A Bayesian Parametric Approach to Measuring Legislative Productivity

Austin Bussing Joshua Y. Lerner

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Abstract

We develop and present a new measure of legislative effectiveness that acknowledges the challenge of assigning scores to individual members who are engaged in a collective legislative process. To produce our effectiveness scores, we opt for a value-added measurement model that is fit on bill-level data with varying intercepts by sponsor. We include majority party membership, committee chair status, and other institutional variables in our models to ensure that our estimates of effectiveness are purged of the effects of organizational status, instead of being driven by them. Our models produce member-level measurements of the predicted marginal change in the probability of bill advancement attributable to the bill's sponsor. We compare our scores to existing legislative effectiveness scores, and include a discussion of the theoretical and methodological differences between our approach and existing approaches.

Introduction

The legislative process is inherently a collective enterprise. Individuals may pursue a variety of different goals through their participation in the process, but ultimately, nothing can be accomplished unilaterally. The concept of individual-level legislative effectiveness is premised on the assumption that legislators are not perfectly interchangeable pieces engaged in the collective production of legislation—but rather that they differ in their skill and ability to advance legislative proposals.

This concept is an intuitive one, and as Volden & Wiseman (2014) mention, it squares with both media portrayals of Congress, and with the ways in which legislators themselves discuss the legislative process. Some members of Congress are lauded as shrewd dealmakers, or as problem-solvers who know how to reach across the aisle to create bipartisan compromises, while others are derided as ineffective back-benchers whose legislative accomplishments are limited to the renaming of post offices. Simple observation of Congress, both by the general public and by political scientists, does seem to suggest that there is some degree of individual skill and ability that goes into the formation and passage of legislative proposals.

While we are willing to believe that legislative effectiveness exists as an individual-level trait, or collection of traits, we are skeptical that it is possible to measure effectiveness using the observable outputs of the legislative process. Just as psychometricians ask how different tests tap into the latent construct of intelligence, we are asking whether or not we can learn about the latent ability of legislators by observing the legislative process. We contend that the fundamental difficulty with conceptualizing and measuring legislative effectiveness as an individual-level trait is the assignment of individual credit for an inherently collective work product. In this paper, we seek to integrate insights about the structure of the legislative process into a number of measurement models that generate alternative legislative effectiveness scores. We argue for the necessity of a measurement strategy that explicitly

accounts for institutional factors of the legislative process, such as majority party advantage, in the generation of individual-level effectiveness scores.

Our paper proceeds as follows. First, we outline existing theoretical approaches to the legislative process, focusing on the importance of organization and institutional design in each theory. Next, we discuss the concept of measuring legislative effectiveness as an individual trait, paying special attention to the difficulties inherent in this endeavor. We then engage in a direct discussion about the similarities and differences between our proposed measurement strategy and the measurement strategy developed by Volden & Wiseman (2014). The next section of our paper describes our alternative measurement strategies and presents five different versions of effectiveness scores. Having presented our new scores, we discuss construct validity, and put our scores and the Legislative Effectiveness Scores of Volden & Wiseman (2014) through a number of validity tests, following Trochim & Donnelly (2001). Finally, we conclude with a discussion of how we contextualize our work within the broader intellectual enterprise of studying legislative effectiveness.

Theoretical Frameworks of the Legislative Process

Success in the legislative process, defined by the progress of bills towards enactment, is contingent upon how the collective legislative body decides to allocate its scarce time across a multitude of proposals. The extent to which individual legislators can meaningfully affect these collective decisions is a matter of debate among political scientists who study legislatures. While all legislators are legally and constitutionally equal in most legislative bodies, institutional features of legislatures, such as the committee system, have important implications for the allocation of legislative opportunities across members. We argue that legislative party organizations interact with these institutional features to create patterns of allocation that are decidedly unequal, particularly across members in the majority and

minority parties.

