0.8314***	0.8504***	0.9233***	0.9326***
	(0.0221)	(0.0223)	(0.0230)	(0.0340)	(0.0375)	(0.0409)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,480	19,480	19,395	6,573	6,573	6,573
R-squared	0.3639	0.3667	0.3769	0.4456	0.4494	0.4704

Table 5 Peer Influence on Voting Behavior of Final Votes

This table examines how spatial proximity and peer relationships affect voting patterns of most junior freshman on final bills vs. intermediate bills in the Senate. Final votes sample include the votes that results in the pass or fail of the bill whereas Intermediate Votes include votes of all other stages. The dependent variable *Vote(Yea/Nay)* is an indicator variable that equals 1 for "Yea" votes and 0 for "Nay" votes. *Close5Yes* (senators at distance 4-5), *Close3Yes* (senators at distance 2-3), and *ClosestYes* (senators at distance of 1) measure the fraction of neighboring senators who voted "Yea", categorized by physical proximity. *ClosestAisleYes* measures the ratio of senators from the opposite party sitting directly across the aisle who voted "Yea". Additional controls include *SameStateYes*, fractions of same-state senators voting "Yea" and *SamePartyYes*, fractions of same-party senators voting "Yea". Congress, Session, Senator and Vote fixed effects are included in all specifications. *** p<0.01, ** p<0.05, * p<0.1

Sample	Final Votes			Intermediate Votes		
Dependent Variable	Vote (Yea/Nay)					
	(1)	(2)	(3)	(4)	(5)	(6)
ClosestYes	0.1635***			0.0847***		
	(0.0324)			(0.0195)		
Close3Yes		0.1557***			0.0671**	
		(0.0474)			(0.0324)	
Close5Yes			-0.0484			0.0303
			(0.0359)			(0.0256)
SamePartyYes	0.7307***	0.7426***	0.9361***	0.8781***	0.8979***	0.9352***
	(0.0369)	(0.0490)	(0.0385)	(0.0221)	(0.0332)	(0.0259)
SameStateYes	0.1338***	0.1410***	0.1425***	0.1509***	0.1544***	0.1530***
	(0.0150)	(0.0150)	(0.0150)	(0.0077)	(0.0077)	(0.0078)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,300	3,300	3,300	7,360	7,360	7,360
R-squared	0.7436	0.7422	0.7414	0.6962	0.6955	0.6954

Table 6 The Impact of Cross-Aisle Closest Senator on Party Line Deviation

This table presents regression analysis of cross-aisle closest senator influence on senators' propensity to deviate from party lines. The dependent variable is the absolute deviation of focal senator to own party, which equals to the vote dummy minus the party simple majority vote of the bill. The independent variable, *ClosestYesAisle*, is the fraction of a senator's cross-aisle closest senator (senators from the opposite party sitting directly across the aisle) who voted "Yea" on a bill. Columns (1)-(4) present results for all senators sample, and (5)-(6) present results for the sample most junior freshman senators with exogenously assigned seats. *SameStateVotes* captures the fraction of same-state senators from the same state voting "Yea". Congress, Session, Senator and Vote fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Sample	All Senators				Most Junior Freshman	
Dependent Variable	Abs. Deviation from own party on bills					
	(1)	(2)	(3)	(4)	(5)	(6)
ClosestYesAisle	0.0047***	0.0067***	0.0071***	0.0084***	0.0356*	0.0269
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0182)	(0.0191)
SameStateYes		-0.0075***		-0.0074***		-0.0305
		(0.0013)		(0.0013)		(0.0208)
Congress FE	No	No	Yes	Yes	No	No
Session FE	No	No	Yes	Yes	No	No
Senator FE	No	No	Yes	Yes	No	No
Vote FE	No	No	Yes	Yes	No	No
Observations	166,031	166,031	166,031	166,031	131	131
R-squared	0.0001	0.0003	0.0675	0.0698	0.0288	0.0450

Table 7 Aisle-Crossing Peer Influence on Party Deviation by Bill Characteristics

This presents regression analysis of cross-aisle peer influence on senators' propensity to deviate from party lines, categorized by committee power and policy areas. The dependent variable is the absolute deviation of a senator from their own party, calculated as the senator's vote minus their party's majority vote on a bill. ClosestYesAisle represents the fraction of a closest cross-aisle senator who voted "Yea" on a bill. Panel A present the result of Aisle-crossing peer influence on bills sponsored by different committees. Following the policy areas in Gentzkow et al., (2022) Panel B presents coefficients for ClosestYesAisle across different policy categories. Congress, Session, Vote and Senator fixed effect is included as where indicated. Precise variable definitions are presented in Appendix Table A1. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Panel A Cross-Aisle Peer Influence by Sponsored Committee

Sample	Power 10 Committees	Power 5 Committees	Power 3 Committees
Dependent Variable	Abs. Deviation from own party		
	(1)	(2)	(3)
ClosestYesAisle	0.0571***	0.1014***	0.1326***
	(0.0118)	(0.0184)	(0.0223)
Controls	Yes	Yes	Yes
Congress FE	Yes	Yes	Yes
Session FE	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes
Observations	4,268	2,366	1,737
R-squared	0.2819	0.3537	0.4065

Panel B Cross-Aisle Peer Influence across Policy Areas

Categories	Closest Yes Aisle Seat	Standard Error	Observations
Alcohol	0.1155***	0.0246	1,364
Budget	0.0395***	0.0106	5,086
Business	0.0651***	0.0118	4,556
Crime	0.1277***	0.0220	1,858
Defense	0.0481***	0.0112	4,529
Economy	0.0392	0.0319	704
Education	0.0544***	0.0111	5,355
Elections	0.0770	0.0470	391
Environment	0.0451***	0.0133	3,830
Foreign	0.0449***	0.0109	5,358
Government	0.0376***	0.0088	7,711
Health	0.0479***	0.0103	5,837
Immigration	0.1214***	0.0218	1,599
Justice	0.0727***	0.0150	2,956
Labor	0.0584***	0.0120	4,304
Mail	0.0499*	0.0301	876
Minorities	0.1948***	0.0640	319
Money	0.0764***	0.0224	1,303
Religion	0.1817***	0.0636	367
Tax	0.0394***	0.0118	4,044
Trade	0.0192	0.0144	3,481
Racial	0.1172*	0.0643	277

Table 9 Summary Statistics of Video Sample

This table presents summary statistics of Senate floor videos from CSPAN. Duration is length of interaction between two senators measured in seconds, *Closest, Close 3* and *Close 5* are indicator variables that equals 1 if two interacting senator's seat are of distance 1, 2-3 and 4-5, respectively. *Aisle Senators* is an indicator variable that equals 1 if either or both of the interacting senators are seating on the aisle column. *Freshman* is an indicator variable that equals 1 if either or both interacting senators join the senate in the year of the video and *most junior senator* is a variable that equals 1 if the senators ranks the last on the seniority list. *Same Party* and *Same States* are indicator variables that equals 1 if two interacting senators are from the same party or state, respectively. *Same Vote* is an indicator variable that equals 1 if two senators voted the same on a rollcall vote. *Number of Interaction* counts the number of interactions between two senators that's captured on the CSPAN videos during the past 7 days of the rollcall votes. *Average Duration* and *Total Duration* are the average and total length of interaction measured in seconds, respectively. Panel A report the summary statistics at the interaction level, and Panel B reports the summary statistics at the vote level.

Panel A: Interaction-level Data

Variable	Obs	Mean	Std. Dev.	Min	Max
Duration	7,985	139.5152	34.0600	31.0000	190.0000
Closest	7,985	0.0898	0.2859	0.0000	1.0000
Close 3	7,985	0.2683	0.4431	0.0000	1.0000
Close 5	7,985	0.2200	0.4143	0.0000	1.0000
Aisle Senators	7,985	0.1588	0.3655	0.0000	1.0000
Freshman	7,985	0.1125	0.3160	0.0000	1.0000
Most Junior Freshman	7,985	0.0520	0.2044	0.0000	1.0000
Same Party	7,985	0.9190	0.2729	0.0000	1.0000
Same State	7,985	0.0119	0.1084	0.0000	1.0000

Panel B: Vote Level

Variable	Obs	Mean	Std. dev.	Min	Max
Same Vote	2,959,653	0.7239	0.4471	0.0000	1.0000
Interaction	2,959,653	0.0218	0.1462	0.0000	1.0000
Number of Interactions	2,959,653	0.0220	0.1475	0.0000	3.0000
Average Durations	2,959,653	2.7751	19.7372	0.0000	190.0000
Total Duration	2,959,653	2.7946	19.9518	0.0000	448.0000

Table 10 Who's Interacting More

This table presents regression result of the impact of seating distance and senator characteristics on interaction durations. *Duration* is length of interaction between two senators measured in seconds, *Closest* and *Close 3* are indicator variables that equals 1 if two interacting senator's seat are of distance 1 and 2-3, respectively. *Same Party* and *Same States* are indicator variables that equals 1 if two interacting senators are from the same party or state, respectively. *Difference in DW* is the difference in dimension 1 of the DW nominate score between two interacting senators. *Same Gender, Same Generation, Same School, Same Major and Same Powerful Committee* are all indicator variables that equals 1 if interacting senators are of the same gender, born in the same generation, goes to same school, study same major, and participate in the same committees. Congress and session fixed effects are included as indicated.

	(1)	(2)
Dependent Variable	Duration	
Closest	9.5078***	
	(0.7440)	
Close3		5.2944***
		(0.4835)
Same Party	103.8103***	103.5153***
	(0.9926)	(0.9983)
Same State	-6.7454***	-6.3438***
	(1.9194)	(1.9247)
Difference in DW	0.1886	0.5477
	(1.2896)	(1.2940)
Same Gender	-0.4429	-0.4220
	(0.4248)	(0.4260)
Same Generation	-0.4250	-0.2339
	(0.3981)	(0.3990)
Same School	0.2824	0.2878
	(1.1628)	(1.1661)
Same Major	0.4968	-0.3263
	(0.7678)	(0.7709)
Same Powerful Committee	-0.0365	0.0911
	(0.4019)	(0.4027)
Congress-Session FE	YES	YES
Observations	9,361	9,361
R-squared	0.856	0.855

Table 11 Cross-Party Interactions

This table compares the characteristics of senator pairs with high cross-party interactions versus those with lower cross-party interactions. *Seating Distance* measures the seating distance between two interacting senators. *Diff in DW Score* represents the difference in the first dimension of DW-NOMINATE scores between two interacting senators. *Same Year Join Senate* is an indicator variable equal to 1 if both senators joined the Senate in the same year, and 0 otherwise. *Same Committee* is an indicator variable equal to 1 if both interacting senators serve on the same committee, and 0 otherwise.

