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Crediting Invisible Work: Congress and the Lawmaking Productivity Metric (LawProM)

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Congressional observers have long been interested in the distinction between legislative "workhorses" and "showhorses." However, when scholars operationalize this by measuring legislator productivity, they often neglect many realities of modern lawmaking by focusing on the traditional bill sponsorship and passage process. To better align measurement with practice, we compile widely available data on bill sponsorship, cosponsorship, and amendments; we also use text-as-data methods to credit instances of behind-the-scenes lawmaking via text reuse between bills. We weight achievements from each of these lawmaking methods to create the Lawmaking Productivity Metric for House Members of the 101–113th Congresses. Including methods of lawmaking beyond bill sponsorship provides important insights about who the congressional workhorses are. In particular, we find that traditional measures systematically undercount the legislative successes of women and likely Black Members of Congress because they disproportionately legislate in less visible ways.

On September 13, 2010, *The Washingtonian* published its biannual "Best & Worst of Congress" list drawn from an informal survey of Capitol Hill staff. It once again identified Representative Sheila Jackson Lee (D-TX) as Congress's biggest "showhorse."[1] Despite extensive speechmaking in the 110th Congress, none of the 41 bills that she sponsored passed into law, lending some credence to her reputation as ubiquitous but ineffective. However, during this same period of time, she was an original cosponsor on 254 bills, 64 of which became law; introduced 25 amendments, five of which became law; and got original text from bills she authored into other's bills three times, two of which became law.[2] Her successes included outcomes like removing the African National Congress from the list of terrorist organizations,[3] improving security for judges and courts,[4] increasing funding for child and maternal health,[5] sending international aid to Liberia,[6] and focusing NASA outreach programs on businesses owned by minorities, women, and disabled veterans.[7] When asked about her showhorse reputation, Jackson Lee remarked "I do the work in this office. I do it quietly and consistently, and I check off the boxes of who's being helped and who's in need."[8] Though "quiet" is rarely an adjective others use to describe Rep. Jackson Lee, a deeper look at her record reveals her self-assessment's essential accuracy: her numerous legislative successes in the 110th Congress all happened through less visible lawmaking efforts. And, as we show below, counting these less visible successes as lawmaking reveals Rep. Sheila Jackson Lee to be a true Congressional workhorse.

The job of a Member of Congress is ostensibly to create law. Lawmaking happens through three basic mechanisms. The first is traditional bill sponsorship and cosponsorship. The second is via floor amendments to bills others have previously sponsored. The third is through more unorthodox approaches, such as adding provisions to omnibus legislation or in committee

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[1] https://www.washingtonian.com/2010/09/13/2010-best-worst-of-congress/. This was neither the first nor last time she has won this ignominious award, and she has also taken home the prize for "C-SPAN Ham," "Biggest Windbag," and "Meanest" on this and other occasions. See for example: https://www.washingtonian.com/2006/09/01/best-and-worst-of-congress/ and https://www.washingtonian.com/2004/09/01/best-worst-of-congress/.

[2] Note that these numbers are somewhat different from official records because of the way we pre-process our data. For example, we remove bills dealing with land transfers, naming buildings, and so forth from the dataset. See Supplementary Appendix B.

[3] https://www.congress.gov/bill/110th-congress/house-bill/5690?s=5&r=88.

[4] https://www.congress.gov/bill/110th-congress/house-bill/660?s=1&r=628.

[5] https://www.congress.gov/amendment/110th-congress/house-amendment/360?s=3&r=85.

[6] https://www.congress.gov/amendment/110th-congress/house-amendment/361?s=3&r=84.

[7] https://www.congress.gov/amendment/110th-congress/house-amendment/1096?s=3&r=69.

[8] https://www.texastribune.org/2017/02/28/sheila-jackson-lee-image-persistence/.

markup. While the legislative processes involved with each of these methods differ, the ultimate result is the same: federal statute. There is little debate among scholars and practitioners that all these lawmaking methods play an important role in the modern Congress. Yet despite many reasons to study lawmaking in more comprehensive ways, Congressional scholars interested in identifying legislative "workhorses" tend to focus on a single method—traditional bill sponsorship and passage. As a result, less visible means of legislating rarely enter into current scholarly analyses of legislator productivity.

In this article, we explain why that is problematic and introduce a new measure of legislative productivity that more fully accounts for the variety of ways MCs shape law: the Lawmaking Productivity Metric (LawProM, pronounced "law prom") and its companion measures, HouseProM and ProM (Eatough and Preece 2024).[9] In addition to giving legislators credit for traditional bill sponsorship, we give legislators credit for cosponsorship, amendment sponsorship, and bill text that they introduce which eventually passes in legislation sponsored by someone else. Not all of these actions are equally costly for lawmakers to engage in, so we weight each by the inverse of their frequency prior to their summation. Hence, a legislator's LawProM score is the *proportion of each lawmaking activity category that a Member of Congress contributed during a given congress, summed together, and then converted to a percentage of all activities.* Because this essentially controls for the structural factors at play in a given congress that make lawmaking easier or harder, LawProM has the additional virtue of being comparable between individual legislators across congresses.[10]

We contend that it is important to incorporate a much wider variety of lawmaking strategies into measures of legislative productivity than bill sponsorship alone. Members of Congress are not limited to traditional methods of legislating (Curry and Lee 2020) and the story of the modern House is one of strategic adaptation as various actors seek ways to produce their favored policy outcomes (Sinclair 1998; 2016). Metrics that do not reflect this will struggle to capture our current understanding of legislative politics. Beyond this, we build a case that bill sponsorship is not a random draw from the total pool of legislative work. Women and Black Members of Congress repeatedly claim that they engage in less visible lawmaking strategies more than their colleagues. If true, an exclusive focus on bill sponsorship would not capture many of their successes and systematically bias assessments of their legislative productivity.

Indeed, when we look closely at various lawmaking approaches, we find that women and Black Members of Congress are more likely to rely on less visible ways of advancing their legislative priorities. Both disproportionately legislate by cosponsorship. The institutional rule that allows for only one sponsor per bill may make it difficult for marginalized MCs to get full credit for collaborative work. Women are also more likely to legislate by transferring text they originally introduced into others' bills that eventually pass. When combined with the work that they do through the traditional lawmaking process, this additional work means that women and likely Black MCs are considerably more productive lawmakers than their colleagues.[11]

The directionality of our findings for women is consistent with previous literature that focuses on bill sponsorship, and our results are similarly concentrated among minority party women (Volden, Wiseman, and Wittmer 2013). However, the substantive size of our result is much larger—for example, we estimate *minority* party women are about 69% as productive lawmakers as *majority* party men compared to about 19% as productive when using Legislative Effectiveness Scores.[12] Furthermore, existing point estimates for Black MCs' legislative effectiveness are negative and often statistically significantly so (Volden and Wiseman 2014), whereas LawProM's estimates for Black MCs are positive and often statistically significantly so. In other words, the existing focus on the traditional lawmaking process in the literature means congressional scholars have not fully appreciated the contributions or creativity of women and Black MCs. Much of the work they engage in has been rendered invisible by measurement choices.

In short, we believe that LawProM, with its fuller accounting of lawmaking approaches, improves on past measures. It more closely aligns the operationalization of productivity with modern understandings of Congressional lawmaking, and it captures work that marginalized lawmakers have thus far not gotten scholarly credit for doing. Further, LawProM components are easy to mix and match, making it an adaptable dataset useful for many research questions that scholars may be interested in. We hope that political scientists find LawProM helpful as they study a wide variety of dimensions of modern lawmaking.

TRADITIONAL AND UNORTHODOX LAWMAKING STRATEGIES

Of the three broad categories of lawmaking tactics, the traditional method of bill sponsorship and passage is

[9] Additionally, our raw data are easily customizable so that scholars can design measures that fit their particular research questions. See LawProM.com.

[10] For example, if an MC contributed 0.23% of the lawmaking in the 108th Congress and 0.23% of the lawmaking in the 110th Congress, their raw legislative production would be higher in the busier 110th Congress, but their relative legislative productivity would have been about average in both cases.

[11] As we explain below, the uncertainty around LawProM estimates for Black MCs is due to extremely high collinearity with the party. In models that do not control for party, Black legislators' LawProM scores are dramatically higher than their white counterparts—the coefficient is about half the size of being in the majority party. In models that do control for party, Black members are not statistically different than their colleagues, though point estimates remain positive and very large.

[12] Compare column 3 of Table 4 and Supplementary Table A7.

the most obvious. This process has been extensively examined from a variety of perspectives, including which legislators are more likely to introduce legislation (Anderson, Box-Steffensmeier, and Sinclair-Chapman 2003; Volden and Wiseman 2014), how legislators build coalitions in support of their bills (Arnold 1990; Fowler 2006), the methods by which they advance those bills (Wawro 2010), how member's positions of power in the legislature affect their proposals (Cox and Terry 2008; Woon 2008), and how the member's electoral environment affects their ability and incentives to introduce and advance legislation (Frantzich 1979; Mayhew 1974).

However, sponsoring bills is just one aspect of lawmaking. Scholars have studied bill cosponsorship as a method of advancing legislation—and claiming credit for it—in the lawmaking process (Fowler 2006; Harbridge 2015; Koger 2003; Thomas and Grofman 1993). Other scholars have noted that a significant portion of the legislating process takes place via amendments, either offered on the floor of the chamber or in committee (Magleby, Monroe, and Robinson 2018). Much of this work focuses on the ability of committees to shape the legislative process via amendments in the markup process (Gilligan and Krehbiel 1987; Hall and Wayman 1990; Krehbiel, Shepsle, and Weingast 1987).