Existing theories of legislatures vary across many dimensions, but one particularly important difference between these theories is the role that they attribute to parties in structuring the legislative process. On one extreme, party cartel theory (Cox & McCubbins 1993, 2005) posits that the majority party usurps the power of individual members and exerts control over the legislative agenda in order to solve the collective action problems inherent to the construction of an electorally-valuable party brand. An illustrative metaphor for this theoretical perspective conceives of Congress as a factory producing widgets. There may be variation in skill across the factory workers, but each worker's skill-level is optimized and put to its best use in the production process. If you wished to learn something about the skill of any individual worker, you would need to have an understanding of the institutions and processes by which management optimizes individual contributions to the collective product. However, under this extended metaphor, you would learn very little about the skill-levels of individual factory workers by examining a widget that they had collectively produced.[1]

To tie the metaphor back to Congress, party-centric theories of legislating posit that the legislative process itself obscures the connection between individual-level skill and bill advancement. While some bills are drafted at the behest of an individual member, and advance through the legislative process largely by the initiative of that member, others are drafted in party leadership offices or in committee, and moved through the legislative process at the behest of the majority party leadership. Committee chairs are frequently able to take credit for important bills that have been collectively produced in their committee. Occasionally, the majority party leadership might decide that an electorally vulnerable majority party legislator is in need of a credit-claiming opportunity, and "gift" a bill to that member.[2] If this type of activity is characteristic of the legislative process, any measurement

[1]This difficulty in learning about individual effort-level or skill-level by observing collective production is what Alchian & Demsetz (1972) refer to as the metering problem in their work on the theory of the firm.

[2]Former representative Barney Frank (D-MA) discussed this seemingly-backward practice on the House floor during debate over the Jumpstart Our Business Startups (JOBS) Act in the 112th Congress. The

strategy that relies on sponsorship for credit allocation risks conflating the collective cooperation of a leadership-driven party with the ability of an individual legislator.[3]

While the cartel theory put forth by Cox & McCubbins (1993) leaves little room for individual legislative effectiveness to become apparent through the legislative process, not all party-oriented theories are as definitive on this point. For example, theories of conditional party government (Rohde 1991; Aldrich & Rohde 2000) may allow individual legislative effectiveness to express itself when the conditions for centralized party leadership control of the legislative process are not met. However, when the conditions of intraparty homogeneity and interparty heterogeneity are met, the more efficient, centralized and leadership-driven legislative process should produce little useful information on individual legislative effectiveness.

Theories of legislatures that do not treat parties as independently meaningful actors in the legislative process nevertheless acknowledge the role of internal institutions in structuring legislative activity. Starting from the premise that legislative committees create unequal legislative rights, Krehbiel (1992) constructs an informational theory of legislative organization to explain why legislators would create and sustain these specialized bodies. Krehbiel's contention that committees serve as agents of the full chamber, and can be incentivized to invest in the development of expertise to produce better-informed policy, can also be read as problematic for the assignment of individual credit for bill advancement. From an informational perspective, the prospects for bill advancement are in part determined by

bill in question was actually an agglomeration of multiple bills, some that had gone through the normal committee process, others that had not. Discussing one such bill, Frank complained:

> "Apparently, the Republican leadership decided it was Christmas in March, so they stole the bill from Mr. Schweikert and Mr. Himes and made a present of it to the gentleman from Arizona (Mr. Quayle)... they took the bill from the two men who had created it... so that the gentleman from Arizona could get credit for the bill—in which he had done no work."

[3]In all fairness, the measurement strategies we present below rely on bill sponsorship, and therefore run this same risk. However, we believe we have mitigated the risk to a certain degree by conditioning on partisan and institutional factors in our models producing effectiveness scores.

characteristics of the committee to which the bill is referred, as opposed to characteristics of that bill's sponsor.[4]

Of course, acknowledging the existence of institutions that create and reinforce inequalities in legislative rights and opportunities across members does not deny the existence of individual-level legislative effectiveness. However, it does highlight the importance of accounting for institutional effects in any measurement strategy that seeks to isolate an individual-level trait for legislative effectiveness.

Conceptualizing Legislative Effectiveness as an Individual Trait

Regardless of whether access to the floor agenda is regulated by the leadership of the majority party, semi-autonomous standing committees, or the chamber as a whole, legislators work within some institutional framework to advance their sponsored legislation. Because we assume there are institutional structures that affect a legislator's ability to advance their legislative proposals, but that are largely beyond the control of the individual legislator, we need to create a measure of legislative effectiveness that is independent of these structural characteristics.