Variable	Senators with most Frequent Cross-party Interactions	Senators with Less Frequent Cross-party Interactions	Difference (Frequent – Less)	P-Value
Seating Distance	8.0270	9.2970	-1.2690	0.0000
	(3.358)	(3.247)		
Diff in DW Score	0.8080	0.7940	0.0140	0.4335
	(0.171)	(0.216)		
Same Year Join Senate	0.0190	0.0220	-0.0030	0.8137
	(0.136)	(0.147)		
Same Committee	0.4720	0.2730	0.1980	0.0000
	(0.501)	(0.446)		

Table 12 Impact of Interactions on Vote Alignment

This table presents regression result of interaction on vote agreements. *Vote Alignment* is an indicator variable that equals 1 if two senators casted same vote on a rollcall vote. *Interactions* is an indicator variable that equals if two senators interacted at least once during the past seven days before the rollcall vote. *Same Party* and *Same States* are indicator variables that equals 1 if two interacting senators are from the same party or state, respectively. *Same Gender, Same Generation, Same School, Same Major and Same Powerful Committee* are all indicator variables that equals 1 if interacting senators are of the same gender, born in the same generation, goes to same school, study same major, and participate in the same committees. Congress and session fixed effects are included as indicated. *** p<0.01, ** p<0.05, * p<0.1

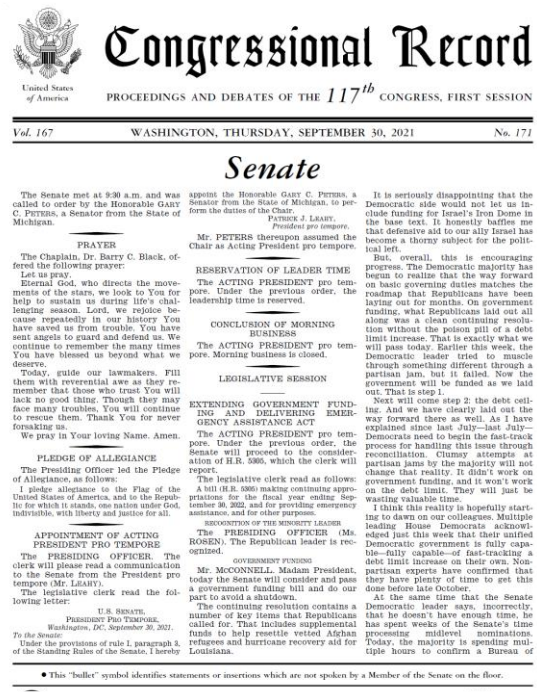
	Baseline	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Vote Alignment							
Interaction	0.0214***	0.0034**	0.0033**	0.0033**	0.0034**	0.0034**	0.0034**	0.0034**
	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)
Same Party		0.4622***	0.4614***	0.4614***	0.4615***	0.4617***	0.4617***	0.4616***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Same State			0.0657***	0.0657***	0.0673***	0.0679***	0.0681***	0.0682***
			(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Same Generation					0.0105***	0.0105***	0.0107***	0.0107***
					(0.0005)	(0.0005)	(0.0005)	(0.0005)
Same Gender					0.0018***	0.0016***	0.0015***	0.0016***
					(0.0005)	(0.0005)	(0.0005)	(0.0005)
Same School					-0.0128***	-0.0130***	-0.0134***	-0.0135***
					(0.0013)	(0.0013)	(0.0013)	(0.0014)
Same Committee						0.0029***	0.0032***	0.0032***
						(0.0005)	(0.0005)	(0.0005)
Same Major							-0.0097***	-0.0097***
							(0.0009)	(0.0009)
Same Religion								0.0016*
								(0.0009)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653
R-squared	0.002	0.203	0.204	0.204	0.204	0.204	0.204	0.204

Table 13 Impact of Interactions and Durations on Vote Alignment

This table presents regression result of the impact of interaction on vote agreements under different measures of interactions. *Vote Alignment* is an indicator variable that equals 1 if two senators casted same vote on a rollcall vote. *Interactions* is an indicator variable that equals if two senators interacted at least once during the past seven days before the rollcall vote. *Number of Interactions* is the number of interactions between two senators within 7 days before the vote. *Total Duration* is the total length of interactions between two senators measured in seconds, and Average *Duration* is average length of interaction between two senators measured in seconds. Congress Session, Senate and Senate Pair fixed effects are included as indicated. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variables						Vote Alignment						
Interaction	0.0214***	0.0207***	0.0039**									
	(0.0018)	(0.0018)	(0.0016)									
Number of Interactions				0.0216***	0.0209***	0.0039**						
				(0.0018)	(0.0017)	(0.0015)						
Total Duration							0.0005***	0.0005***	0.0001***			
							(0.0000)	(0.0000)	(0.0000)			
Average Duration										0.0005***	0.0005***	0.0001***
										(0.0000)	(0.0000)	(0.0000)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Session Seating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Senators FE	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Senator Pair FE	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653	2,959,653
R-squared	0.002	0.020	0.239	0.002	0.020	0.239	0.002	0.021	0.239	0.002	0.021	0.239

Appendix A Additional Figures and Tables



Congressional Record

United States of America

PROCEEDINGS AND DEBATES OF THE 117th CONGRESS, FIRST SESSION

Vol. 167 WASHINGTON, THURSDAY, SEPTEMBER 30, 2021 No. 171

Senate

The Senate met at 9:30 a.m. and was called to order by the Honorable GARY C. PETERS, a Senator from the State of Michigan.

PRAYER

The Chaplain, Dr. Barry C. Black, offered the following prayer:

Let us pray.

Eternal God, who directs the movements of the stars, we look to You for help to sustain us during life's challenging season. Lord, we rejoice because repeatedly in our history You have saved us from trouble. You have sent angels to guard and defend us. We continue to remember the many times You have blessed us beyond what we deserve.

Today, guide our lawmakers. Fill them with reverential awe as they remember that those who trust You will lack no good thing. Though they may face many troubles, You will continue to rescue them. Thank You for never forsaking us.

We pray in Your loving Name. Amen.

PLEDGE OF ALLEGIANCE

The Presiding Officer led the Pledge of Allegiance, as follows:

I pledge allegiance to the Flag of the United States of America, and to the Republic for which it stands, one nation under God, indivisible, with liberty and justice for all.

APPOINTMENT OF ACTING PRESIDENT PRO TEMPORE

The PRESIDING OFFICER. The clerk will please read a communication to the Senate from the President pro tempore (Mr. LEAHY).

The legislative clerk read the following letter:

U.S. SENATE,
PRESIDENT PRO TEMPORE,
Washington, DC, September 30, 2021.

To the Senate:

Under the provisions of rule I, paragraph 3, of the Standing Rules of the Senate, I hereby appoint the Honorable GARY C. PETERS, a Senator from the State of Michigan, to perform the duties of the Chair.

PATRICK J. LEAHY,
President pro tempore.

Mr. PETERS thereupon assumed the Chair as Acting President pro tempore.

RESERVATION OF LEADER TIME

The ACTING PRESIDENT pro tempore. Under the previous order, the leadership time is reserved.

CONCLUSION OF MORNING BUSINESS

The ACTING PRESIDENT pro tempore. Morning business is closed.

LEGISLATIVE SESSION

EXTENDING GOVERNMENT FUNDING AND DELIVERING EMERGENCY ASSISTANCE ACT

The ACTING PRESIDENT pro tempore. Under the previous order, the Senate will proceed to the consideration of H.R. 5305, which the clerk will report.

The legislative clerk read as follows:

A bill (H.R. 5305) making continuing appropriations for the fiscal year ending September 30, 2022, and for providing emergency assistance, and for other purposes.

RECOGNITION OF THE MINORITY LEADER

The PRESIDING OFFICER (Ms. ROSEN). The Republican leader is recognized.

GOVERNMENT FUNDING

Mr. MCCONNELL. Madam President, today the Senate will consider and pass a government funding bill and do our part to avoid a shutdown.

The continuing resolution contains a number of key items that Republicans called for. That includes supplemental funds to help resettle vetted Afghan refugees and hurricane recovery aid for Louisiana.

It is seriously disappointing that the Democratic side would not let us include funding for Israel's Iron Dome in the base text. It honestly baffles me that defensive aid to our ally Israel has become a thorny subject for the political left.

But, overall, this is encouraging progress. The Democratic majority has begun to realize that the way forward on basic governing duties matches the roadmap that Republicans have been laying out for months. On government funding, what Republicans laid out all along was a clean continuing resolution without the poison pill of a debt limit increase. That is exactly what we will pass today. Earlier this week, the Democratic leader tried to muscle through something different through a partisan jam, but it failed. Now the government will be funded as we laid out. That is step 1.

Next will come step 2: the debt ceiling. And we have clearly laid out the way forward there as well. As I have explained since last July—last July—Democrats need to begin the fast-track process for handling this issue through reconciliation. Clumsy attempts at partisan jams by the majority will not change that reality. It didn't work on government funding, and it won't work on the debt limit. They will just be wasting valuable time.

I think this reality is hopefully starting to dawn on our colleagues. Multiple leading House Democrats acknowledged just this week that their unified Democratic government is fully capable—fully capable—of fast-tracking a debt limit increase on their own. Nonpartisan experts have confirmed that they have plenty of time to get this done before late October.

At the same time that the Senate Democratic leader says, incorrectly, that he doesn't have enough time, he has spent weeks of the Senate's time processing midlevel nominations. Today, the majority is spending multiple hours to confirm a Bureau of

• This "bullet" symbol identifies statements or insertions which are not spoken by a Member of the Senate on the floor.

Land Management nominee who literally collaborated with ecoterrorists, fiddling away day after day after day while they pretend they lack the time to do their most basic job.

Senate Republicans have been totally transparent. We have given Democrats a step-by-step guide to governing in this environment and months of advance notice to get it done. The consolation to draw from this week is very clear: Clumsy efforts at partisan jams do not work. What works is when the majority accepts the reality of the situation.

We are able to fund the government today because the majority accepted reality. The same thing will need to happen on the debt limit next week.

TRIBUTE TO SUE TIMAS

Now, Madam President, on an entirely different matter, few public servants know Western Kentucky and its people as well as my good friend Sue Tharp. Sue has served as my team's Paducah-based field assistant since 1985. She is retiring this month after nearly four decades of uninterrupted service to the Commonwealth.

Sue holds the record for being the longest continually serving employee from my entire career in public service. She has been with me since day one of my Senate service.

So, today, I would like to honor this one-of-a-kind Kentuckian whose steady leadership in Western Kentucky has been integral to my office's mission to serve the Bluegrass and the people who call it home.

Now, when you ask Sue's colleagues to describe their coworker, you hear one word again and again and again: dedicated. In 36 years, Sue has scarcely missed a day in the office. She tackles her constituents' problem with her quick wit and her smile. Her knowledge of Western Kentucky is encyclopedic. And Sue has played a key part in training almost every other field staffer on our team, sharing hard-won wisdom with the next generation of public servants.

So when I think of Sue's service to Kentucky, two images come to mind. The first is Sue winning over even the most impassioned callers to my office, whether the call started out friendly or not. Sue will listen carefully, record their concerns, and do all she can to help. But then she also invariably will end up discussing other favorite topics, such as quilting. Sue is an avid volunteer at the National Quilt Museum in Paducah. So when the conversation wraps up, Sue will be smiling, and you know the person who just hung up on the other end is smiling too.

The second image comes from an event called Fancy Farm, which is an annual picnic in Graves County. It is the crown jewel of Western Kentucky's heritage. Sue is one of the event's most enthusiastic attendees. She often travels down early to peruse the area's many antique stores. She loves attending the church barbecue, taking in the speeches, and cheering with the crowd. Any politician who steps up to that podium is guaranteed to notice Sue amidst the throng.

Sue's day job has been public service for more than three decades, but even that hasn't soaked up all of her love for the Quilt Museum, and it will be Sue handing you a brochure. Vacation in one of Western Kentucky's beautiful parks, and Sue Tharp will be waving to you from the door of her RV.