Scholars have also discussed the importance of various dimensions of "unorthodox lawmaking" (Sinclair 2016). For example, many scholars have studied the role of omnibus legislation—especially its ability to facilitate distributive politics and logrolling—in the legislative process (Evans 1994; 2004; Krutz 2000; 2001a; 2001b; Lee 2000; Wilkerson, Smith, and Stramp 2015). And scholars acknowledge that conference committees have at times had a great deal of power to shape the content of important legislation outside of the traditional lawmaking process (Lazarus and Monroe 2007; Park, Smith, and Vander Wielen 2017; Ryan 2011; Vander Wielen 2013; Wielen 2010).

REVEALING OVERLOOKED PATTERNS IN LAWMAKING

While there is wide acceptance among Congressional observers that legislation happens in a variety of ways, scholarly operationalization of lawmaking focuses almost entirely on the traditional bill sponsorship and passage process (Anderson, Box-Steffensmeier, and Sinclair-Chapman 2003; Clinton and Lapinski 2006; Cox and Terry 2008; Mayhew 1991; Volden and Wiseman 2014). This means that legislative victories that happen through other processes (see e.g., Casas, Denny, and Wilkerson 2020; Wilkerson, Smith, and Stramp 2015) do not get "counted" when measuring legislative successes. It is not entirely clear why scholars have kept a narrow focus on bill sponsorship—perhaps a combination of path dependence, a skepticism of the importance of things like cosponsorship and amendments, and computational limitations that made identifying transfers of text between bills hard to do.

Regardless, there are at least three reasons to be concerned about the failure to credit legislators for lawmaking successes beyond the bills they introduce. First, there is some evidence that the frequency of unorthodox lawmaking methods has increased in recent years (Curry and Lee 2020). That means traditional measures capture less of the actual lawmaking than they previously did. Second, we know that Members of Congress claim—and get—credit for legislative actions far beyond traditional bill sponsorship (Grimmer 2013; Grimmer, Messing, and Westwood 2012). For example, legislators' press releases often completely ignore the distinction between sponsorship and cosponsorship or between passing their legislation as a standalone bill versus as an amendment to or section of someone else's bill.[13] This is likely a consequence of the institutional limitation on sponsorship: each bill can only have one official sponsor despite much of the legislative process being collaborative. Decisions about how to allocate sponsorship in such a setting are likely at least as fraught as decisions about how to allocate credit among coauthors in academia, where we have evidence that there are significant biases in who is given credit for collaborative work (Sarsons 2017; Sarsons et al. 2021).

These considerations are important, but we focus on a third reason in this article. If the traditional lawmaking process is simply a random draw from the distribution of all congressional work, then there is little empirical reason to worry about what it misses if one is simply interested in ranking legislators in terms of productivity. But if not, an exclusive focus on the traditional process can bias our understanding of who the legislative workhorses are. Alternative lawmaking approaches have different costs and benefits; hence, they may be employed in different types of situations and by different types of legislators. Unorthodox lawmaking approaches are sometimes the most feasible route to passage, but they are also potentially more difficult to claim credit for since they are typically the result of more collaborative, behind-the-scenes efforts. For these reasons, identifying who engages in them may actually be an especially good way to distinguish between legislative workhorses and showhorses because they indicate who is willing to sacrifice credit for outcomes.

So, is traditional bill sponsorship and passage a random draw from all lawmaking work? There are good reasons to believe it is not. A recurring theme in research on women and Black Members of Congress is

[13] While a thorough analysis of credit claiming in press releases is beyond the scope of this project, an example may be illustrative. A review of all press releases between 1/8/2020 and 2/4/2021 from Rep. John Curtis's (R-UT) website found that 20 claimed credit for introducing a bill he sponsored and 10 claimed sponsorship credit for introducing a bill for which he was actually a cosponsor. Three claim credit for passing a bill he sponsored but for which he was actually a cosponsor; two claim credit for passing a bill he sponsored; and two claim credit for writing legislation that was passed via someone else's bill. Other press releases made announcements, explained votes, and so on.

that these legislators approach lawmaking differently than their colleagues. In popular discourse, women legislators are believed to be uniquely good at behind-the-scenes problem-solving and bipartisanship (Dittmar et al. 2017; though see Lawless, Theriault, and Guthrie 2018). In interviews with 83 women Members of Congress, Dittmar, Sanbonmatsu, and Carroll find that women frequently claim they have a different approach to lawmaking than their male peers (2018). For example, Representative Julia Brownley (D-CA) observed, "women just approach problem solving…in a much different way than men do…and we want to get things done" (2018, 131) Senator Debbie Stabenow (D-MI) remarked, "I think we are much more focused on solving problems and getting things done and less focused on the trappings of power, our name on a bill, all of the ego trappings with the job."[14] Senator Kirsten Gillibrand (D-NY) echoes this sentiment: "We are often less concerned with credit, less concerned with partisan politics, less concerned with ideology and more focused on how you get something done" (Dittmar, Sanbonmatsu, and Carroll 2018, 131).

While many political scientists have assumed these types of claims are simply part of women's strategic self-presentation in interviews, there is some quantitative evidence that women's lawmaking styles are distinct—and sometimes distinctly effective. Women state legislators frequently rely on the relationships they form in women's caucuses to achieve their legislative goals despite lower status (Holman and Mahoney 2018). Women have somewhat different cosponsorship patterns (Swers 2005) and legislative priorities (Swers 2002) than men. Women tend to face particular challenges advancing their legislation through committees (Volden, Wiseman, and Wittmer 2018), and yet at least when women are in the minority, they are more effective legislators than men (Volden, Wiseman, and Wittmer 2013). Men and women in the 103rd–105th Congresses were similarly effective in passing the bills they introduced, once other factors were controlled for (Jeydel and Taylor 2003). Furthermore, on average, women Members of Congress outperform men in directing federal spending to their districts (Anzia and Berry 2011). And, on a number of dimensions, Congressional women appear to work harder than their male counterparts to stay in office (Lazarus and Steigerwalt 2018). Taken together, these findings justify taking seriously women legislators' claims about sex differences in approaches to lawmaking—and therefore be skeptical that focusing on the traditional lawmaking process is focusing on a random draw of all lawmaking work.

The literature on Black Members of Congress gives us similar reasons to pay attention to alternative approaches to lawmaking. Though existing measures of legislative effectiveness suggest Black MCs are less effective legislators overall (Volden and Wiseman 2014; Volden, Wiseman, and Wittmer 2013), they are effective in keeping issues of racial equality on the Congressional agenda (Canon 1999; Hall 1998; Minta and Sinclair-Chapman 2013) and participate in the work of committees at a higher rate than their colleagues (Gamble 2007; 2011a). Nevertheless, Peay finds that the bills sponsored by Black Members are disproportionately winnowed out at the committee stage; this limited access to the traditional legislative process makes it difficult for Black MCs to translate their policy priorities into statute (2020).

A number of scholars have noted the ways in which Black MCs approach lawmaking in creative ways. The difficulty Black legislators face in the traditional legislative process may help to explain the outsized role that the Congressional Black Caucus plays in narratives about legislative success (Tate 2020). Collective approaches to lawmaking offer one pathway around institutional barriers (Peay 2020; Tyson 2016). And, Garcia notes the marked flexibility in Black MCs approaches to advancing their legislative agendas over the years (Garcia 2016).

Why might MCs from marginalized backgrounds disproportionately turn to less visible legislative approaches? Gender and race scholars provide a few answers to this question. Feminist institutionalist approaches point out that even when an institution is ostensibly neutral, there can be many practical ways in which gendered power dynamics are replicated and reinforced (Kenny 2007; Mackay, Kenny, and Chappell 2010). For example, scholars have found that even in highly structured deliberative settings like legislative committee hearings, women's authority gets disproportionately challenged through patterns of interruptions (Ban et al. 2022; Kathlene 1994; Miller and Sutherland 2023); majoritarian decision rules may be partly to blame (Karpowitz and Mendelberg 2014; Mendelberg, Karpowitz, and Oliphant 2014). Women legislators respond to these barriers in rational ways by adapting their legislative strategies (Holman and Mahoney 2018; Vallejo Vera and Gómez Vidal 2022).

The problems are compounded in complex ways for women of color. In her account of the ways Congressional institutions are raced-gendered, Hawkesworth provides several first-hand accounts of Black congresswomen using creative legislative approaches to overcome barriers (Hawkesworth 2003). For example, Delegate Eleanor Holmes Norton (D-DC) "gets things in bills all the time because I look around for someone to work with," including convincing Representative Bill Archer (R-TX), who was the Ways and Means committee chair, to add provisions to the budget bill to support widows of DC police officers killed in the line of duty (Hawkesworth 2003, 535).[15] Yet Hawkesworth notes that one of the consequences of effective behind-the-scenes lawmaking is "invisibility" (2003, 535). Gamble reinforces this theme of invisible labor in her analysis of

[14] https://cawp.rutgers.edu/footnotes/making-case-more-women-office-our-interviews-83-congresswomen-can-help.

[15] Some studies of Congress exclude non-voting members like Holmes. All of the current non-voting members are racial/ethnic minorities and four of the six are women. Excluding them is not a race- or gender-neutral decision.

Black Congressional leadership, noting the "smaller and quieter ways in which black Members of Congress are making a difference" (Gamble 2011b, 466).

The upshot is that marginalized MCs may strategically forgo recognition for the sake of policy wins—practically speaking, this means relying more on cosponsorship, amendments, and contributing text to others' bills. This represents a creative approach to institutional constraints, but it poses serious measurement challenges and reaffirms the suspicion that bill sponsorship is not a random draw from the set of all lawmaking work. Therefore, an exclusive focus on the easily visible lawmaking process may bias our conclusions toward underappreciating the work that marginalized MCs do.