Taking legislative effectiveness seriously as an individual-level trait requires careful consideration of how the trait, which is unobservable, relates to outcomes that we can observe. We are unable to directly observe a legislator's skill as such, but we are able to observe the progress through the legislative process of a bill sponsored by the member. Thus, we have to make inferences about the trait of effectiveness based on the bill advancement indicators that we observe. We can interpret bill advancement as a signal about the skill of

[4]For example, ideologically heterogeneous committees —which Gilligan & Krehbiel (1989) show to be more informationally efficient—are more likely to have their reported bills brought to the floor under a restrictive rule.

the bill's sponsor—but we assume that the signal is somewhat noisy. This is because bill advancement is partially a function of the individual skills and efforts of the bill's sponsor, and partially a function of organizational and structural factors that are not directly related to those individual-level characteristics. Formally, we can write this as:

$$X = f(\theta, \omega) \tag{1}$$

Where X, the bill advancement outcome we observe, is a function of sponsor skill-level θ and organizational and structural factors captured by ω—such as whether the member happens to be in the majority party or hold a committee leadership position.

Here we fundamentally differ with Volden & Wiseman (2014, pg. 17), who demonstrate that their legislative effectiveness measure is based on the innate abilities of members, their accumulated skill sets, their institutional position, and "a broader set of considerations consistent with well-established expectations about the internal workings of the House of Representatives." Following the measurement strategy laid out in this paper, we seek to uncover a latent measure of effectiveness that taps only these first two factors—innate abilities and accumulated skill sets—but that is invariant to institutional position and the internal workings of the House. In the language of the formula above, we attempt to use information about bill advancement, X, to recover estimates of sponsor skill, θ.

Our measurement models explicitly condition on the structural characteristics, ω, because these factors are so closely linked to legislative success that they threaten to obscure the true variation in legislative effectiveness that may exist across members. We are interested in measuring effectiveness that precedes the various institutional factors that influence productivity. We are asking, in a sense, is there a trait of legislative effectiveness that is not just the combined outputs of legislative institutions? Is this tangible attribute of legislators that derives from personal characteristics and associated abilities and traits, or is it merely

institutional positioning all the way down?

Volden & Wiseman (2014, pg. 43) find that, by their measure of legislative effectiveness, "majority-party members and committee chairs are about two to five times more effective, respectively, than the average (nonmajority) member of Congress." The fact that a legislator could double their effectiveness if their party switched from the minority to the majority—and quintuple their effectiveness if they became a committee chair—is a testament to the importance of parties and committees in structuring legislative activity in the House. This finding also casts doubt on the utility of the measure as an individual-level metric of legislative effectiveness, as these massive theoretical jumps cannot feasibly be connected to the skill or ability of an individual legislator.

Properties of a Latent Trait Versus a Composite Measure

The legislative effectiveness measure developed in Volden & Wiseman (2014) is based on observable bill-advancement checkpoints—bill introduction, consideration in committee, consideration beyond committee, House passage, and enactment into law. The authors' measurement strategy improves on previous attempts to gauge legislative effectiveness because it takes into account the intermediate stages of the legislative process, rather than relying exclusively on the highly discriminating bar of bill enactment. However, it remains unclear whether legislative effectiveness, as conceptualized and measured by Volden & Wiseman (2014), should be thought of as a reflective latent trait or a formative composite measure.

Reflective traits exist independent of how they are measured. The components of the trait are caused by the construct itself — bill progression is caused, at least in part, by the bill sponsor's underlying latent legislative effectiveness. The canonical reflective trait would be aptitude; we do not believe that test questions on an intelligence test make up intelligence uniquely, but instead reflect the test takers underlying intelligence and their responses (measured with some error) indicate their latent ability.

Formative measures, on the other hand, are measures that are formed by multiple different components that cause the construct. For formative measures, the canonical example is socioeconomic status, which exists only insofar as it is a combination of education, wealth, and occupational prestige. It is not that these elements of the construct are caused by SES, but rather that SES is the combined influence of all of these components (Stenner *et al.* 2008). So under this assumption, legislative effectiveness would be the combined efforts of all five stages Volden & Wiseman (2014) discuss—and the measure itself would be complete if and only if all components are present.

There is a disconnect between the measurement strategy used to construct legislative effectiveness scores—which suggests a composite formative measure—and the discussion of the scores themselves, which are often treated as if they are a reflective latent trait. Legislative effectiveness scores are essentially a weighted fraction of a given legislator's productivity in terms of the five components of legislative advancement listed above. Scores are generated in comparison with the rest of the chamber; they are fractional scores capturing the proportion of legislative activity attributable to a given member in a given Congress. Essentially, every legislator's score is determined by the scores of their fellow members because it is derived relative to every other member's productivity. The sum of legislative effectiveness scores for every member in a given Congress is equal to the total number of members in that Congress. LES can be considered a measure constructed from the simplex, in that every member's score is contingent on every other members score in that time; by construction, if one members score goes up everyone else's goes down or stays the same.