Sue's dedication to Western Kentucky and its people is boundless. For all these years, she understood that while my staff report to me, all of us report to the people of Kentucky. In fact, at one point I believe Sue even lived directly across the street from our Paducah office.

So while Sue is departing our team, I am positive she isn't finished serving Kentucky. This is just the next chapter. More time to volunteer, more time to be generous to her friends and her neighbors, more time with her husband Dan and son Benjamin.

So, Sue, I couldn't be more grateful. Thank you for your decades of hard work and for your lasting impact on the Commonwealth.

TRIBUTE TO JANE LEE

Madam President, on one final matter, the pressing matters I discussed at the beginning of my remarks suggest I could not find a more appropriate time to honor the sterling staff expert who has advised me on budget issues and appropriations for over 5 years. But, in another sense, it pains me to say there couldn't be a worse time because the occasion for this tribute is that Jane Lee is soon taking leave of the Senate and taking the next step in her career.

Jane arrived in my office with a big job to do but the perfect skill set to do it. She studied at a couple of schools called Stanford and Columbia. She had worked in the private sector, risen through the ranks at OMB during the Bush 43 administration, worked for a House Budget chairman named Paul Ryan, and held leading rolls with Senate Appropriators and Republican Whip JOHN CORNYN.

Jane's resume was impeccable, her reference unimpeachable. She was already a force of nature on Capitol Hill, so my expectations, as you can imagine, were high from the start. But for about 5½ years, day in and day out, through a never-ending catalog of serious challenges, Jane kept raising the bar higher and higher.

Jane's colleagues throughout the Senate admire her determination and her dogged focus. She is methodical and meticulous. She grasps both the big political picture and the finest policy details much more capably than most people could hope to grasp either.

When you handle budget talks and funding negotiations for a leadership office, you are kind of a hybrid player-coach to offices and committees all across the Senate. Jane is a skilled leader. She can get a diverse team driving toward a goal with warmth and good humor but also tenacity and total professionalism.

For countless major bipartisan and bicameral compromise bills over the past 5 years, Jane has been one of very last staff experts on either side holding the pen. She is a principled fighter, but once negotiations concluded, everyone on both sides trusted Jane to be an honorable and honest broker. That speaks volumes.

Earlier this week, one of Jane's colleagues remarked simply, "I don't think I've ever worked with someone like Jane." This turns out to be the universal consensus of everyone. Her knowledge and her instincts spill outside her portfolio and make everyone look better. The high standards to which she holds herself are infectious.

She marshals the knowledge and the relationships that come with many years of government service but also inexhaustible earnestness, energy, and enthusiasm for the fray.

So Jane is exactly the kind of person you would hope to find in the government, just the kind of worker a Senate office is lucky to find, and just the sort of public servant the country deserves.

I don't think anyone would be terribly surprised if, one day, the Senate finds itself refamiliarizing ourselves with Jane's qualifications in a formal capacity.

I have to note that Jane would hasten to redirect all this praise toward her parents Michael and Jean, as well as her grandmother Hee Soon. She is a proud daughter of first-generation Americans and small business entrepreneurs whose love of country and commitment to hard work have shaped their daughter's life at every step.

At clutch moments, these qualities have benefited not just me, not just our conference, but our entire country. Today, one such time especially stands out in my memory.

It was a year and a half ago when COVID thrust our country into a health crisis and an economic crisis at the very same time. During the bipartisan scramble that built a historic CARES Act, Jane, our Swiss Army knife, wound up as my liaison to the Small Business Committee. She poured herself into helping Senators set up, preserve, and protect the landmark Paycheck Protection Program that saved a huge, huge number of jobs and countless small businesses exactly like the ones she grew up watching her parents manage.

But while Jane's commitment to her work has been peerless, her commitment to her family is greater still. Her beloved husband Tom and her son Mitchell and her parents and grandmother need to see more of her than

her bottomless Senate portfolio has often permitted. So while the whole institution will sorely miss her, we also join her in celebrating the new adventures to come.

To our incredibly competent budget expert, our cherished colleague, and one of the Senate's most talented jazz and rock-and-roll singers, we say not just ''farewell'' and ''good luck'' but ''bravo'' on a simply outstanding performance.

RECOGNITION OF THE MAJORITY LEADER

The PRESIDING OFFICER. The majority leader is recognized.

H.R. 5305

Mr. SCHUMER. Madam President, I begin this morning with some good news: Today, the Senate will pass a continuing resolution that will eliminate the possibility of a government shutdown tonight. The CR we are voting on will keep the government funded until December 3, provide funding to help process and resettle Afghan refugees, and finally deliver on critical disaster aid for Americans battered by the storms and wildfires this summer.

As part of today's agreement, we will hold a vote series starting at 10:30 this morning on three amendments offered by Senators CORTEZ, MASSIALL, and BRAUN. We will hold a vote on final passage soon thereafter, and I am confident the House will approve this measure later this afternoon and send it to the President's desk before funding runs out.

This is a good outcome, one I am happy we are getting done. With so many things to take care of here in Washington, the last thing the American people need is for the government to grind to a halt. But, of course, we have more work to do. Just as our Republican colleagues realize that a government shutdown would be catastrophic, they should realize that a default on the national debt would be even worse. I will have more to say on this later.

NOMINATIONS

Madam President, now on nominations, despite a week marked by Republican obstruction, the Senate is making great progress on our responsibility to confirm President Biden's nominees to his administration.

Last week, a handful of Members made a scene here on the Senate floor in a doomed effort to stymie a number of nominees critical to our national defense. I am glad to say that, over the course of the week, we have successfully confirmed these individuals despite these theatrics from that handful of Republicans Senators.

This Chamber will not allow anyone to hijack the confirmation process to score political points and to prevent these nominations from being approved. It will not happen. We will move forward. It will take a little more time, but we will get it done.

Today, the Senate will keep going. After passing the CR, we will turn to the nomination of Rohit Chopra to serve as the Director of the Consumer Financial Protection Bureau. Mr. Chopra is the right man to lead this Agency tasked with protecting Americans from predatory financial institutions. He is a veteran of the CFPB from the Obama years, where he specialized in protecting students from unscrupulous practices of student loan providers.

Under President Trump, who didn't give a hoot about the average person, the CFPB spent more time protecting the likes of payday lenders and for-profit colleges than American consumers. With Mr. Chopra's confirmation, the CFPB will return to fighting on the side of the American worker instead of big financial institutions. I look forward to his confirmation today.

After that, we will turn to the nomination of Tracy Stone-Manning to lead the Bureau of Land Management. Few Agencies are as important for protecting and promoting America's public lands. In the years to come, the BLM will play an even greater strategic role in our government's effort to fight climate change.

Ms. Stone-Manning is a familiar face here in the Senate. She served as a staffer for Senator TESTER before moving to Montana to work for then-Governor Bullock. As head of Montana's environmental agency, she earned the reputation not only as a skilled policymaker but also as an honest broker, one who commanded the respect of conservationists and ranchers alike.

Of course, you would never guess that by listening to some of the histrionics coming from the other side. Unable to disqualify Ms. Stone-Manning on the merits, which is so obvious to just about anyone who examines it, some of our Republican colleagues have used her nomination to launch cheap, out-of-context attacks. Thankfully, no one is taking these attacks seriously.

Because of her exceptional qualifications, Tracy Stone-Manning has broad support of the Democratic caucus to lead the BLM, and I expect her nomination to be approved later today.

Finally, I am also pleased that today President Biden is announcing the nomination of another outstanding judge from my home State: Dale Ho to serve as district judge for the Southern District of New York.

Like so many of President Biden's judicial nominees, Mr. Ho is a prominent civil rights lawyer and voting rights expert. A graduate of Yale and Princeton, a veteran of the NAACP and the ACLU, Mr. Ho would bring an impressive resume to the judiciary. I am thrilled that President Biden has taken my advice to nominate Mr. Ho, and I look forward to working on his confirmation.

In a more general note on this issue, I am proud that the Senate is not only increasing the demographic diversity on the bench—more women, more people of color, and more individuals from immigrant families—but also its occupational diversity as well—voting rights experts, civil rights lawyers, public defenders, and more. This is how we work to strengthen not only diversity in our judiciary but the trust that it represent all Americans.

DEBT LIMIT

Madam President, finally, on the debt limit, just as our Republican colleagues realized a government shutdown would be catastrophic, they should realize that a default on the national debt would be even worse.

Throughout American history, the Federal Government has consistently met its debt on time. The unbroken promise is what made the United States the leading economy in the world for so long, benefiting countless millions of families. So when we talk about extending the debt limit, that is what is at stake.

Last week, Senate Democrats presented our Republican colleagues with reasonable proposals to prevent a default from happening. We offered to hold a simple majority vote so Democrats could fix the debt ceiling ourselves. They rejected that offer.

We are not even asking Republicans to vote yes, even though we know they should, but, instead, just to get out of the way; just get out of the way, and let us keep the faith and credit in America's finances intact. Unfortunately, Republicans spent the week solidifying themselves as the party of default; the party that says America doesn't pay its bills; the party that would send our economy into unknown and dangerous territory.

On Monday, Republicans unanimously blocked a measure that would have funded the government and raised the debt ceiling.

On Tuesday, the Republican leader blocked the proposal to raise the debt ceiling with only Democratic votes—exactly what Republicans insisted they wanted from the start.

By Wednesday, it was clear that Republicans were committed not only to voting in favor of default but even preventing Democrats from solving this risk crisis on our own.

Every day that Republicans continue their cynical obstruction, they risk causing irreparable harm to the economy. The last time Republicans played games with the full faith and credit of the United States, our sovereign debt was downgraded. This time around, the consequences for American families could be far worse.

Despite Republicans' intransigence, the facts have not changed. We must raise the debt ceiling. We cannot allow America to default.

Yesterday, the House approved legislation providing for a clean debt limit extension until the end of 2022. At the appropriate time, I will move to proceed to its consideration, which could come as early as next week.

By now, we are not asking Republicans to vote with us to solve the debt limit crisis they have created. If they want to oppose this measure and bring

us closer to financial disaster, they can write their names in the history books as the Senators who let the country default for the first time ever. But Republicans need to get out of the way so Senate Democrats can address the issue quickly and without needlessly endangering the stability of our economy.

We cannot afford the risk of a drawn-out, unpredictable process sought by the minority, which could very well actually cause a default, no. The way to resolve this crisis is much more simple. Either Republicans man up out of their insane position and work with Democrats or they get out of the way while we solve the problem ourselves.

UNANIMOUS CONSENT AGREEMENT

Madam President, I ask unanimous consent that the previously scheduled votes begin at 11:05 a.m. and that all provisions of the previous order remain in effect.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. SCHUMER. I yield the floor.

The PRESIDING OFFICER. The Senator from Vermont.

H.R. 5305

Mr. LEAHY. Madam President, we will have before us a substitute amendment identical to H.R. 5305, which we will be voting on today. H.R. 5305 is the House-passed continuing resolution, except that the provision raising the debt ceiling has been removed because Republicans continue to block raising the debt ceiling.

But the stop-gap measure really keeps the government funded through December 3. It provides $28 billion to help States that have been ravaged by hurricanes and wildfires. It provides critical assistance to Afghan refugees who fled the Taliban in the wake of the U.S. withdrawal from Afghanistan. Many of those refugees have worked with American forces and helped us. So I urge all members to vote for it.