In short, if one is interested in understanding who the true Congressional workhorses are, one needs to think about legislative production in a way that captures the wide variety of processes through which legislators contribute to federal statute. While there are a number of dimensions of legislative influence that are difficult or impossible to capture,[16] we believe there are three legislative strategies that are relatively straightforward to add to a measure of legislative productivity: cosponsorship, amendments, and the transfer of text between bills.

Hence, we propose several hypotheses to explore as a demonstration of one way in which LawProM could be used to study empirical puzzles:[17]

H_{1a}. Women legislators will disproportionately engage in unorthodox lawmaking approaches (cosponsorship, amendments, bill influence via text reuse) than men legislators.

H_{1b}. Women legislators will be more productive legislators, as measured by LawProM, than men legislators.

H_{2a}. Black legislators will disproportionately engage in unorthodox lawmaking approaches (cosponsorship, amendments, bill influence via text results) than white legislators.

H_{2b}. Black legislators will be more productive legislators, as measured by LawProM, than white legislators.

PATTERNS IN BILL SPONSORSHIP, COSPONSORSHIP, AMENDMENTS, AND BILL TEXT REUSE

Conceptually, we consider lawmaking productivity to mean the frequency with which a congressperson sponsors a new, unique policy that is enacted into law. Because we are focusing on *policy* rather than *bills*, sponsorship can take several forms: being the sponsor of record for a bill, cosponsoring a bill, sponsoring amendments, or sponsoring legislative text that later passes in someone else's legislation. For LawProM, we credit legislators for policies that they *enact into law* through any of these avenues. For HouseProM, a less restrictive measure, we focus on successful *engrossment*[18] *in the House* of policy that one has sponsored; this acknowledges the limited influence House members have on the Senate and president's responses to their legislation. For ProM, our least restrictive measure, we include all actions that are included in LawProM and HouseProM, plus the sponsorship of policy *at the introduction stage* as well. Hence, in ProM, policy proposals that do not advance through the legislative process still receive some credit.

Accordingly, our dataset contains legislative actions surrounding 80,990 bills, 13,656 amendments, and 17,013 distinct instances of bill influence via text reuse in the 101st–113th Congresses at three different stages of the legislative process (introduction, engrossment in the House, and enactment into law).[19,20] It also contains relevant demographic information about each Representative or Delegate.[21] Below we describe each action—straightforward in the cases of bill sponsorship, bill cosponsorship, and floor amendment sponsorship, but more complex when we turn to our new measure of bill text reuse over time. For each of these, we also analyze patterns of which legislators disproportionately use each method of lawmaking.

Bill Sponsorship

Using a compilation of historical data from the 101st to the 113th Congresses (1989–2015), our dataset contains information about the bill sponsorship activity of each legislator in each Congress.[22] On average, legislators sponsor 8 bills per Congress, of which 1 typically passes

[16] For example, we are unable to credit any edits or additions to legislation in which the text does not appear in a previously introduced bill. This could include some dimensions of the (sub)committee markup or conference committee processes. These are important parts of the legislative process, and we hope that future researchers are able to uncover ways to include them.

[17] While we also believe that there are likely raced-gendered dynamics at play, the relatively small numbers of Black women in the dataset lead us to consider this possibility in a more descriptive way.

[18] Engrossment is the stage at which a bill has passed its chamber and any amendment text has been added.

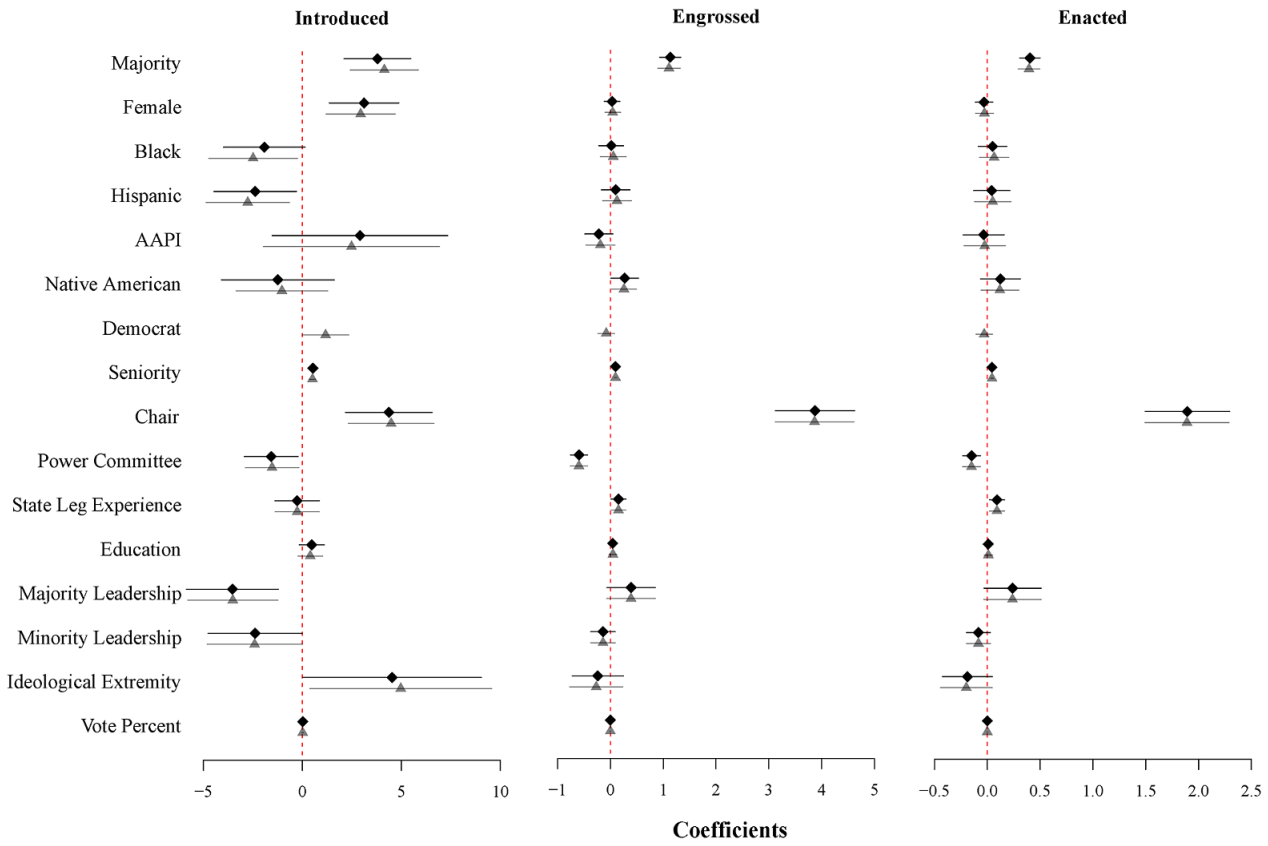
[19] For full distributions of the frequency of each of these actions at each stage of the process, see Supplementary Figure A1.

[20] Both bills and amendments go through a pre-processing stage where a number of existing bills and amendments are excluded from the data and analysis. See Supplementary Appendix B—Pre-Processing for more information.

[21] Information and demographics for each legislator were compiled from three sources to collect as comprehensive information about each legislator as possible. We started with the available information in each legislator's congressional record via Congress.gov. Additional demographics (most notably race, religious affiliation, education, and career/military experiences) were added from the CQ Congress Collection member profiles. Information about the committee assignments and leadership positions of each member was added from the Center for Effective Lawmaking's House dataset. We merged these data on ThomasID and BioGuideID. Research assistants added missing information and corrected a number of notable errors (e.g., Rep. Brad Carson [D-OK] was not listed as Native American in the CQ data).

[22] Historical bill status data and bill text have been made publicly available through the Government Publishing Office through two major sources: THOMAS and Congress.gov. The data from both are

FIGURE 1. Correlates of Lawmaking through Bill Sponsorship



Note: Regression results in Supplementary Tables A2.1–A2.3, Models 1 (diamonds; without party) and 2 (triangles; with party).

the House, and 0.4 are enacted into law. Others have previously studied patterns of bill sponsorship in great depth, but we believe it is useful to note a few of these patterns as a point of comparison to other, less-studied approaches to lawmaking. As Figure 1 shows, majority party members and committee chairs are typically the most successful legislators with regard to sponsoring bills, and especially sponsoring bills that are successfully engrossed in the House and enacted into law. This is, of course, not surprising given the institutional dominance of these two groups of legislators. We also find that women legislators are more likely to introduce legislation—indeed the gender gap is the same size as the gap between minority and majority party legislators—but these bills are no more likely to be successful than those sponsored by men. Black and Hispanic legislators introduce less legislation, but they have about as many successful bills as others.