While LES is constructed in a composite manner, the way Volden & Wiseman (2014) discuss effectiveness does not suggest that they believe it to be caused by their five indicators of legislative productivity exclusively. Instead, they make repeated references to legislative effectiveness being a "proven ability to advance their agenda" which is driven by "innate ability, the acquisition and cultivation of a critical skill set, and the sophisticated utilization

of key legislative institutions" (Volden & Wiseman 2014, pg. 30). Furthermore, when discussing the elements of the innate ability that informs legislative effectiveness, Volden & Wiseman (2014) claim that "such abilities likely manifest themselves in ways that are subject to systematic investigation" and that "effective members possess important skills, that they can cultivate these skills over time, and that these skills translate into a measure of effectiveness that captures the movement of legislation through Congress." This entire discussion treats legislative effectiveness as being, at least partly, a measure that is held innately. It is merely *reflected* in the legislative productivity that we observe. The construct validity tests they provide suggest the same: year-to-year correlations, correlation between freshman scores and scores many sessions out, etc. all speak to the same idea: legislative effectiveness is an underlying trait and should be evaluated as such.

Difference Between Productivity and Effectiveness

We argue that Volden & Wiseman (2014) provide a holistic measure of individual legislative productivity that takes the entire legislative process into consideration, and weights for bill importance. However, we are hesitant to equate this productivity with effectiveness. Productivity is an individual measure of legislative output that, in this case, is fully attributed to the bill sponsor. In the language of our formalization above, this construction takes X, or a transformed version of X, and equates it directly with legislative effectiveness. This, we argue, conflates the individual (θ) and structural (ω) forces that jointly produce bill progression. In the next section of this paper, we model bill advancement as a function of a number of institutional characteristics, and estimate random effects—or varying intercepts—at the member level. These member-level intercepts are meant to capture the variation in bill advancement outcomes that can rightly be attributed to the individual traits or efforts of bill sponsors. The intercepts drawn from the series of models that we estimate in the next section serve as our alternative legislative effectiveness scores.

Model Description

In order to generate parametric legislative effectiveness scores, we fit a series of Bayesian hierarchical ordered logit models with pooled intercepts for member-years. The functional form of these models is identical to an ordered scale 2-pl (two parameter) IRT with covariates. We follow the procedure laid out by Bürkner (2019) to fit an item response theory model with covariates in Stan, while substituting our own structure for the ordinal logit working as the link function in the model (Gelman *et al.* 2014).

These models are fit on a bill-level dataset, comprised of all 61,801 HR bills introduced from the 103$^{\text{rd}}$ - 113$^{\text{th}}$ congresses (1993-2015) that were coded as "Important" by the Congressional Bills Project (Adler & Wilkerson 2020). We opt for a multilevel structure because of the hierarchical nature of our data—with bills nested within members, nested within congresses. Ultimately, the individual member-level intercepts estimated by the models are our quantities of interest, as they represent the marginal effect on the likelihood of bill consideration (or passage) that is attributable to the identity of the bill's sponsor. Our model can be defined as follows:

$$\begin{aligned} Pr(y_{ijk} = 1) &= ologit^{-1}(\mu) \\ \mu = y_{ijk} &= \beta_{0jk} + \beta_{jk} + ... + \beta_i + ...\epsilon_{ijk} \end{aligned} \tag{2}$$

Where i indexes an individual bill, j indexes an individual member, and k indexes a Congress.

Justification for Dependent Variable Selection

Our dependent variable is a three-level categorical variable representing the final status of each bill in our data. This variable can take on values of "Introduced" for bills that are

only introduced and are not given consideration on the House floor, "House Floor" for bills that are considered on the House floor but do not become law, and "Became Law" for those bills that did ultimately get enacted into law. This contrasts somewhat with the stages of the legislative process considered by Volden & Wiseman (2014), who look at bill introductions, bills that receive action in committee, bills that receive action beyond committee, bills that passed the House, and bills that became law. Our approach provides an admittedly more limited picture of the legislative process, but we justify it as more parsimonious, and more directly connected to our concept of legislative effectiveness.