But I agree with the majority leader that it is shameful we can't reach an agreement today to raise the debt ceiling and protect the full faith and credit of the United States. If Republicans don't want to vote to protect the faith and credit of the United States, if the Republicans don't want to vote for the money that pays for the programs that they had supported under Donald Trump, well, then, stand out of the way and Democrats can raise the debt ceiling.

Over and over, the last few days, we heard from Members on the other side of the aisle speak about the consequences of passing a continuing resolution that contained disaster relief to help hurricane-ravaged States, like Louisiana and Texas. They are pleading for help. Well, we are about to pass a CR that provides that help.

I have always taken the position that if there is a disaster in any State, that we should all come together to provide assistance because we are the United States of America; it is not just one State. Whether it is my State of Vermont or Texas or any other State, we can provide the assistance.

But they may go home and say: Hey, we voted to get money, disaster relief for our hurricane-ravaged States.

Somebody is going to say: Well, wait a minute, where does the money come from to help recover and build if the U.S. Treasury is literally out of money?

In other words, they have a position where they can vote for something that could be popular back home, and it is kind of like ''the check is in the mail.'' We are not going to give you any money for it, but, boy, we are going to speak about how important it is to help.

Many Senators here today want to provide a trillion dollars to fund Israel's so-called Iron Dome, even though Israel has not spent the money we have given them before them. Well, we will pass a bill to do just that. But if there is no money in the U.S. Treasury to pay the bills, it is nothing but an empty promise to one of our closest allies. We are voting on a blank check.

According to the Treasury Department, we are going to reach the debt ceiling in 18 days. Now, I say that because we ought to know what we are voting on. What we are not voting on—as the majority leader pointed out, we are not voting on the debt ceiling.

We could say: Oh, we are helping hurricane-ravaged areas; oh, we are making sure Americans have things we vote for, but we are not voting for the money.

If we don't raise the debt ceiling, once that happens, we run out of money to pay our men and women in uniform. We all support our men and women in uniform. We are just not going to put in the money to pay them. We can't send out Social Security checks. Find a Senator in this place that would say they are against Social Security. But to put the money in for it, they are not ready to do that. Just saying: Oh, we all support our veterans. Of course, we do. We are just not going to put the money in to support them.

For the first time in history, the U.S. will default on its debt. The economy will take such a hit that it will take years to recover. Millions of people will be out of work. Bills will not be paid. Watch the stock market go down faster than we have ever seen and millions of Americans' lifetime savings will be at risk. Oh, we are for all of those—we just—you are on your own.

Now, the Republican Party is playing political games with U.S. economy and with people's livelihoods, and it is shameful. Senator MCCONNELL said he would not provide a single Republican vote to raise the debt ceiling. It is interesting because most of this debt was incurred under a Republican President and a Republican-controlled Senate.

But as irresponsible as it is for the Republican leader to say we won't vote to pay for the debt that we incur, we, on the Democratic side, are prepared to show what leadership looks like and do it all on our own. We are willing to pass this with Democratic votes.

But the Republicans continue to filibuster. If we don't resolve the debt issue in the coming days, make no mistake where the blame lies: squarely at the feet of the Senate Republicans.

When we go back and say all these wonderful things we have done for you in the continuing resolution, but we are not going to pay for it—we need to pass the CR today, of course, to avert a government shutdown tomorrow. A government shutdown, as we know from those in the last administration, wastes billions, accomplishes nothing. But it is also essential not only to pass the continuing resolution, but to unite and pass the debt limit extension, or there is not going to be money in the Treasury—no money to pay for the funding of this bill for American families, for the elderly, for our troops.

Now, prior to the final passage, we will have a series of three amendment votes. With only 13 hours for the government set to shut down—13 hours and a few minutes—any one of these amendments could peril the continuing resolution. They are controversial. They could complicate House passage. So I would urge a ''no'' vote on all three amendments and an ''aye'' vote for final passage.

Any one of those things in those three amendments, bring them up as legislation somewhere else, but don't shut down the government because you didn't get your political amendments.

AMENDMENT NO. 3830

(Purpose: In the nature of a substitute.)

Mr. LEAHY. Madam President, I call up amendment No. 3830.

The PRESIDING OFFICER. The clerk will report the amendment by number.

The senior assistant legislative clerk read as follows:

The Senator from Vermont [Mr. LEAHY] proposes an amendment numbered 3830.

(The amendment is printed in today's RECORD under ''Text of Amendments.'')

AMENDMENT NOS. 3831, 3832, AND 3833 TO AMENDMENT NO. 3830

Mr. LEAHY. Madam President, I ask unanimous consent to call up all remaining amendments, in order, with respect to H.R. 3595 en bloc, and ask that they be reported by number.

The PRESIDING OFFICER. Without objection, it is so ordered.

The clerk will report the amendments by number en bloc.

AMENDMENT NO. 3831 TO AMENDMENT NO. 3830

The senior assistant legislative clerk read as follows:

The Senator from Vermont [Mr. LEAHY], for Mr. CORTEZ and others, proposes an amendment numbered 3831 to amendment No. 3830.

The amendment is as follows:

(Purpose: To modify the immigration benefits for which certain Afghan nationals are eligible)

Beginning on page 40, strike line 6 and all that follows through page 83, line 6, and insert the following:

Figure A1 Congressional Record on Vote Discussions This figures present an example of Congressional Records on September 30th, 2021. We extract the conversation between senators from these document to construct common phrases used by both parties.

Table F1 Variable Definition

Variable	Definition
Vote	Indicator variable that equals 1 if the focal senator voted "Yea" and 0 if voted "Nay".
ClosestYes	Fraction of neighboring senators at a distance of 1 who voted "Yea".
Close3Yes	Fraction of neighboring senators at a distance of 2-3 who voted "Yea".
Close5Yes	Fraction of neighboring senators at a distance of 4-5 who voted "Yea".
Close5No	Fraction of neighboring senators at a distance of 4-5 who voted "Nay".
Close3No	Fraction of neighboring senators at a distance of 2-3 who voted "Nay".
ClosestNo	Fraction of neighboring senators at a distance of 1 who voted "Nay".
Absent5	Indicator variable that equals 1 if there are 5 senators with "Not Voting" status in the closest proximity group and 0 otherwise.
SamePartyYes	Fraction of senators from the same political party who voted "Yea".
SameStatesYes	Fraction of senators from the same state who voted "Yea".
AbsDeviationfromOwnParty	Absolute deviation of a senator from their own party, calculated as the absolute value of the difference between the senator's vote (1 for "Yea", 0 for "Nay") and their party's majority vote (>50%) on a bill.
ClosestYesAisle	Fraction of a senator's cross-aisle closest senators (senators from the opposite party sitting directly across the aisle) who voted "Yea" on a bill.
EntryAge	Years of age of the senator upon initial appointment to the Senate.
Female	Indicator variable that equals 1 if the senator is female and 0 otherwise.
GreatestGen	Indicator variable that equals 1 if the senator belongs to the Greatest Generation cohort (born approximately 1901-1927) and 0 otherwise.
Silent	Indicator variable that equals 1 if the senator belongs to the Silent Generation cohort (born approximately 1928-1945) and 0 otherwise.
Boomer	Indicator variable that equals 1 if the senator belongs to the Baby Boomer Generation cohort (born approximately 1946-1964) and 0 otherwise.
GenX	Indicator variable that equals 1 if the senator belongs to Generation X cohort (born approximately 1965-1980) and 0 otherwise.
Millennial	Indicator variable that equals 1 if the senator belongs to the Millennial Generation cohort (born approximately 1981-1996) and 0 otherwise.
AcademicExp	Indicator variable that equals 1 if the senator has prior professional experience in academia, identified by keywords "professor," "lecturer," or "faculty," and 0 otherwise.
LawExp	Indicator variable that equals 1 if the senator has prior professional experience in legal practice, identified by keywords "prosecutor," "chief justice," "attorney general," "district attorney," "prosecuting," "attorney," "lawyer," "legal advisor," "law firm," "practiced law," or "commenced practice" and 0 otherwise.
FinExp	Indicator variable that equals 1 if the senator has prior professional experience in finance or business, identified by keywords "consultant," "adviser," "advisor," "consulting firm," "consultancy," "bank," "financial," "executive," "insurance," "businessman," or "businesswoman" and 0 otherwise.

PubServExp	Indicator variable that equals 1 if the senator has prior professional experience in public service roles and 0 otherwise.
MilitaryExp	Indicator variable that equals 1 if the senator has prior military service, identified by keywords related to specific conflict ["World War II," "World War 2," "WWII," "WW2," "Second World War," "Korean War," "Vietnam War," "service in Vietnam," "Gulf War," "First Iraq War," "Operation Desert Storm," "Afghanistan War," "War in Afghanistan," "Operation Enduring Freedom," "Iraq War," "Operation Iraqi Freedom"], military institutions ["Naval Academy," "War College"], or service branches ["National Guard," "Army Reserve"] and 0 otherwise.
PoliticalExp	Indicator variable that equals 1 if the senator has prior political experience, identified by keywords "mayor", "House of Rep", "governor", "
ScienceDegree	Indicator variable that equals 1 if the senator possesses an academic degree in a scientific discipline, identified by keywords "science," "biology," "chemistry," "physics," "B.S.," or "M.S." and 0 otherwise.
EconDegree	Indicator variable that equals 1 if the senator possesses an academic degree in economics, identified by keywords "economics," "economist," "B.Econ," or "M.Econ" and 0 otherwise.
LawDegree	Indicator variable that equals 1 if the senator possesses a legal academic credential, identified by keywords "J.D.," "LL.B.," or "LL.M." and 0 otherwise.
BusinessDegree	Indicator variable that equals 1 if the senator possesses an academic degree in business, identified by keywords "business," "MBA," or "BBA" and 0 otherwise.
MedicalDegree	Indicator variable that equals 1 if the senator possesses a medical academic credential, identified by keywords "medicine," "medical," "MD," "MBBS," "M.D.," or "Md." and 0 otherwise.
PctSameGeneration	Share of senators who belong to the same generation as the focal senator.
PctSameGender	Share of senators who share the same gender as the focal senator.
PctSameParty	Share of senators who belong to the same political party as the focal senator.
PctSameState	Share of senators who represent the same state as the focal senator.
PctSameMajor	Share of senators who have the same academic major or field of study as the focal senator.
PctSameReligion	Share of senators who practice the same religion as the focal senator.
PctSameCommittee	Share of senators who serve on the same committee(s) as the focal senator.
PctSameSchool	Share of senators who attended the same educational institution(s) as the focal senator.
PctSameLawExp	Share of senators who share the same legal experience status as the focal senator.
PctSamePoliticalExp	Share of senators who share the same political experience status as the focal senator.
PctSameFinExp	Share of senators who share the same finance/business experience status as the focal senator.
PctSameAcademicExp	Share of senators who share the same academic experience status as the focal senator.
PctSamePubServExp	Share of senators who share the same public service experience status as the focal senator.