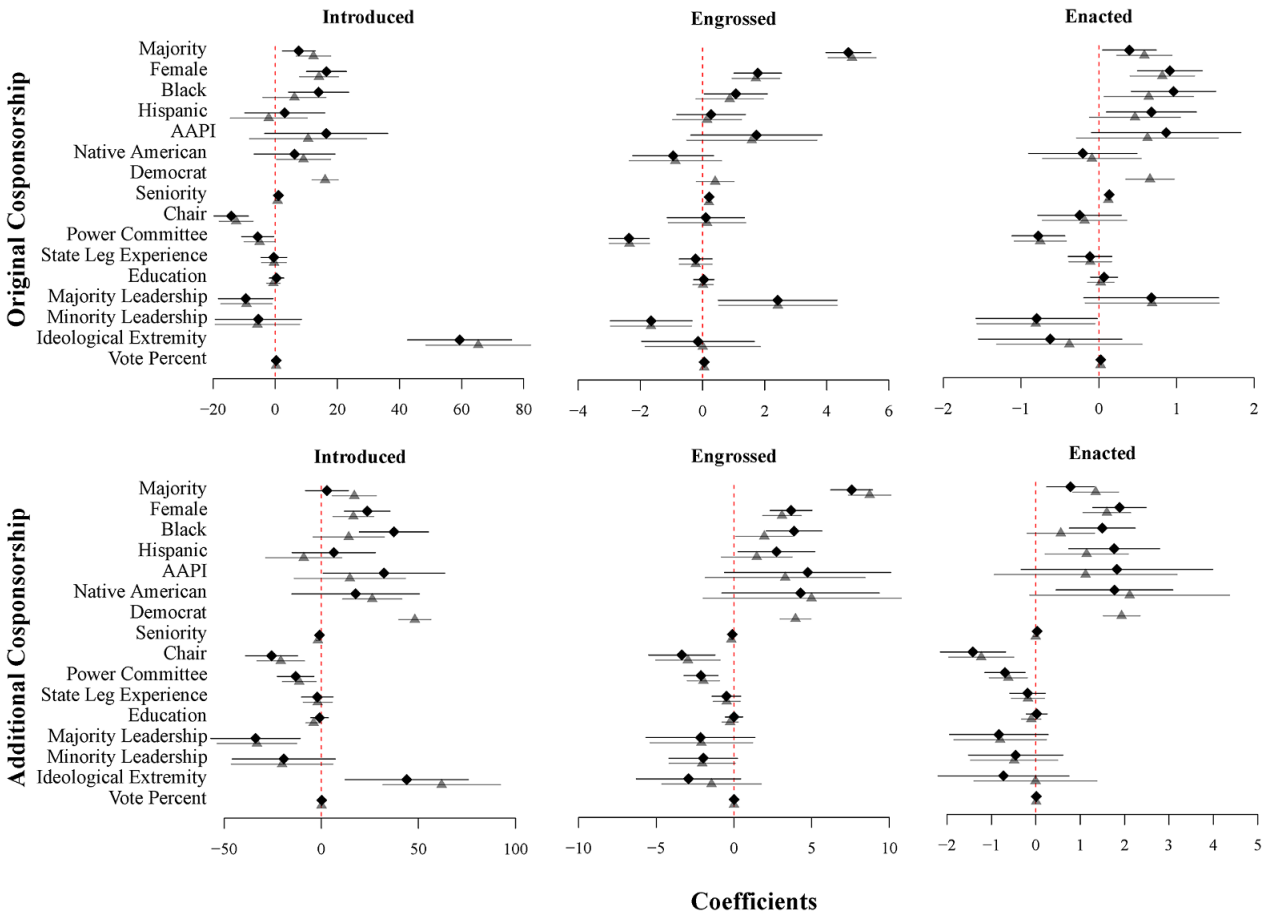
Figure 1 essentially represents our current understanding of which legislators are most productive since that understanding relies exclusively on bill sponsorship. It is worth noting that because there are some differences in who introduces legislation versus who successfully engrosses or enacts legislation, measures that rely heavily on counts of bill introduction may not reflect well on who the actual lawmakers are. For example, they may overestimate the productivity of ideologically extreme legislators and underestimate the productivity of majority leadership and Black and Hispanic legislators.

Bill Cosponsorship

Scholars disagree about the importance of cosponsorship because of its frequency and relative low cost, but legislators regularly claim lawmaking credit for bills they cosponsor, and cosponsorship networks reflect substantive policy preferences (Koger 2003; Swers 2005). Further, the institutional rule that every bill is only allowed to have one sponsor means that in collaborative legislative efforts, all but one of the authors of policy will have to be listed as cosponsors. To our knowledge, no one has yet studied how legislators negotiate this decision, but given findings about the allocation of credit in other collaborative settings, it is not unreasonable to suspect race-gender patterns in who gets the most credit (Isaksson 2018; Sarsons 2017; Sarsons et al. 2021).

maintained at GovInfo.gov and are available via the Congress Project at https://github.com/unitedstates/congress.

FIGURE 2. Correlates of Lawmaking through Bill Cosponsorship



Note: Regression results in Supplementary Tables A3.1–A4.3, Models 1 (diamonds; without party) and 2 (triangles; with party).

Cosponsorship can be divided into original cosponsors, those who are cosponsors at the time of the bill's introduction, and later cosponsors, those who join on in support at any later point in the process. On average, legislators are original cosponsors on 134 bills per Congress; 21 of these typically pass the House, and 9 of these are typically enacted into law. They join an average of 120 bills per Congress as a later cosponsor. Patterns of bill cosponsorship are somewhat different than bill sponsorship. Figure 2 shows that women cosponsor (as original and additional cosponsors) much more legislation than similarly positioned male colleagues. And, in contrast to bill sponsorship, women are more likely than men to cosponsor bills that are successfully engrossed and enacted. Black Members of Congress are also more likely to cosponsor legislation than others and more likely for it to be successfully engrossed and enacted. In short, there are highly gendered and raced patterns of cosponsorship that mean that ignoring cosponsorship ignores work that women and Black MCs disproportionately do. Especially given the institutional limitations on sponsorship—and the possibility that decisions about who gets official sponsorship and who is relegated to cosponsorship may not be random—these patterns seem important.

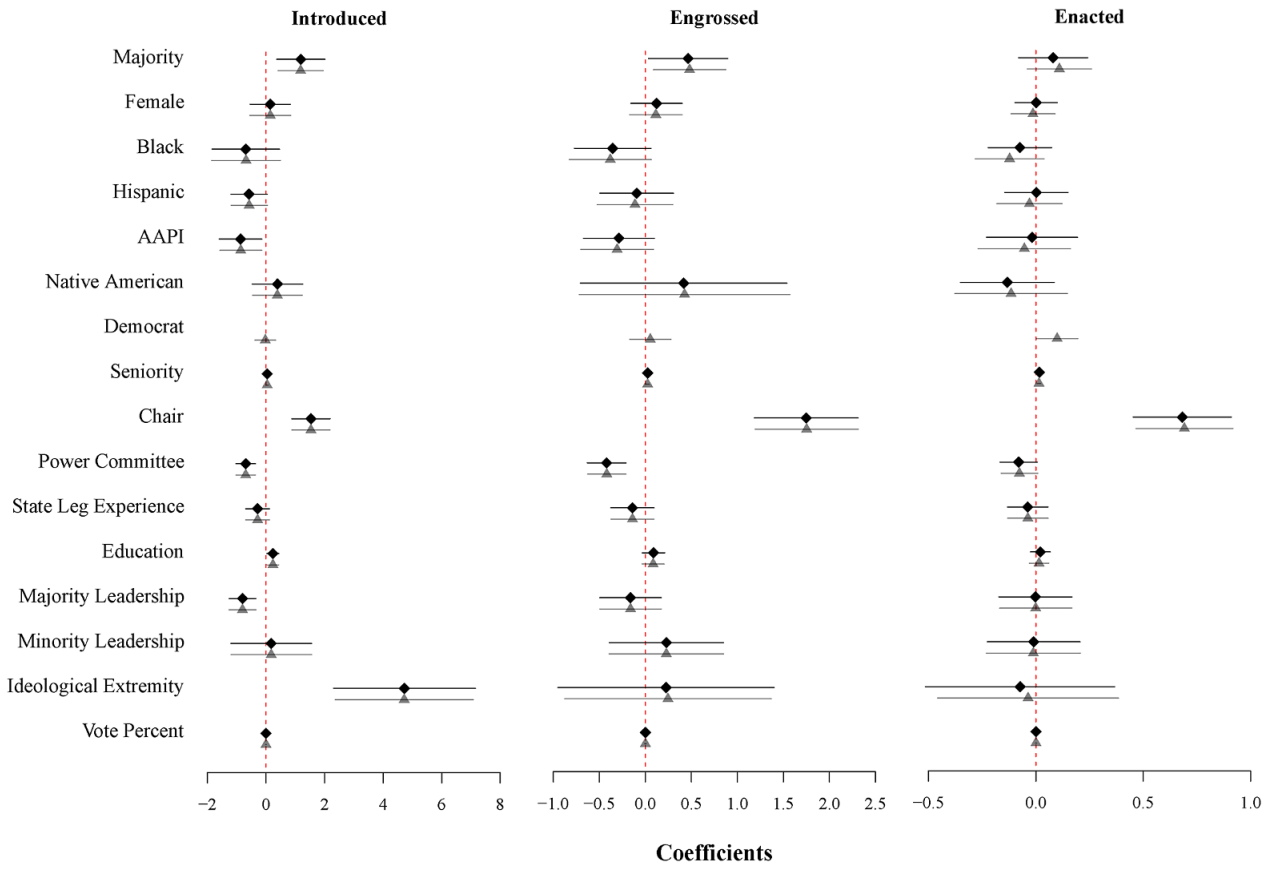
Amendments

Our dataset includes 13,656 floor amendments. Across all Congresses, legislators on average sponsor 2 floor amendments; typically 1 passes the House and 0.3 are enacted into law. Figure 3 reveals that patterns of who introduces and passes amendments are more muted than other lawmaking approaches. As we might expect given House floor amendment procedures, committee chairs, and majority party members dominate this process.

Unorthodox Lawmaking via Bill Influence

In addition to traditional lawmaking actions, legislators have opportunities to influence legislation behind the scenes in order to get policies they care about incorporated into legislation. Yet, unlike traditional lawmaking actions, there are no straightforward indicators of unorthodox lawmaking, which makes it much more complex to operationalize. While it is well-known that legislators frequently transfer text between bills that are languishing to bills with better prospects of passage, it has not been measured as a part of a legislator's productivity. We argue that a more complete measure of a

FIGURE 3. Correlates of Lawmaking through Amendments



Note: Regression results in Supplementary Tables A5.1–A5.3, Models 1 (diamonds; without party) and 2 (triangles; with party).

legislator's lawmaking success should give them credit for contributing text to legislation sponsored by other members.

Methodology

Recent work has begun to identify when text reuse across bills happens (Casas, Denny, and Wilkerson 2020; Wilkerson, Smith, and Stramp 2015). However, existing methods are poorly suited for the purposes of measuring and comparing productivity and are computationally intense at scale. Therefore, we take a somewhat different methodological approach to legislative text reuse, described below, to identify the reappearance of policy language from an earlier bill in subsequent successful bills.

We consider a member to have successfully created law via unorthodox bill influence if a section in a bill which they sponsored[23] that did not pass eventually appears in a bill sponsored by another member of Congress that does pass. We use bill sections to allow for the separate consideration of the potential success of individual policies within any given bill. A bill section is the basic unit of organization of a bill that should only contain a single proposition of enactment[24] which makes it the most practical and likely indicator of a single policy within a larger bill.[25] To identify the reuse of a bill section we use a Jaccard similarity coefficient estimator adapted for use with text data[26] to estimate the Jaccard similarity coefficient between every potentially influential pairing of bill sections[27]

[23] Bill text was scraped from Congress.gov. There are a variety of bills and bill sections that are omitted from the analysis. These are outlined in Supplementary Appendix B.

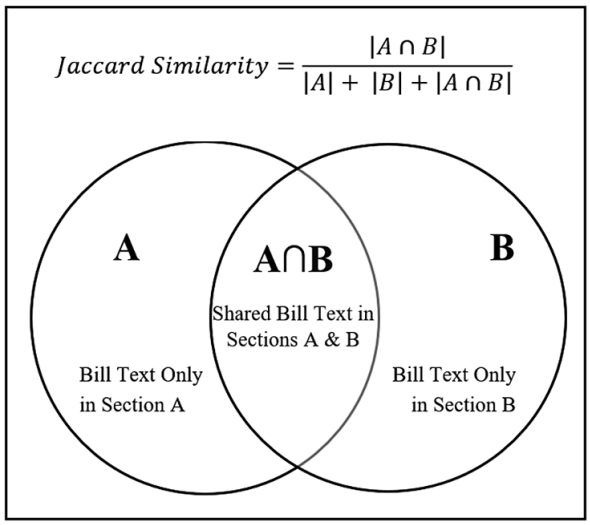
[24] As Designated by U.S. Code No. 1 § 104—*Numbering of Sections.*

[25] These sections vary somewhat significantly in terms of length and number across (and often in terms of length within) bills. The length of bill sections used in this analysis ranges from 30 to 291,830 words (between 1 and 26,808 sentences) with the average bill section containing 376 words (approximately 12 sentences). The number of bill sections within any given bill ranges from 1 to 1,011, with the average bill containing 150 sections. Supplementary Table A1 outlines the number of bills and the number of sections introduced in each congress included in the analysis.

[26] From Lincoln Mullen's "textreuse" package in R.

[27] While the method of text comparison used means that bills sponsored by a given legislator are compared to future bills sponsored by the same legislator, legislators are not given credit for any identified instance of text reuse across bills sponsored by the same member. For more information about bill section omissions and match removals

FIGURE 4. The Calculation of Bill Section Jaccard Similarity Coefficients



introduced in the House of Representatives in the 101st–113th Congresses. We measure whether each introduced bill section influences any bill section introduced or otherwise acted upon after its introduction during the same Congress or during any Congress following the Congress it was originally introduced. We chose to do cross-Congress comparisons because we know that legislators incorporate language from unsuccessful bills into bills in later Congresses, which makes considering success over time an important part of potential bill influence.[28] This means that a section introduced in the 107th Congress may potentially influence all bill sections introduced in the 107th–113th Congresses, but not in the 101st–106th Congresses. Therefore, we calculate Jaccard similarity coefficients between this section and all other sections in the 107th–113th Congresses.

Jaccard similarity coefficients give an indication of the similarity of two sets—in this case, a set is a section of bill text—in terms of a ratio of the shared and entire parts of both sets. In this application, the ratio indicates the ratio of bill text that appears in both bill sections to the entirety of the bill text in both sections individually. Jaccard similarity coefficients run from 0 to 1 with higher coefficients indicating more similar sections of text. Figure 4 outlines the calculation of a Jaccard similarity coefficient in its application to bill text reuse in more detail.

It is important to note that Jaccard similarity is an unordered text reuse approach, meaning that it does not account for differences in the word order between texts. While there are many reasons to believe that differences in word order may indicate significant differences in the meaning of bill text, existing text reuse approaches that account for word order are not practical for this application because of the number of comparisons being made and our intended use of the comparison outcomes. Most common ordered text reuse approaches, including Smith–Waterman algorithm-based approaches, rely on local sequence alignments that are unique to the two documents being compared even when the algorithm used is set up identically across multiple comparisons. This means that their outputs are not readily comparable and are difficult to interpret without individual consideration. Because of both the non-comparability and complexity problems with ordered text reuse scores (as well as the computational intensity required to compute them), an unordered approach is the best option for our analysis.[29]

For the 911,711 bill sections in House bills from the 101st–113th Congresses, we need to estimate more than 36 million unique Jaccard similarity comparisons.[30] It is computationally intense to compute the intersection and union of each comparison, so we used the MinHash locally sensitive hashing scheme to quickly estimate Jaccard similarly coefficients; MinHash is an unbiased estimator of Jaccard coefficients. This allows for faster comparisons of large text corpuses, like those used in our analysis. This technique returns a list of possible matches within a text corpus and allows for the

made in the bill text matching process refer to Supplementary Appendix B.

[28] If an MC is still in office during a later Congress in which their bill text successfully passes, they will get credit for their work in the later Congress. MCs who are no longer in Congress do not get any credit even if the text they originally authored eventually passes in someone else's legislation (i.e., there are no "zombies" in the data).

[29] As a validation check to determine if the Jaccard-based matching sections we identify hold up in an ordered text reuse approach, we calculated a local alignment measure using an adapted version of the Smith–Waterman algorithm designed for use with text for each matching bill section we identified using Jaccard similarity coefficients. In every case, the score given by the local alignment check was positive and was often quite large. Because Smith–Waterman algorithms determine scores by giving points for matches and penalties for mismatches or gaps in the sequence, this suggests that the matches we find are not simply sections with the same words in differing orders with differing meanings. In addition, we spot-checked a randomly selected set of matched sections across all Congresses to see if their text appears to be matching (in that it is describing the implementation of the same or very similar policy) when read side-by-side, and in each case, our matches appear to be correct. We used Lincoln Mullen's "textreuse" package in R. The Parameters used in the local alignment validation check are as follows:

Score Assigned to Matching Word = 2
Score Assigned to Mismatching Word = –2
Penalty for Opening a Gap in the Sequence = –1.

[30] We processed each bill section both before and after the estimation of the Jaccard similarity coefficients to ensure that legislators are not being given credit for non-unique policy introduction, including eliminating all introduced sections that appeared more than once in a later bill. This reduces the chance that we pick up repetitive technical language. These limits have made our measure quite conservative, but we feel that the problems associated with false positives are generally greater than the problems associated with false negatives in the context of giving credit for lawmaking. For more information about the pre- and post-processing of bills and bill section text see Supplementary Appendix B.

computation of how likely it is that any pair of documents within the corpus will be a possible match based on the parameters set and the Jaccard similarity coefficient estimated.[31] It follows that these parameters can also be used to identify a threshold that indicates a probable match. The probability of a match takes an S-curve, so with our parameters, it is expected that documents with a score above 0.35 are probable matches (Leskovec, Rajaraman, and Ullman 2014; Mullen 2016).

With our specifications, we found 17,013 distinct instances of unorthodox bill influence by identifying matching sections from 32,702 bills that were introduced that did not pass with sections from 24,890 bills that were determined to be potential matches. While there are a variety of ways we could choose to credit the original author of the text, particularly if there are multiple section matches in the later bill, we have chosen to code whether a legislator influences a later bill as dichotomous. We made this choice for multiple reasons. First, without additional information, it is difficult to know if multiple section matches represent multiple distinct legislative ideas or if it is just the result of an idea spanning several bill sections. Therefore, we have chosen to take a conservative approach and only give legislators credit for influencing any given bill one time to avoid artificially inflating their influence. Second, it is relatively common for several consecutive sections of an earlier bill to appear in a later bill when those sections are on the shorter side, and less common when they are longer. This suggests that the distinction between smaller and larger sections may be more complex than simply being representative of multiple policies. Finally, coding bill influence as dichotomous makes it more easily comparable to and compatible with the counts of traditional lawmaking actions.

Analysis

As with traditional lawmaking, we consider unorthodox lawmaking through bill influence at multiple stages of the legislative process, with influence being identified at both the engrossment and enactment stages. Across all Congresses, legislators influence an average of 1.8 bills that are introduced to the House, 0.4 bills that pass the House, and 0.24 bills that pass into law. This suggests that unorthodox lawmaking through bill influence happens fairly regularly, especially among committee chairs, and that it is an important part of a more complete measure of legislative productivity.