PctSameMilitaryExp	Share of senators who share the same military experience status as the focal senator.
SameGenerationYes	Share of senators from the same generation as the focal senator who voted "Yea".
SameGenderYes	Share of senators of the same gender as the focal senator who voted "Yea".
SamePartyYes	Share of senators from the same political party as the focal senator who voted "Yea".
SameStateYes	Share of senators from the same state as the focal senator who voted "Yea".
SameMajorYes	Share of senators with the same academic major or field of study as the focal senator who voted "Yea".
SameReligionYes	Share of senators practicing the same religion as the focal senator who voted "Yea".
SameCommitteeYes	Share of senators serving on the same committee(s) as the focal senator who voted "Yea".
SameSchoolYes	Share of senators who attended the same educational institution(s) as the focal senator who voted "Yea".
SameLawExpYes	Share of senators sharing the same legal experience status as the focal senator who voted "Yea".
SamePoliticalExpYes	Share of senators sharing the same political experience status as the focal senator who voted "Yea".
SameMilitaryExpYes	Share of senators sharing the same military experience status as the focal senator who voted "Yea".
SameFinExpYes	Share of senators sharing the same finance/business experience status as the focal senator who voted "Yea".
SameAcademicExpYes	Share of senators sharing the same academic experience status as the focal senator who voted "Yea".
SamePubServExpYes	Share of senators sharing the same public service experience status as the focal senator who voted "Yea".

Table A2 Impact of Peer Influence and Shared Characteristics on Freshman Senators' Voting Behavior

This table analyzes how the impact of distance on senators voting behavior given the similarity in characteristics. The dependent variable *Votes (Yes/No)* is an indicator variable that equals 1 for "Yes" votes and 0 for "No" votes. Independent variables measure the influence of similar senators who voted "Yes" on the focal senator's vote, including physical proximity (*Close3Yes*) and various shared characteristics such as generation (born within 10 years), gender, party affiliation, state representation, educational background (major field and institution), religious affiliation, committee membership, and professional experiences in legal, political, military, financial, academic, and public service sectors. Precise variable definitions are presented in Appendix Table A1. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Senator From Non-Regular Election Years			Senator From Regular Election Years		
Dependent Variable	Votes (Yes/No)					
ClosestYes	0.2312***			0.0805***		
	(0.0545)			(0.0179)		
Close3Yes		0.0657			0.1841***	
		(0.0747)			(0.0306)	
Close5Yes			0.0571			-0.0265
			(0.0482)			(0.0247)
SamePartyYes	0.7409***	0.8876***	0.9089***	0.9250***	0.8284***	1.0339***
	(0.0600)	(0.0704)	(0.0459)	(0.0215)	(0.0318)	(0.0260)
SameStateYes	0.1171***	0.1397***	0.1295***	0.1662***	0.1692***	0.1695***
	(0.0283)	(0.0282)	(0.0288)	(0.0074)	(0.0074)	(0.0074)
SameGenerationYes	0.2227**	0.1471	0.1484	-0.0140	-0.0096	0.0090
	(0.1099)	(0.1097)	(0.1094)	(0.0431)	(0.0429)	(0.0430)
SameGenderYes	0.0786	0.0827	0.0735	-0.1315***	-0.1346***	-0.1471***
	(0.0955)	(0.0969)	(0.0976)	(0.0509)	(0.0508)	(0.0509)
SameMajorYes	-0.0176	0.0131	0.0189	-0.0727***	-0.0718***	-0.0809***
	(0.1436)	(0.1453)	(0.1446)	(0.0263)	(0.0262)	(0.0262)
SameReligionYes	0.2316*	0.1581	0.1661	0.0049	-0.0086	-0.0026
	(0.1244)	(0.1243)	(0.1246)	(0.0168)	(0.0168)	(0.0168)
SameCommitteeYes	-0.2424	-0.1596	-0.1557	-0.0823*	-0.0912*	-0.0871*
	(0.1603)	(0.1654)	(0.1618)	(0.0494)	(0.0493)	(0.0494)
SameSchoolYes	-0.0933**	-0.0805*	-0.0839**	0.0743***	0.0872***	0.0816***
	(0.0408)	(0.0410)	(0.0411)	(0.0127)	(0.0126)	(0.0126)
SameLawExpYes	0.1639	0.1507	0.1344	0.1118***	0.1189***	0.1161***
	(0.1664)	(0.1678)	(0.1685)	(0.0387)	(0.0387)	(0.0387)
SamePoliticalExpYes	-0.3555***	-0.3597***	-0.3530***	-0.0349	-0.0378	-0.0428
	(0.0904)	(0.0925)	(0.0927)	(0.0265)	(0.0264)	(0.0264)
SameMilitaryExpYes	-0.0344	-0.0452	-0.0357	0.0961***	0.0767**	0.0920**
	(0.1093)	(0.1129)	(0.1132)	(0.0371)	(0.0372)	(0.0372)
SameFinExpYes				-0.0186	-0.0342	-0.0244
				(0.0472)	(0.0472)	(0.0472)
SameAcademicExpYes				0.0858	0.0977	0.0886
				(0.0604)	(0.0604)	(0.0605)
SamePubServExpYes				-0.2194***	-0.2456***	-0.2441***
				(0.0625)	(0.0621)	(0.0623)
Congress FE	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,419	1,419	1,419	9,350	9,350	9,350
R-squared	0.7273	0.7228	0.7230	0.7108	0.7113	0.7102

Table A3 Impact of Distance on Senator Voting: Freshman Cohort Effect

This table presents regression analysis of peer influence on Senate voting behavior. *Vote(Yea/Nay)* is an indicator variable, coded as 1 for "Yea" and 0 for "Nay", of the focal senator's vote. *ClosestFreshmanYea* measure the fraction of neighboring freshman senator voted Yea, and *ClosestNon-freshmanYea* measure the fraction of neighboring senior senator voted Yea. *Close3FreshmanYea* measure the fraction of freshman senator of distance 2 and 3 voted Yea, and *Close3Non-freshmanYea* measure the fraction of distance 2 and 3 senior senator voted Yea. *SameStateYes* and *SamePartyYes*, which capture the fraction of senators from the same state and party voting "Yea", respectively. Precise variable definitions are presented in Appendix Table A1. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Dependent Variable	Vote (Yea/Nay)			
	(1)	(2)	(3)	(4)
ClosestFreshmanYes	0.0761***			
	(0.0172)			
Close3FreshmanYes		0.2449***		
		(0.0227)		
ClosestNon-freshmanYes			0.0365***	
			(0.0132)	
Close3Non-freshmanYes				0.0641***
				(0.0187)
Same Party Yes	0.8999***	0.7328***	0.9198***	0.8877***
	(0.0211)	(0.0260)	(0.0164)	(0.0195)
Same State Yes	0.1270***	0.1231***	0.1514***	0.1513***
	(0.0090)	(0.0093)	(0.0073)	(0.0066)
Congress FE	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes
Observations	4,805	4,928	8,520	10,746
R-squared	0.7795	0.7968	0.6853	0.6984

Table A4 Role of Face-to-Face Interactions: Using Absent Senators

This table presents regression analysis of peer influence on Senate voting behavior. *Vote (Yea/Nay)* is an indicator variable, coded as 1 for "Yea" and 0 for "Nay", of the focal senator's vote. *ClosestYes* (senators at distance of 1), *Close3Yes* (senators at distance 2-3), and *Close5Yes* (senators at distance 4-5) measure the fraction of neighboring senators who voted "Yea", categorized by physical proximity. *Absent 5%* is a indicator variable that equals 1 if the fraction of absent peer in the congress-session is less than and equal to 5 percent. *SameStateYes* and *SamePartyYes* capture the fraction of senators from the same state and party voting "Yea", respectively. Precise variable definitions are presented in Appendix Table A1. Columns (1)-(3) present results for all senators. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
Dependent Variable		Vote (Yea/Nay)	
ClosestYes	0.1239***		
	(0.0162)		
ClosestYes X 5% Absent	-0.1954***		
	(0.0346)		
Close3Yes		0.1121***	
		(0.0258)	
Close3 Yes X 5% Absent		-0.2355***	
		(0.0352)	
Close5Yes			-0.0257
			(0.0198)
Close5Yes X 5% Absent			-0.2264***
			(0.0434)
5% Absent	0.1270***	0.1515***	0.1502***
	(0.0340)	(0.0340)	(0.0373)
Same Party Yes	0.8374***	0.8352***	0.9796***
	(0.0017)	(0.0023)	(0.0202)
Same State Yes	0.1203***	0.1195***	0.1532***
	(0.0007)	(0.0007)	(0.0066)
Congress FE	Yes	Yes	Yes
Session FE	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes
Observations	10,812	10,812	10,812
R-squared	0.7014	0.7007	0.6998

Table A5 Impact of Distance on Senator Voting: Seating Fixed Effect

This table presents regression analysis of peer influence on Senate voting behavior. *Vote (Yea/Nay)* is an indicator variable, coded as 1 for "Yea" and 0 for "Nay", of the focal senator's vote. *ClosestYes* (senators at distance of 1), *Close3Yes* (senators at distance 2-3), and *Close5Yes* (senators at distance 4-5) measure the fraction of neighboring senators who voted "Yea", categorized by physical proximity. *SameStateYes* and *SamePartyYes* capture the fraction of senators from the same state and party voting "Yea", respectively. Precise variable definitions are presented in Appendix Table A1. Columns (1)-(3) present results for all senators, and columns (4)-(6) focus on the most junior freshman senators with exogenously assigned seats. Congress, Session, Vote, Senator and Seating fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Dependent Variable	Vote (Yea/Nay)		
	(1)	(2)	(3)
ClosestYes	0.1070***		
	(0.0239)		
Close3Yes		0.0599***	
		(0.0137)	
Close5Yes			-0.0193
			(0.0225)
SamePartyYes	0.7503***	0.8883***	0.9680***
	(0.0245)	(0.0163)	(0.0234)
SameStateYes	0.1475***	0.1503***	0.1517***
	(0.0065)	(0.0065)	(0.0065)
Congress FE	Yes	Yes	Yes
Session FE	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes
Seat FE	Yes	Yes	Yes
Observations	10,812	10,812	10,812
R-squared	0.7012	0.6996	0.6990

Table A6 Impact of Distance on Senator Voting: Extreme Ideology (Closest and Closest, Close 3 with Close 3)

This table presents regression analysis of peer influence on Senate voting behavior by peer's ideology. *Vote (Yea/Nay)* is an indicator variable that equals 1, coded 1 for "Yea" and 0 for "Nay", of the focal senator's vote. *ClosestModerateYes* is the fraction of yea vote by the closest peer with absolute DW-nominate score in the quantile 1 to 3, *ClosestExtremeVoteYes* is the fraction of yea votes by the closest peer with absolute DW-nominate score in quantile 4, with quantile 1 being the lowest and quantile 4 being the highest. *SameStateYes* and *SamePartyYes*, which capture the fraction of senators from the same state and party voting "Yea", respectively. Precise variable definitions are presented in Appendix Table A1. Congress, Session, Vote and Senator fixed effect is included as where indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
Dependent Variable	Vote (Yea/Nay)			
ClosestExtremeVoteYes	0.0817***			
	(0.0137)			
Close3ExtremeVoteYes		0.1525***		
		(0.0137)		
ClosestModerateVoteYes			0.0206*	
			(0.0108)	
Close3ModerateVoteYes				-0.0016
				(0.0192)
SameStateVotes	0.7491***	0.7564***	0.9405***	0.9507***
	(0.0198)	(0.0173)	(0.0139)	(0.0198)
SamePartyVotes	0.2476***	0.1689***	0.1447***	0.1517***
	(0.0097)	(0.0083)	(0.0069)	(0.0066)
Congress FE	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes
Observations	6,578	7,284	9,781	10,812
R-squared	0.6913	0.7241	0.6834	0.6990