Consistent with women's accounts of gender difference in approaches to lawmaking, Figure 5 shows that women Members of Congress are much more likely than similar men to place text from bills they originally introduced into other's bills, and they are much more likely to pass legislation through the House and into law this way as well. The size of this gender gap is about the same size as the gap between majority party and minority party members. And, though Black Members of Congress are somewhat less likely to influence others' bills this way in the introductory stage, they are similarly likely to influence others' bills at the engrossment and enactment stages. All of this suggests that a failure to consider behind-the-scenes lawmaking disproportionately disadvantages some legislators more than others.

THE LAWPROM MODEL

The data described above from the 101st to the 113th Congresses (1989–2015) allow us to compile a metric that indicates the frequency with which legislators have completed various lawmaking actions relative to the 80,990 bills, 13,656 amendments, and 911,711 bill sections in the dataset. Specifically, we create three measures: LawProM, which combines these actions to represent how frequently legislators enact policies into federal statute; HouseProM, which represents how often legislators engross policies through the House; and ProM, which is the most generous measure and which counts behaviors like introducing bills and amendments in addition to the actions covered by HouseProM and LawProM.[32] Table 1 outlines which actions each metric includes.

Because bill sponsorship, cosponsorship, amendments, and bill influence via text reuse are not equally costly behaviors, we weight each of these successes by the inverse of how common they are. In other words, we divide the number of times a legislator completed a lawmaking action within a Congress by the total number of times that action occurred within the same Congress to get the proportion of each action that a legislator engaged in. When we sum the actions together, this gives more credit to actions that are less frequent, a proxy for importance.[33] This also has the effect of controlling for the overall level of productivity in each congress, which can vary quite widely.[34] While there are questions for which raw productivity levels might be best suited to answer, we see many virtues of a metric that accounts for the unique set of structural factors that make lawmaking easier or harder in that congress when considering relative productivity.[35]

Once we have calculated a legislator's weighted score for each legislative action and added them together, we then divide these weighted scores by the

[31] The parameters of our LSH MinHashing are as follows:
MinHash N = 240
MinHash seed = 3352
LSH bands = 60.

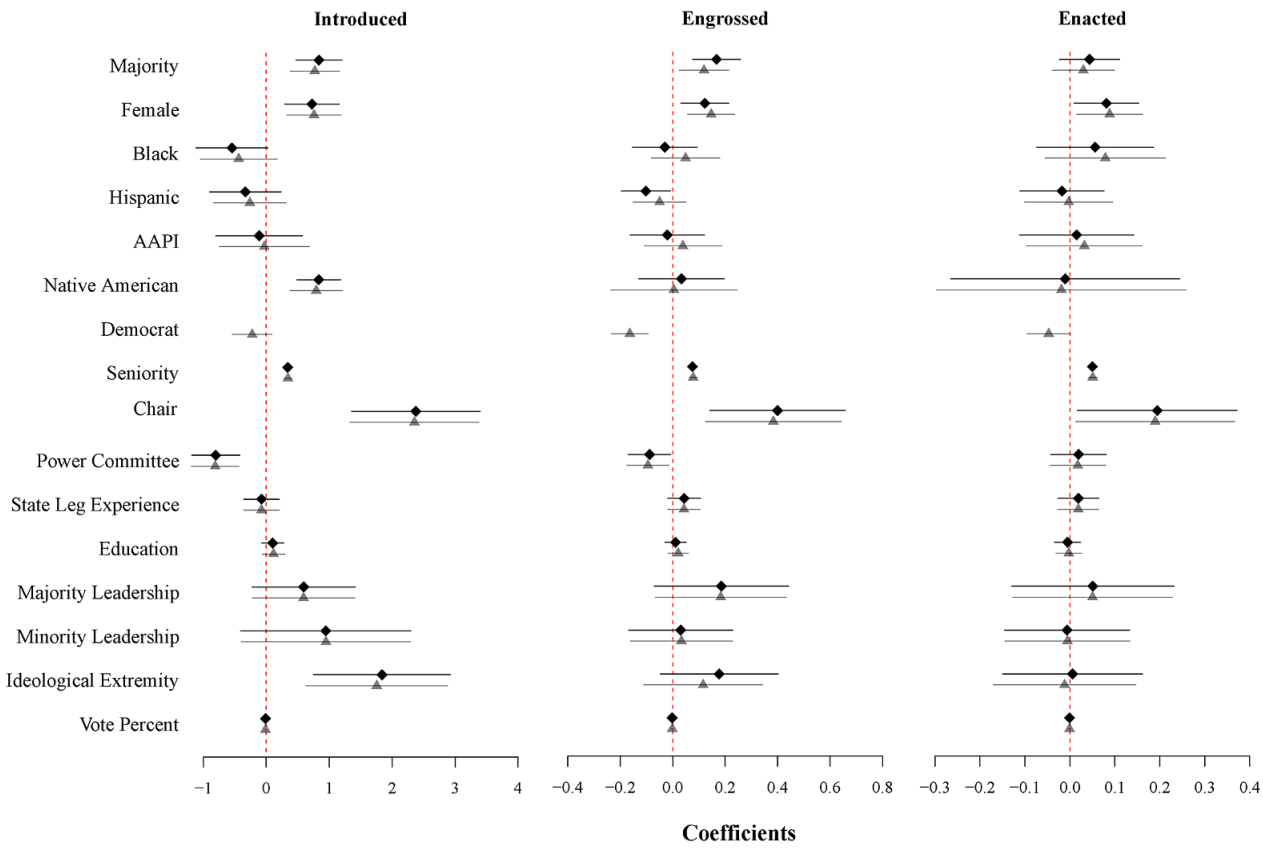
[32] For visual representations of LawProM and its component parts, see Supplementary Figures A1–A2.

[33] Hence, even scholars who are skeptical about the importance of cosponsorship can rest assured that cosponsorship is not especially influential in our model. In the 113th Congress, a legislator would have to cosponsor about 15 bills at the post-introduction stage for it to count as much as introducing one bill and about 400 bills for it to count as much as passing one bill they introduced.

[34] See Supplementary Figure A1 for more information about how productivity varies across congresses.

[35] Scholars interested in raw productivity levels can download and customize our raw data, available at LawProM.com.

FIGURE 5. Correlates of Unorthodox Lawmaking through Bill Influence



Note: Regression results in Supplementary Tables A6.1–A6.3, Models 1 (diamonds; without party) and 2 (triangles; with party).

TABLE 1. Included Lawmaking Actions by Metric

ACTION	ProM	HouseProM	LawProM
Sponsored an introduced bill	X		
Sponsored a bill that passed the House	X	X	
Sponsored a bill that passed into law	X		X
Cosponsored a bill at time of introduction	X		
Cosponsored a bill after introduction	X		
Cosponsored a bill that passed the House	X	X	
Cosponsored a bill that passed into law	X		X
Sponsored an amendment	X		
Sponsored an amendment that passed the House	X	X	
Sponsored an amendment that passed into law	X		X
Influenced a bill that was introduced in the House	X		
Influenced a bill that passed the House	X	X	
Influenced a bill that passed into law	X		X

Note: Abbreviations for compared measures: HouseProM, House Productivity Metric; LawProM, Lawmaking Productivity Metric; ProM, Productivity Metric.

number of terms in the model[36] and multiply the score by 100. This makes the final score representative of *the proportion of each lawmaking activity that a Member of Congress contributed during a given congress, summed together and then converted to a percentage of all activities.* This allows for both simple interpretation of the meaning of our scores and straightforward within- and across-Congress comparisons.

Our first measure, the LawProM gives a score to each House member in each Congress by crediting a legislator for all of their sponsored and cosponsored bills, amendments, and influenced bills *that pass into law.* This version of our measure assumes that for legislators to truly be considered productive they must ultimately influence federal statute by getting the policy they helped produce enacted into law. It is calculated as follows for member of Congress *i* in Congress *t*:

Equation 1: Components of and Weighting for LawProM.

$$\text{LawProM}_{it} = \left[\begin{array}{l} \left(\frac{\text{sponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{sponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{original cosponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{original cosponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{additional cosponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{additional cosponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{amendment}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{amendment}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{influence}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{influence}_{\text{enact}_{kt}}} \right) \end{array} \right] \frac{100}{5}. \quad (1)$$

Across all Congresses, the median legislator has a LawProM score of 0.08, which represents a skew toward less productivity than one would expect if all MCs contributed equally (which would be a score of about 0.23). Several legislators receive a score of 0 because they were entirely unsuccessful at contributing to any enacted legislation in a given congress.[37]

We have also created a version of the metric, HouseProM, that focuses on passage through the House (e.g., the engrossment stage of the lawmaking process). Like LawProM, HouseProM gives legislators credit for sponsorship, cosponsorship, amendments, and influence of bills that are passed at the engrossment stage in the House, regardless of whether they were enacted into law. Because members of the House have the greatest ability to push legislation through their chamber and much less control over what the Senate and President do, HouseProM focuses on giving legislators credit for successfully passing legislation in their chamber. HouseProM is calculated as follows for legislator *i* in Congress *t*:

Equation 2: Components of and Weighting for House Productivity Metric (HouseProM).

$$\text{HouseProM}_{it} = \left[\begin{array}{l} \left(\frac{\text{sponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{sponsor}_{\text{engross}_{kt}}} \right) + \\ \left(\frac{\text{original cosponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{original cosponsor}_{\text{engross}_{kt}}} \right) + \\ \left(\frac{\text{additional cosponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{additional cosponsor}_{\text{engross}_{kt}}} \right) + \\ \left(\frac{\text{amendment}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{amendment}_{\text{engross}_{kt}}} \right) + \\ \left(\frac{\text{influence}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{influence}_{\text{engross}_{kt}}} \right) \end{array} \right] \frac{100}{5}. \quad (2)$$

Across all Congresses, the median legislator has a HouseProM score of 0.09, with the most productive legislator in the dataset being Representative Traficant of Ohio in the 103rd Congress with a score of 2.17 and several legislators receiving a score of 0 because they are unsuccessful at lawmaking actions at the engrossment stage.[38]

Finally, because scholars sometimes wish to operationalize lawmaking productivity more generously, we have created a general productivity metric, ProM. It includes all of the lawmaking actions counted in both LawProM and HouseProM for each legislator in each Congress. It *also* gives credit for each lawmaking actions at the introductory stage.[39] In other words, this metric gives legislators credit for both traditional and unorthodox lawmaking actions at all three stages of the legislative process[40] and is therefore the most generous with what actions are considered to actually constitute legislative productivity. ProM is calculated as follows for member of Congress *i* in Congress *t*:

Equation 3: Components of and Weighting for Productivity Metric (ProM).

[36] This is consistent across every Congress except for the 101st. There were no identified instances of bill influence for engrossed or enacted bills within the 101st Congress so neither of the influence terms show up in any calculation of the productivity metric. For easier comparability, we divided by the number of terms that do occur (13) so that the score still represents the percentage of lawmaking done by each legislator in that Congress.

[37] See Supplementary Figure A2 for distributions of legislation actions.

[38] Many readers may be surprised by Rep. Traficant's high score. But, in fact, amid the bluster, during the 103rd Congress alone he sponsored 7 bills that passed the House, was an original cosponsor on 7 bills and later cosponsor on 17 bills that passed the House, had 50 successful floor amendments, and was able to incorporate language into 4 other bills. For example, he convinced Rep. Klink (D-PA) to incorporate legislation he wrote in the 102nd Congress about identifying and labeling American-made products into HR 3041 in the 103rd Congress, which passed the House and eventually was enacted into law.

[39] Only cosponsors who remained on the bill throughout the lawmaking process after signing were counted.

[40] As with bill sponsorship, cosponsorship, and amendment sponsorship, it is possible for a member to receive credit for bill text reuse at every stage during which their bill text was identified as being reused.

$$\text{ProM}_{it} = \left[\begin{array}{l} \left(\frac{\text{sponsor}_{\text{intro}_{it}}}{\sum_{k=1}^{N} \text{sponsor}_{\text{intro}_{kt}}} + \frac{\text{sponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{sponsor}_{\text{engross}_{kt}}} + \frac{\text{sponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{sponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{original cosponsor}_{\text{intro}_{it}}}{\sum_{k=1}^{N} \text{original cosponsor}_{\text{intro}_{kt}}} + \frac{\text{original cosponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{original cosponsor}_{\text{engross}_{kt}}} + \frac{\text{original cosponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{original cosponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{additional cosponsor}_{\text{intro}_{it}}}{\sum_{k=1}^{N} \text{additional cosponsor}_{\text{intro}_{kt}}} + \frac{\text{additional cosponsor}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{additional cosponsor}_{\text{engross}_{kt}}} + \frac{\text{additional cosponsor}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{additional cosponsor}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{amendment}_{\text{intro}_{it}}}{\sum_{k=1}^{N} \text{amendment}_{\text{intro}_{kt}}} + \frac{\text{amendment}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{amendment}_{\text{engross}_{kt}}} + \frac{\text{amendment}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{amendment}_{\text{enact}_{kt}}} \right) + \\ \left(\frac{\text{influence}_{\text{intro}_{it}}}{\sum_{k=1}^{N} \text{influence}_{\text{intro}_{kt}}} + \frac{\text{influence}_{\text{engross}_{it}}}{\sum_{k=1}^{N} \text{influence}_{\text{engross}_{kt}}} + \frac{\text{influence}_{\text{enact}_{it}}}{\sum_{k=1}^{N} \text{influence}_{\text{enact}_{kt}}} \right) \end{array} \right] \frac{100}{15}. \quad (3)$$

As with the previous measures, we weighted each lawmaking action by how often it occurred in that Congress as a way to account for the relative importance and difficulty of each action. Across all Congresses, the median legislator has a ProM score of 0.11, with the most productive legislator again being Representative Traficant of Ohio in the 103rd Congress with a score of 1.88. Even with this broadly defined measure of productivity, there are still a number of legislators with a score of 0 because they are not participating in any of the lawmaking actions considered in the model.

GENDER, RACE, AND LAWMAKING PRODUCTIVITY IN CONGRESS

As discussed above, we find that there are meaningful differences in who engages in various lawmaking approaches. Women are more likely to enact policy through cosponsorship and bill influence than similarly situated men, and Black Members of Congress are more likely to enact legislation through cosponsorship than similarly situated white Members of Congress. These findings partially confirm Hypotheses 1_a and 2_a, that women and Black MCs will disproportionately engage in unorthodox lawmaking approaches. Because existing research tends to focus on bill sponsorship and passage and neglect the lawmaking avenues that MCs from marginalized backgrounds disproportionately engage in, current measures of lawmaker productivity systematically under-credit the work that some Members of Congress do. Hence, we expect that a more comprehensive measure will reflect favorably on women and Black Members of Congress.

Tables 2–4 report correlates of legislative productivity, as measured by our ProM, HouseProM, and LawProM, respectively, across four OLS regression models with clustered robust standard errors. Models 1 and 2 reflect the challenges of isolating estimates for Black MCs when there is extremely high collinearity with party; Models 3 and 4 breakdown the results for women and Black MCs by majority and minority party status, since prior work suggests the biggest difference is for minority party women compared to minority party men.

As we would expect, majority party members, those with more seniority, and committee chairs all are more productive lawmakers. We are also able to confirm Hypothesis 1_b that women MCs are more productive lawmakers for ProM, HouseProM, and LawProM scores. The effect size of being a woman member is about a third of the size of being in the majority party. As with past studies, we find that most of this is driven by minority-party women strongly outperforming minority-party men (Volden, Wiseman, and Wittmer 2013). However, the substantive size of our result is considerably larger than past research—for example, we estimate *minority* party women are about 69% as productive lawmakers as *majority* party men compared to about 19% as productive when using Legislative Effectiveness Scores.[41]

Hence, although men dominate the very top of the distribution of LawProM scores, women overall outperform men who are similarly situated to them. The top-scoring women in our dataset is Connie Morella (R-MD) in the 106th Congress, with a LawProM score of 1.17. In the 106th Congress, she introduced 31 bills, 4 of which were enacted into law. She was an original cosponsor on 201 bills and a later cosponsor on 236 bills; 28 and 20 of them, respectively, were enacted. She sponsored two amendments, neither of which were ultimately successful. However, she authored text in 9 bills sponsored by other legislators that were enacted. Morella is most commonly remembered as a moderate Republican who was able to win reelection in a Democratic district for many years; whether her unusual level of productivity was a cause or effect of this is hard to know but points to directions for future research.

We also find some evidence for Hypothesis 2_b that Black MCs are more productive lawmakers for LawProM scores, but because of the high collinearity of race and party, the statistical significance of this finding

[41] Compare predicted values derived from column 3 of Table 4 and Supplementary Table A7.

TABLE 2. Correlates of High Legislative Productivity—Productivity Metric (ProM)

Variables	(1)	(2)	(3)	(4)
Majority	0.070***	0.073***	0.074***	0.077***
	(0.011)	(0.010)	(0.011)	(0.010)
Female	0.029***	0.027**	0.039***	0.037***
	(0.010)	(0.011)	(0.013)	(0.013)
Female × Majority			−0.022	−0.021
			(0.013)	(0.013)
Black	0.003	−0.002	0.010	0.006
	(0.015)	(0.016)	(0.017)	(0.018)
Black × Majority			−0.019	−0.021
			(0.015)	(0.015)
Hispanic	−0.007	−0.010	−0.007	−0.010
	(0.014)	(0.014)	(0.014)	(0.014)
AAPI	0.009	0.006	0.009	0.005
	(0.014)	(0.014)	(0.014)	(0.014)
Native	0.013	0.013	0.012	0.013
	(0.012)	(0.013)	(0.012)	(0.013)
Democrat		0.011		0.011
		(0.007)		(0.007)
Seniority	0.012***	0.012***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Chair	0.188***	0.189***	0.187***	0.188***
	(0.020)	(0.020)	(0.020)	(0.020)
Power Committee	−0.047***	−0.046***	−0.047***	−0.046***
	(0.008)	(0.008)	(0.008)	(0.008)
State leg experience	−0.001	−0.001	−0.001	−0.001
	(0.007)	(0.007)	(0.007)	(0.007)
Education	0.004	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Majority leadership	0.002	0.003	0.005	0.005
	(0.016)	(0.016)	(0.016)	(0.016)
Minority leadership	0.001	0.001	0.000	0.000
	(0.018)	(0.018)	(0.018)	(0.018)
Ideological extremity	0.046	0.050*	0.044	0.048*
	(0.029)	(0.029)	(0.029)	(0.029)
Vote percent	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.087***	0.083***	0.086***	0.082***
	(0.022)	(0.023)	(0.022)	(0.023)
Observations	5,575	5,575	5,575	5,575
R^2	0.240	0.241	0.241	0.242

Note: Clustered robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

depends on the model. Although Black MCs do no better or worse than others in our ProM and HouseProM measures, there is some evidence that they are considerably more effective at contributing to federal statute (LawProM) than other similar legislators. In all of the models in Table 4, the point estimate of the effect size of being a Black MC is around half of the size of the effect of being in the majority party. Whether this estimate meets conventional definitions of statistical significance varies across models, though. Past research has generally estimated that Black MCs are less productive lawmakers than white MCs, so even null results are a meaningful departure from current findings (Volden and Wiseman 2014). Our results suggest that current research on the institutional barriers Black MCs face in translating their legislative priorities into law ought to be supplemented by research that examines the ways in which they nevertheless succeed at a higher rate than their colleagues.