Table A7 Aisle-Crossing Peer Influence on Party Deviation at Different Stages of the Votes

This presents regression analysis of cross-aisle closest senator influence on senators' propensity to deviate from party lines from the 101st to 117th Congress. The dependent variable is the absolute deviation of a senator from their own party, calculated as the senator's vote (1 for "Yea", 0 for "Nay") minus their party's majority vote (>50%) on a bill. *ClosestYesAisle* represents the fraction of a senator's cross-aisle closest senator (senators from the opposite party sitting directly across the aisle) who voted "Yea" on a bill. Panel A present the aisle-crossing peer influence to senators at different stages of the bill, and Panel B present aisle-crossing peer influence to senators on polarizing votes. Congress, Session, Vote and Senator fixed effect is included as where indicated. Precise variable definitions are presented in Appendix Table A1. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A Impact of Aisle-Crossing Peer Influence at Different Stages of the Bill

Sample	All Votes		Final Votes		Most junior Freshman Final Votes	
Dependent Variable	Abs. Deviation from own party					
	(1)	(2)	(3)	(4)	(5)	(6)
ClosestYesAisle	0.0070***	0.0083***	0.0243***	0.0443***	0.0852	0.1145
	(0.0014)	(0.0014)	(0.0058)	(0.0057)	(0.1243)	(0.1481)
SameStateYes		-0.0074***		-0.1925***		-0.0912
		(0.0013)		(0.0073)		(0.2305)
Congress FE	Yes	Yes	Yes	Yes	No	No
Session FE	Yes	Yes	Yes	Yes	No	No
Senator FE	Yes	Yes	Yes	Yes	No	No
Vote FE	Yes	Yes	Yes	Yes	No	No
Observations	166,198	162,916	14,719	14,719	16	16
R-squared	0.0675	0.0698	0.1532	0.1925	0.0324	0.0439

Panel B Impact of Aisle-Crossing Peer Influence on Close Votes

Sample	Margin 3% votes	Non-margin 3% votes	Margin 5% votes	Non-margin 5% votes
Dependent Variable	Abs. Deviation from own party			
	(1)	(2)	(3)	(4)
ClosestYesAisle	0.0423***	0.0267***	0.0432***	0.0174***
	(0.0033)	(0.0031)	(0.0028)	(0.0036)
SameStateYes	0.0061***	-0.0020	0.0007	0.0267***
	(0.0023)	(0.0018)	(0.0020)	(0.0021)
Congress FE	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes
Senator FE	Yes	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes	Yes
Observations	100,523	180,451	129,547	151,427
R-squared	0.0655	0.0601	0.0702	0.0636

Appendix A8 Most Viewed Bill that Flipped in Counterfactual Analysis

This table presents key legislation that would have changed outcome (from pass to fail or fail to pass) under counterfactual randomized seating arrangements in the Senate. Most viewed bills are top ten most-viewed bill compiled each Monday from the previous week's metrics provide by the Congress.gov. Policy area are categories that legislative analysts in the Congressional Research Service (CRS) assigned to each bill upon the release of official text by the Government Publishing Office. Bill summaries are official summaries provide by CRS.

Congress	Session	Bill Number	Policy Area	Bill Summary
113	2	H.R.5021	Economics and Public Finance	A bill to provide an extension of Federal-aid highway, highway safety, motor carrier safety, transit, and other programs funded out of the Highway Trust Fund, and for other purposes.
115	2	S.J.Res.52	Science, Technology, Communications	A joint resolution providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Federal Communications Commission relating to "Restoring Internet Freedom".
115	2	S.J.Res.54	International Affairs	A joint resolution to direct the removal of United States Armed Forces from hostilities in the Republic of Yemen that have not been authorized by Congress.
116	1	H.J.Res.46	Immigration	This joint resolution terminates the national emergency related to the U.S.-Mexico border, declared by the President on February 15, 2019.
116	1	H.R.3877	Economics and Public Finance	A bill to amend the Balanced Budget and Emergency Deficit Control Act of 1985, to establish a congressional budget for fiscal years 2020 and 2021, to temporarily suspend the debt limit, and for other purposes.
116	2	H.R.1957	Public Lands and Natural Resources	An Act to amend title 54, United States Code, to establish, fund, and provide for the use of amounts in a National Parks and Public Land Legacy Restoration Fund to address the maintenance backlog of the National Park Service, the United States Fish and Wildlife Service, the Bureau of Land Management, the Forest Service, and the Bureau of Indian Education, and to provide permanent, dedicated funding for the Land and Water Conservation Fund, and for other purposes.

117	1	S.Con.Res.5	International Affairs	This concurrent resolution establishes the congressional budget for the federal government for FY2021, sets forth budgetary levels for FY2022-FY2030, and provides reconciliation instructions for legislation that increases the deficit.
117	1	S.J.Res.33	International Affairs	A joint resolution joint resolution relating to increasing the debt limit.
117	1	S.Con.Res.14	Economics and Public Finance	This concurrent resolution establishes the congressional budget for the federal government for FY2022, sets forth budgetary levels for FY2023-FY2031, and provides reconciliation instructions for legislation that increases the deficit.
117	1	H.R.1319	Economics and Public Finance	A bill to provide for reconciliation pursuant to title II of S. Con. Res. 5.
117	1	H.R.5305	Economics and Public Finance	A bill making continuing appropriations for the fiscal year ending September 30, 2022, and for providing emergency assistance, and for other purposes.

Table A9 Most Polarized Phrases in Bills

This table present the most frequent phrases used by Republican and Democratic Senators during the legislative discussion. The legislative discussion is obtained from Congressional Records. All text are split into bi-grams (2 word short phrases) #R and #D are the frequency of words used by either Republican and Democratic Senators in the respective Congress.

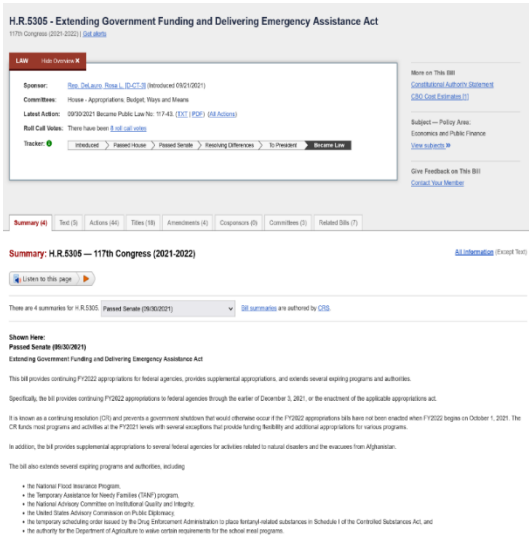
	Congress 104 (1995-1997)					Congress 105 (1997-1999)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
balanced budget	414	252	balanced budget	130	490	commerce bill	80	4	universal service	0	136
federal mandates	132	44	budget resolution	262	496	white house	78	30	nato expansion	84	184
unfunded mandates	132	54	work first	44	278	hourly employees	52	4	tobacco companies	6	100
federal government	232	166	public hearings	40	238	black market	48	4	democratic alternative	12	90
unfunded federal	68	16	tax cut	88	258	tax increase	40	0	american people	24	98
wilderness act	52	0	child care	148	318	price cigarettes	56	20	service fund	0	72
tax burden	52	0	balance budget	104	258	cdbg funds	36	2	judiciary committee	50	114
water right	48	4	social security	80	232	emergency cdbg	32	0	appropriations bill	62	124
trust lands	44	0	republican plan	8	156	take money	36	4	public health	2	64
small businesses	46	4	deficit reduction	34	178	money away	28	0	telephone service	4	64
	Congress 106 (1999-2001)					Congress 107 (2001-2003)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
security surplus	292	162	insurance company	8	172	small business	208	28	farm bill	624	1100
president's budget	150	40	managed care	48	188	finance committee	180	46	food stamp	4	264
point order	102	14	specialty care	52	180	small businesses	124	48	conference report	166	338
kennedy bill	84	0	tax cut	40	148	health insurance	104	40	family farmers	46	204
earnings limit	104	26	primary care	80	176	nuclear fuel	88	28	freedom farm	40	188
drug benefit	108	32	family farmers	36	116	tax relief	96	40	food stamps	12	156
gop budget	72	0	patients bill	64	140	livestock industry	56	4	law enforcement	14	122
senate budget	116	48	insurance companies	20	96	nuclear energy	66	14	state local	10	108
clinton budget	68	0	tax credit	8	80	state court	68	16	legal immigrants	4	100

financial statements	68	0	bill rights	80	148	tax increase	48	0	dairy farmers	18	112
	Congress 108 (2003-2005)						Congress 109 (2005-2007)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
intelligence community	176	88	homeland security	38	172	change outlays	214	0	minimum wage	122	584
medical liability	90	4	tax code	24	132	produce change	184	0	estate tax	16	456
coast guard	116	34	jobs overseas	0	104	outlays sec	174	0	health care	44	220
intelligence committee	74	20	american workers	8	88	medical liability	131	4	bill rights	24	176
national intelligence	372	320	human rights	6	86	point order	142	28	habeas corpus	4	104
yield back	50	8	american jobs	4	74	attorneys general	146	76	wage rate	0	80
finance committee	52	12	tax breaks	4	72	tax relief	82	18	port security	8	76
counterterrorism center	40	0	job creation	24	90	state attorneys	72	8	immigration reform	4	68
north korean	40	0	port security	8	68	judge pryor's	77	20	come home	0	60
governmental affairs	60	22	tax cuts	4	62	class actions	60	4	amending constitution	12	72
	Congress 110 (2007-2009)						Congress 111 (2009-2011)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
census bureau	292	0	farm bill	26	286	american people	216	86	health insurance	132	414
clean portfolio	96	4	health care	126	376	stimulate economy	48	4	health care	658	902
tax credit	96	12	conference report	104	294	fix housing	44	0	insurance companies	28	180
handheld computers	68	0	american people	159	296	create jobs	98	56	care system	38	116
tax code	60	4	budget resolution	76	206	spending bill	46	4	national banks	0	60
emergency spending	40	0	alternative minimum	56	180	housing market	44	4	insurance company	26	84
cost overruns	40	0	tax cuts	96	212	spend money	48	12	rules regulations	0	48
chattanooga epb	40	0	president's budget	24	138	next generation	40	4	national security	24	68
emergency funding	36	0	minimum tax	54	166	stimulus bill	50	16	care costs	35	78
wind energy	80	44	senate bill	4	104	small business	54	22	status quo	14	56
	Congress 112 (2011-2013)						Congress 113 (2013-2015)				

Republican	#R	#D	Democrat	#R	#D	Republican	#R	#D	Democrat	#R	#D
vat rebate	48	0	clean air	0	96	health care	268	170	people disabilities	0	48
taiwan relations	40	0	debt ceiling	16	108	health insurance	154	70	adult education	0	32
ash industry	40	0	district court	0	84	american people	136	52	tar sands	0	26
relations act	36	0	west virginia	8	86	majority leader	98	14	senate republicans	0	24
illinois kirk	28	0	farm bill	6	82	budget agreement	60	4	law school	0	22
madam yeas	20	0	judiciary committee	41	110	tax increase	52	0	district court	0	22
white house	20	0	senate republicans	0	68	care law	76	28	judiciary committee	0	22
ash exports	20	0	payroll tax	22	82	small businesses	70	24	public works	0	22
federal government	20	4	conference report	0	56	environmental impact	52	8	federal judiciary	0	20
obama administration	16	0	air act	0	56	military retirees	48	4	young people	4	24
	Congress 114 (2015-2017)						Congress 115 (2017-2019)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
regular order	64	12	middle class	0	32	tax relief	40	0	affordable care	58	206
coal ash	52	0	health care	6	32	small businesses	50	14	care act	52	176
oil sands	56	4	care act	2	24	secretary state	34	0	health insurance	54	178
greenhouse gas	48	0	roads bridges	4	26	farm bureau	32	0	yield floor	11	76
climate change	52	8	announce california	0	22	law enforcement	44	14	insurance companies	24	74
offer amendments	52	8	affordable care	4	24	national security	34	10	people disabilities	2	48
revenue sharing	44	0	want say	0	18	mike pompeo	22	0	health care	122	164
home care	44	0	environment public	0	16	yucca mountain	22	0	mental health	4	42
energy security	36	0	public works	0	16	appropriations bills	20	0	postal service	0	38
american energy	36	0	works committee	0	16	standard deduction	20	0	health coverage	4	36
	Congress 116 (2019-2021)						Congress 117 Session 1 (2021-2022)				
Republican	**#R**	**#D**	**Democrat**	**#R**	**#D**	**Republican**	**#R**	**#D**	**Democrat**	**#R**	**#D**
land trust	134	0	trump tax	0	18	keystone pipeline	4	0	special drawing	0	16

great american	92	2	treasury department	2	18	hoosier seniors	4	0	drawing rights	0	16
american outdoors	90	2	yemeni people	0	12	eliminate cap	2	0	patrick henry	0	14
outdoors act	82	0	supreme court	6	16	cap replace	2	0	helsinki final	0	10
outdoor recreation	64	4	republicans democrats	0	10	replace spending	2	0	stamp act	0	8
public lands	60	4	state charities	0	10	spending community	2	0	haven't added	0	8
national park	54	6	charitable contribution	0	10	care amount	2	0	people district	0	8
land water	78	38	workers consumers	0	8	amount need	2	0	final act	0	8
conservation fund	68	30	million yemenis	0	8	need removes	2	0	jefferson memorial	0	6
water conservation	74	38	suffering yemeni	0	8	removes arbitrary	2	0	taxation without	0	6

Appendix B Institutional Contexts: H.R. 5305 Budget Bill



Panel A: Bill Information for H.R. 5303

Grouped By Vote Position

YEAs ---65

Baldwin (D-WI)	Hassan (D-NH)	Reed (D-RI)
Bennet (D-CO)	Heinrich (D-NM)	Romney (R-UT)
Blumenthal (D-CT)	Hickenlooper (D-CO)	Rosen (D-NV)
Blunt (R-MO)	Hirono (D-HI)	Rounds (R-SD)
Booker (D-NJ)	Kaine (D-VA)	Sanders (I-VT)
Brown (D-OH)	Kelly (D-AZ)	Schatz (D-HI)
Burr (R-NC)	Kennedy (R-LA)	Schumer (D-NY)
Cantwell (D-WA)	King (I-ME)	Shaheen (D-NH)
Capito (R-WV)	Klobuchar (D-MN)	Shelby (R-AL)
Cardin (D-MD)	Leahy (D-VT)	Sinema (D-AZ)
Carper (D-DE)	Lujan (D-NM)	Smith (D-MN)
Casey (D-PA)	Manchin (D-WV)	Stabenow (D-MI)
Cassidy (R-LA)	Markey (D-MA)	Tester (D-MT)
Collins (R-ME)	McConnell (R-KY)	Tillis (R-NC)
Coons (D-DE)	Menendez (D-NJ)	Van Hollen (D-MD)
Cornyn (R-TX)	Merkley (D-OR)	Warner (D-VA)
Cortez Masto (D-NV)	Murkowski (R-AK)	Warnock (D-GA)
Duckworth (D-IL)	Murphy (D-CT)	Warren (D-MA)
Durbin (D-IL)	Murray (D-WA)	Whitehouse (D-RI)
Feinstein (D-CA)	Ossoff (D-GA)	Wyden (D-OR)
Gillibrand (D-NY)	Padilla (D-CA)	Young (R-IN)
Graham (R-SC)	Peters (D-MI)	

NAYs ---35

Barrasso (R-WY)	Hagerty (R-TN)	Portman (R-OH)
Blackburn (R-TN)	Hawley (R-MO)	Risch (R-ID)
Boozman (R-AR)	Hoeven (R-ND)	Rubio (R-FL)
Braun (R-IN)	Hyde-Smith (R-MS)	Sasse (R-NE)
Cotton (R-AR)	Inhofe (R-OK)	Scott (R-FL)
Cramer (R-ND)	Johnson (R-WI)	Scott (R-SC)
Crapo (R-ID)	Lankford (R-OK)	Sullivan (R-AK)
Cruz (R-TX)	Lee (R-UT)	Thune (R-SD)
Daines (R-MT)	Lummis (R-WY)	Toomey (R-PA)
Ernst (R-IA)	Marshall (R-KS)	Tuberville (R-AL)
Fischer (R-NE)	Moran (R-KS)	Wicker (R-MS)
Grassley (R-IA)	Paul (R-KY)	

Panel B: Voting Record associated with H.R. 5303

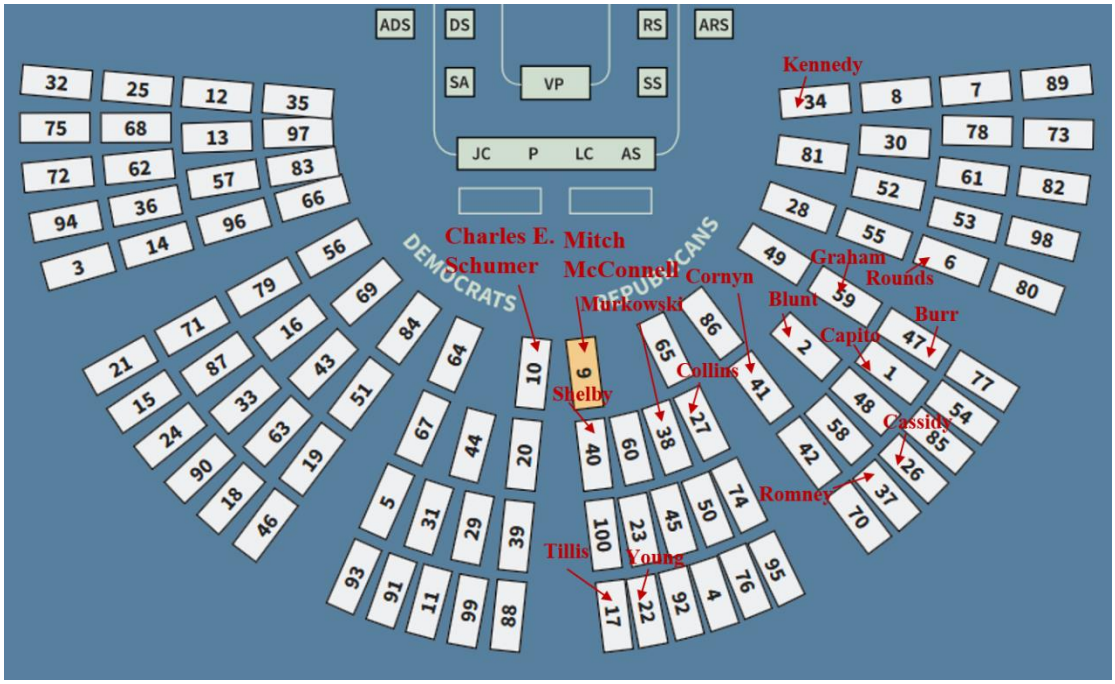
Figure B1 An Example of Voting on H.R. 5305 - Extending Government Funding and Delivering Emergency Assistance Act This figure illustrate how H.R. 5305 is present on the Congress website and the voting records associated with H.R. 5303. Panel A presents the webpage of H.R. 5303, including the sponsor, relevant dates, roll call information, bill summary, and status of the bill. Panel B present an example of roll call votes of H.R. 5303.

Date	All Actions
09/30/2021	Passed Senate, under the order of 9/29/21, having achieved 60 votes in the affirmative, with an amendment by Yea-Nay Vote. 65 - 35. Record Vote Number: 397. Action By: Senate
09/30/2021	S.Amdt.3832 Amendment SA 3832, under the order of 9/29/21, not having achieved 60 votes in the affirmative, was not agreed to in Senate by Yea-Nay Vote. 53 - 47. Record Vote Number: 396. Action By: Senate
09/30/2021	S.Amdt.3831 Amendment SA 3831, under the order of 9/29/21, not having achieved 60 votes in the affirmative, was not agreed to in Senate by Yea-Nay Vote. 50 - 50. Record Vote Number: 395. Action By: Senate
09/30/2021	S.Amdt.3833 Amendment SA 3833 not agreed to in Senate by Yea-Nay Vote. 50 - 50. Record Vote Number: 394. Action By: Senate
09/27/2021	Cloture on the motion to proceed to the measure not invoked in Senate by Yea-Nay Vote. 48 - 50. Record Vote Number: 385. (CR S6693) Action By: Senate

Figure B2 All Senate Rollcall Votes on H.R. 5303 This figure present the summary of all Senate roll call voting actions of H.R. 5303.

last_name	party	state	vote
Blunt	R	MO	Yea
Burr	R	NC	Yea
Capito	R	WV	Yea
Cassidy	R	LA	Yea
Collins	R	ME	Yea
Cornyn	R	TX	Yea
Graham	R	SC	Yea
Kennedy	R	LA	Yea
McConnell	R	KY	Yea
Murkowski	R	AK	Yea
Romney	R	UT	Yea
Rounds	R	SD	Yea
Shelby	R	AL	Yea
Tillis	R	NC	Yea
Young	R	IN	Yea

Panel A List of Switchers on H.R.5303



Panel B List of Switchers and Their Seats on the Senate Seating Plan

Figure B2 Distributions of Switchers on H.R. 5303 and Their Seats on the Senate Seating Plan

This figure present the seating distribution of switchers on H.R. 5303.

Table B1 Distance to Senator Schumer for Republican Switchers vs. Non-switchers

This table presents the distance to Senator Schumer for Republican switchers and non-switchers in the context of HR5303 during the 117th Congress. It compares the mean distance between those who switched to support the bill (switchers) and those who did not (non-switchers). The standard deviation of the distance to Senator Schumer for both groups is reported in parentheses.

	Non-switchers	Switchers	Difference	T-stats
Average Distance to Senator Schumer	5.286	4.000	1.286	2.133
	(2.023)	(1.773)		

Appendix C Distance Calculation and Senate Chamber Estimation

The Senator chamber is arranged in semicircle with 7 narrower aisles near the podium, measuring 114 feet long by 80 feet wide. We found the dimension of senator desk to be h. 35.37 x w. 28 x d. 20.37 in. (h. 89.85 x w. 71.12 x d. 51.75 cm). We then assumed space between senator desks in the same column to be 40 in. (102 cm) and space between senator desks in the same row to be 10 in. (25 cm).