Although the small number of Black women in Congress during the time period of our study somewhat limits the analysis we can do of this subgroup, Table 5 shows descriptive statistics for Black women compared to other groups. Generally, Black women outperform the average MC, the average woman MC, and the average Black MC.

The highest-scoring Black woman in our LawProM dataset is Eleanor Holmes Norton (D-DC) in the 103rd Congress, with a score of 0.932. Despite being a nonvoting delegate, she introduced 39 bills, 8 of which were enacted. She was an original or later cosponsor on 330 bills, 19 of which were enacted; she offered

TABLE 3. Correlates of High Legislative Productivity—House Productivity Metric (HouseProM)

Variables	(1)	(2)	(3)	(4)
Majority	0.102***	0.100***	0.105***	0.103***
	(0.012)	(0.012)	(0.012)	(0.012)
Female	0.022**	0.023**	0.027**	0.028**
	(0.009)	(0.009)	(0.011)	(0.011)
Female × Majority			−0.010	−0.010
			(0.013)	(0.013)
Black	−0.006	−0.003	0.005	0.007
	(0.013)	(0.014)	(0.014)	(0.015)
Black × Majority			−0.028*	−0.027
			(0.017)	(0.017)
Hispanic	−0.012	−0.010	−0.012	−0.010
	(0.013)	(0.014)	(0.013)	(0.014)
AAPI	0.003	0.005	0.003	0.005
	(0.016)	(0.017)	(0.016)	(0.017)
Native	0.021	0.020	0.021	0.020
	(0.014)	(0.013)	(0.014)	(0.013)
Democrat		−0.005		−0.005
		(0.008)		(0.008)
Seniority	0.012***	0.012***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Chair	0.239***	0.239***	0.239***	0.238***
	(0.026)	(0.026)	(0.026)	(0.026)
Power Committee	−0.062***	−0.062***	−0.062***	−0.062***
	(0.008)	(0.008)	(0.008)	(0.008)
State leg experience	0.004	0.004	0.004	0.004
	(0.008)	(0.008)	(0.008)	(0.008)
Education	0.004	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Majority leadership	0.022	0.022	0.023	0.023
	(0.019)	(0.019)	(0.020)	(0.020)
Minority leadership	0.010	0.010	0.009	0.009
	(0.017)	(0.017)	(0.017)	(0.017)
Ideological extremity	−0.006	−0.008	−0.007	−0.009
	(0.032)	(0.032)	(0.032)	(0.032)
Vote percent	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.092***	0.094***	0.091***	0.093***
	(0.024)	(0.025)	(0.024)	(0.025)
Observations	5,575	5,575	5,575	5,575
R^2	0.273	0.273	0.274	0.274

Note: Clustered robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$,*$p < 0.1$.

4 amendments, 1 of which was enacted. Text that she authored appeared in 5 other bills, but none of them passed the House. Returning to the example that we began the paper with, Representative Sheila Jackson Lee (D-TX) scores similarly high in the 110th Congress (LawProM = 0.926) despite *none* of her 41 bills that she directly sponsored being passed into law. In fact, she holds four of the five top LawProM scores among Black women. Her reputation for having high staff turnover and being a "publicity hound,"[42] "biggest show horse" and "meanest"[43] ought to be contextualized with an understanding that her lowest LawProM score in our dataset is 0.298. That was for the 104th Congress—her first. For reference, in the overall database, the median score is 0.084 and the 90th percentile for productivity is 0.328. Representative Jackson Lee's workhorse LawProM scores highlight why it is so important to stop relying exclusively on bill sponsorship to measure legislative productivity. For a variety of reasons, legislators pursue lawmaking in different ways. But, at the end of the day, the *United States Code* does not distinguish between how the policy became law.

[42] https://www.texastribune.org/2017/02/28/sheila-jackson-lee-image-persistence/.

[43] https://www.washingtonian.com/2014/10/05/the-best-worst-of-congress-2014/.

TABLE 4. Correlates of High Legislative Productivity—Lawmaking Productivity Metric (LawProM)

Variables	(1)	(2)	(3)	(4)
Majority	0.058***	0.062***	0.065***	0.069***
	(0.012)	(0.012)	(0.012)	(0.012)
Female	0.022*	0.020*	0.045***	0.042***
	(0.012)	(0.012)	(0.014)	(0.014)
Female × Majority			−0.050***	−0.049***
			(0.017)	(0.017)
Black	0.030*	0.023	0.036**	0.030
	(0.018)	(0.019)	(0.018)	(0.019)
Black × Majority			−0.019	−0.022
			(0.019)	(0.019)
Hispanic	0.021	0.016	0.021	0.016
	(0.019)	(0.019)	(0.019)	(0.019)
AAPI	0.019	0.014	0.019	0.013
	(0.016)	(0.016)	(0.016)	(0.016)
Native	0.012	0.013	0.011	0.012
	(0.019)	(0.019)	(0.018)	(0.018)
Democrat		0.015*		0.015*
		(0.008)		(0.008)
Seniority	0.015***	0.014***	0.015***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)
Chair	0.240***	0.241***	0.238***	0.240***
	(0.029)	(0.029)	(0.029)	(0.029)
Power Committee	−0.036***	−0.036***	−0.036***	−0.036***
	(0.009)	(0.009)	(0.009)	(0.009)
State leg experience	0.003	0.004	0.003	0.003
	(0.008)	(0.008)	(0.008)	(0.008)
Education	0.001	0.000	0.001	−0.000
	(0.004)	(0.004)	(0.004)	(0.004)
Majority leadership	0.022	0.023	0.026	0.027
	(0.022)	(0.022)	(0.022)	(0.022)
Minority leadership	−0.009	−0.009	−0.010	−0.011
	(0.018)	(0.018)	(0.018)	(0.018)
Ideological extremity	−0.035	−0.029	−0.038	−0.032
	(0.031)	(0.031)	(0.031)	(0.031)
Vote percent	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.116***	0.111***	0.115***	0.110***
	(0.026)	(0.027)	(0.026)	(0.026)
Observations	5,575	5,575	5,575	5,575
R^2	0.197	0.198	0.199	0.200

Note: Clustered robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 5. Descriptive Statistics for Aggregated ProM, HouseProM, and LawProM Scores

	All members	All women members	All Black members	Black women members
ProM				
Mean	0.222	0.224	0.231	0.250
Median	0.182	0.187	0.179	0.197
HouseProM				
Mean	0.223	0.209	0.205	0.220
Median	0.173	0.165	0.160	0.174
LawProM				
Mean	0.223	0.215	0.239	0.235
Median	0.157	0.152	0.153	0.169

CONCLUSION

In this article, we have argued that a number of important dimensions of lawmaking have not been captured by existing measures of productivity. While there is wide acceptance among Congressional scholars that lawmaking happens in a variety of ways, the empirical study of legislative productivity focuses almost entirely on traditional bill sponsorship and passage. We present a new series of metrics, LawProM, HouseProM, and ProM that measure not only the traditional legislative process, but also policy successes that happen through amendments, cosponsorship, and text transfer between bills.

Why does this matter? Bill sponsorship is not a random draw from all the work that Members of Congress do. There are patterns in which legislators use various lawmaking approaches. While our measures give some of the same answers to empirical questions about legislative productivity that previous measures do, they also highlight what has been lost in current measures. In particular, we find support for the common claim that women Members of Congress go about the legislative process somewhat differently than men. They are considerably more likely to engage in cosponsorship and unorthodox bill influence than men. This is consistent with qualitative accounts from women in Congress about their legislative work. And, including these methods of lawmaking in a measure dramatically increases the size of the substantive relationship between the sex of the MC and their level of productivity. We also find that Black Members of Congress are consistently productive legislators via a variety of methods and this ultimately results in very high LawProM scores compared to their colleagues, though problems with collinearity between race and party limit the causal claims we can make. However, even a null result between race and legislative productivity is a departure from previous findings that typically find Black MCs to be less productive than their peers. In short, leaving less visible lawmaking approaches out from measures of effectiveness means biasing estimates of productivity in ways that under-appreciate the contributions of women and Black MCs.

In this article, we have been relatively agnostic about why marginalized Members of Congress tend to pursue different legislative strategies than others. It is possible that they may have a preference for these alternative strategies. However, as scholars have noted in the past, it is likely that they represent strategic adaptation to a traditional system that is gendered and raced in ways that present barriers that require workarounds. Although this is not a question we are able to address in this analysis, we hope there are ways for other researchers to use our data to investigate this question and many others about the collaborative and creative work that marginalized Members of Congress engage in.

More broadly, we recognize that there is a large number of questions about the modern Congress that are best answered with nuanced measures of productivity. Our raw data provide scholars with the ability to customize a measure with the specific avenues and stages of lawmaking relevant to their project by using the appropriate component parts to build a productivity metric that retains many of the advantages of the measures described in this work (including straightforward interpretation and comparability).[44] We hope our data become a useful and adaptable tool for scholars.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit http://doi.org/10.1017/S0003055424000224.

DATA AVAILABILITY STATEMENT

Research documentation and/or data that support the findings of this study are openly available at the American Political Science Review Dataverse: https://doi.org/10.7910/DVN/R2NKL3.

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CONFLICT OF INTEREST

The authors declare no ethical issues or conflicts of interest in this research.

ETHICAL STANDARDS

The authors affirm this research did not involve human participants.

[44] See LawProM.com.

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