We draw blueprint of the Senator Chamber from pictures and live recordings. We divided Senate Chamber into 4 parts(shades of gray, orange, red and white respectively). For gray shadow, we can find the distance between the person behind the podium and the wall to be 7 feet. For red shadow, we can calculate the distance from the first row to the last row to be 21 feet. For the white part, we can find distance |D-E| to be 23 feet. The Senator chamber measures 80 feet wide so we can calculate distance |B-C| in orange shadow to be 29 feet.

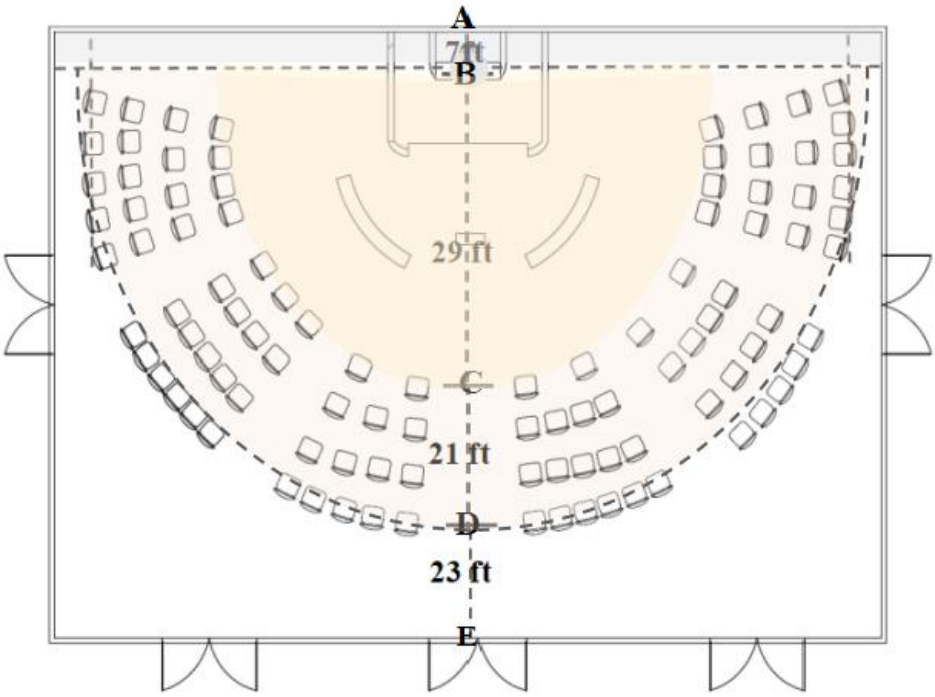


Figure C1 Blueprint of the Senator Chamber in the 117th congress, session 1. This figure illustrates the layout of the Senator Chamber, with inner semicircle radius to be 29 feet (348 inches) and outer semicircle radius to be 50 feet (600 inches) .

From above information, we can calculate radius of inner semicircle to be 29 feet and radius of outer semicircle to be 50 feet. We then can calculate circumference of inner semicircle to be 90 feet (1080 inches) and outer semicircle to be 157 feet (1884 inches). Using these information, we can calculate the aisles away from the podium(outer semicircle) to be 98 in.(250 cm) and the aisles near the podium(inner semicircle) to be 70 in.(178 cm).

Table C1 Average Width of Aisles

This table present the estimated parameters of the items in the Senator Floor. The parameters are estimated using images from live recordings of Senate Session from CSPAN.

	Circumference	Width of desks and space	Width of aisles in total
Inner semicircle	1080 inches	586 inches	494 inches
Outer semicircle	1884 inches	1194 inches	690 inches

Table C2 Relative Distance of *Closest*, *Close3* and *Close5* Senators

This table present the estimated relative distance between Closest, Close3 and Close5 Senators on the Senator Floors base on their seats. The parameters are estimated using images from live recordings of Senate Session from CSPAN. For each of the group, we calculate all possible combination of the relative seat locations, and calculate the average distance of all possible cases.

Panel A: Senators to their *closest* peer

Relative position to peers	Distance	Percentage of cases
At the same column	45 inches(1.1 meters)	40%
At the same row inside one box	36 inches(0.9 meters)	45%
At the same row across an aisle	98 inches(2.5 meters)	15%
Average Distance	**49 inches(1.2 meters)**	

Panel B: Senators to their *close 3* peers

Relative position to peers	Distance	Percentage of cases
At the same column	135 inches(3.3 meters)	7%
At the same row inside one box	108 inches(2.7 meters)	10%
At the same row across an aisle	170 inches(4.3 meters)	20%
At the different row and column inside one box	90 inches(2.2 meters)	52%
At the different row and column across an aisle	146 inches(3.7meters)	11%
Average Distance	**117 inches(3.0 meters)**	

Panel C: Senators to their *close 5* peers

Relative position to peers	Distance	Percentage of cases
At the same column	Impossible	
At the same row inside one box	180 inches(4.5 meters)	1%
At the same row across an aisle	250 inches(6.4 meters)	15%
At the same row across two aisles	302 inches(7.7 meters)	2%
At the different row and column inside one box	150 inches(3.8 meters)	10%
At the different row and column across an aisle	240 inches(6.1 meters)	70%
At the different row and column across two aisles	270 inches(6.9 meters)	2%
Average Distance	**234 inches(6.0 meters)**	

Appendix D Video Analysis Methods

We obtained senate chamber videos from CSPAN website. We filter the videos by titles with "Senate Sessions" as other debate or speech videos often only include shots of individual senators giving speech and not including frames with senate discussion, whereas "Senate Session" video often capture senator interactions during voting or non-presentation periods. We also filter "Senate Pro Forma Session" as they are very short in length and often only include procedural items. To further maximize efficiency, we run all videos with YOLO v11, the latest generation of object detection model that is widely used in the computer vision domain, to identify the number of individual in each frame. We then filter parts of video with less than or equal to 1 individual as they will not include any pairs of interacting senators.

One challenge that prevents us from using existing human-identification models is the low resolution of senate videos. CSPAN senate chamber videos all have a maximum resolution of 576p (1024×576 pixels). At this resolution, facial features critical for person identification become severely degraded, with individual faces often occupying fewer than 20×20 pixels after detection cropping. This presents significant challenges for feature extraction, as standard pre-trained models like FaceNet or ArcFace are typically trained on higher-resolution images (112×112 pixels or larger). The limited pixel information reduces the discriminative power of facial embeddings and increases inter-class similarity, making senator identification considerably more difficult than in standard surveillance or identification tasks.

To identify interacting senators, we trained our YOLOv11 model to detect both individual senators and interaction zones as distinct object classes. Our annotation schema includes: (1) Senator classes that contains individual senator identities with standard bounding boxes and (2) Interaction zone class that contains spatial regions where senators are engaged in discussions, handshakes, or other interactions. We randomly sampled 20% of the frame for manual annotation, and fine-tuned YOLO-v11 model with our manually labeled dataset. Training hyper parameters were set as follows: initial learning rate of 0.01 with cosine annealing scheduler, batch size of 16, and 300 epochs with early stopping based on validation mAP@0.5. We then tackle the interaction identification: After inference, we apply geometric intersection analysis between senator detections and interaction zones. A senator is considered part of an interaction if their detection box centroid falls within any interaction zone bounding box. This geometric relationship is computed using simple point-in-rectangle tests, making the post-processing computationally efficient.

Another challenge that prevents us from effectively identifying interacting senators is that senators often have their backs towards the camera. To tackle this issue, we utilized homographic matrix transformations to establish geometric correspondence between front-facing and rear-facing senator positions within the fixed Senate chamber layout. By computing a homography matrix H through manual annotation of key point correspondences between the two viewing perspectives, we can apply inverse transformations to normalize rear-facing detections to a canonical front-facing view, effectively augmenting our training data while maintaining spatial consistency. This approach not only doubles the effective training samples for each senator but also enables cross-perspective validation during inference, where detections in one view can be geometrically verified against predicted positions in the complementary perspective.

Appendix D House Office Lotteries

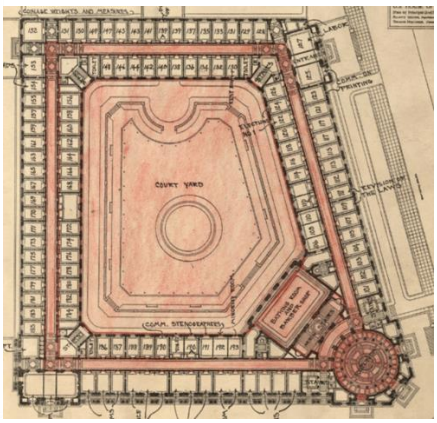
POLITICS

On Lottery Day, These Are the House Offices Nobody Wants

Freshmen members get ready to slog back and forth to the Capitol



Numbered chips are placed in order before the start of the room lottery draw and selection for the incoming members of the 114th Congress in November 2014. (Bill Clark/CQ Roll Call file photo)





Lucy McBath, D-Ga., does a dance after drawing number 18 during the new member room lottery draw in the Rayburn Building on Nov. 30, 2018. (Tom Williams/CQ Roll Call)

Kansas Republican Jake LaTurner was the unluckiest freshman on Thursday, drawing number 57, giving him the last pick of available office space. He didn't get the sympathetic groans or encouraging applause from his new colleagues that have comforted lottery losers in previous years.



Figure D1 House Office Lottery This set of figures shows the House Office Lotteries process Top left figure shows the random lottery in which a computerized algorithm chooses the order in which House members physically pull numbered disks with their office choice position from a wooden box, and the top right figure shows map of offices that the senators are drawing. Bottom figures shows the expression of the member of the House after their lottery draws.

Table D1 House of Representatives: Office Lotteries

This table presents regression analysis of peer influence on House voting behavior among freshman representatives. Vote (Yea/Nay) is an indicator variable, coded as 1 for "Yea" and 0 for "Nay", of the focal representative's vote. Close5Yes (representatives at distance 4-5), Close3Yes (representatives at distance 2-3), and ClosestYes (representatives at distance of 1) measure the fraction of neighboring representatives who voted "Yea", categorized by physical proximity in office locations. Same State Votes and Same Party Votes capture the fraction of representatives from the same state and party voting "Yea", respectively. Same Building Votes measures the fraction of representatives in the same office building voting "Yea". Columns (1)-(3) present results for freshman representatives with office assignments determined by lottery. Congressman, Congress-session, and Vote fixed effects are included as indicated. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Dependent Variable	Vote (Yea/Nay)		
	(1)	(2)	(3)
Close5Yes	0.0123***		
	(0.0015)		
Close3Yes		0.0067***	
		(0.0012)	
ClosestYes			0.0033***
			(0.0009)
SameStateVotes	0.1561***	0.1557***	0.1602***
	(0.0013)	(0.0013)	(0.0015)
SamePartyVotes	0.9631***	0.9634***	0.9600***
	(0.0009)	(0.0009)	(0.0010)
SameBuildingVotes	-0.0875***	-0.0818***	-0.0795***
	(0.0023)	(0.0021)	(0.0021)
Congressmen FE	Yes	Yes	Yes
Congress-session FE	Yes	Yes	Yes
Vote FE	Yes	Yes	Yes
Observations	937,065	929,619	749,426
R-squared	0.7275	0.7275	0.7275