Although we agree that consideration in committee is an important step in the legislative process, we ultimately exclude this step from the construction of our dependent variable because it is not a necessary prerequisite for bill advancement (Bendix 2016).[5] We want to avoid creating a measure that would punish the sponsors of bills that bypassed the committee system to make it to the floor. In another substantive departure from the setup in Volden & Wiseman (2014), we do not include actual House passage as a step in our ordered dependent variable. We exclude this step for two reasons. Firstly, bill failure on the House floor is a rare event, so this step would look almost identical to the preceding step of floor consideration. Additionally, we argue that getting a bill consideration on the floor is more directly tied to the efforts of the bill's sponsor than whether or not that bill passes the House. Future work on this project will examine the extent to which the legislative effectiveness scores we produce are robust to different constructions of our ordered dependent variable.

Independent Variables

In this paper, we present five different sets of parametric legislative effectiveness scores, derived from five related models. We refer to the first of these models as the "Baseline"

[5]Bussing (2020) also documents the increasing frequency of bills bypassing committee and being brought to the floor under suspension of the rules.

model—a multilevel ordered logistic regression fit with no covariates. Theoretically, the scores that are derived from this model should be most similar to the legislative effectiveness scores from Volden & Wiseman (2014), as all of the variation in the likelihood of bill advancement is absorbed by our member-Congress intercepts.

The four other models from which we derive scores presented in this paper are incrementally built-out versions of this Baseline model. The "Majority" model simply adds a dichotomous majority party indicator to our intercept model. It is well-established that members of the majority party, particularly in the House, will be more successful in advancing their introduced bills—for reasons that have little or nothing to do with their individual level of effectiveness. However, existing measures of legislative effectiveness are largely driven by majority party status. This can be seen in the precipitous drop-off in effectiveness experienced by members of the former majority after partisan control of the chamber switches, such as when House Democrats became the new minority in the 104th Congress. Because we are attempting to measure legislative effectiveness as an innate, individual-level characteristic, this Majority model conditions on majority party status to ensure that the resulting effectiveness scores are purged of its effect, as opposed to being driven by it.

Table 1: Alternative Effectiveness Models

Eff. Score	**Covariates Included**
Baseline	None
Maj. Party	Majority Party Indicator
Institutional	Majority Party Indicator Cmte. Chair Indicator
Institutional Plus	Majority Party Indicator Cmte. Chair Indicator Subcmte. Chair Indicator
Full Institutional	Majority Party Indicator Cmte. Chair Indicator Subcmte. Chair Indicator Cmte. Ranking Member Indicator

Acknowledging that a substantial portion of the variation in legislative effectiveness between members of the majority party can be explained by their institutional position, we fit an "Institutional" model that adds a dichotomous committee chair indicator to the Majority model.[6] Our "Institutional Plus" model also includes a subcommittee chair indicator variable, and our "Full Institutional" model adds an indicator for committee ranking member status. We include these committee leadership indicator variables for the same fundamental reason that we include a majority party indicator—because the incremental boost in effectiveness associated with these positions is not inherently tied to an individual trait. There are a number of reasons why attaining a leadership position on a committee would boost a member's ability to guide their bills through the legislative process. Full committee chairs, subcommittee chairs, and, to a lesser extent, ranking members from the minority party, are given opportunities to claim credit for the collective work products of their committee or subcommittee. These committee leaders may be listed as the sponsors of bills that were drafted and amended within their committee—and therefore any legislative effectiveness measure that relies on sponsorship to attribute credit may reward these members disproportionately (Casas *et al.* 2020, pgs. 6-7). Additionally, these committee leaders are more likely to be the sponsor of important bills that must be enacted into law, such as appropriations bills, or bills that reauthorize major federal programs (Adler & Wilkerson 2012). While members may have had to demonstrate some form of effectiveness in order to attain a committee leadership positions, we want to avoid a measurement strategy that conflates the benefits of institutional stature with innate legislative effectiveness.[7]

[6]Lewallen (2020) demonstrates the boost in LES that members get when they become committee chairs. He shows that these boosts are not sustainable beyond the period of chairmanship, and that the magnitude of the boost is heavily dependent on the type of committee.

[7]We are not denying that members may have attained committee leadership *because* of their effectiveness, but we do want to ensure that members are not characterized as effective simply *because* of their committee leadership status. If these members truly are innately effective, our measurement should identify them as such, even controlling for the effect of their institutional status.

Effectiveness Scores

As mentioned above, we present five different individual-level measures of legislative effectiveness drawn from the varying intercepts that were estimated at the member-Congress level in each of our models. These intercepts, along with their standard errors, give us estimates of the marginal increase or decrease in the likelihood of bill progression that is attributable to the identity of each bill's sponsor.

Figure 1: Correlation Between Scores

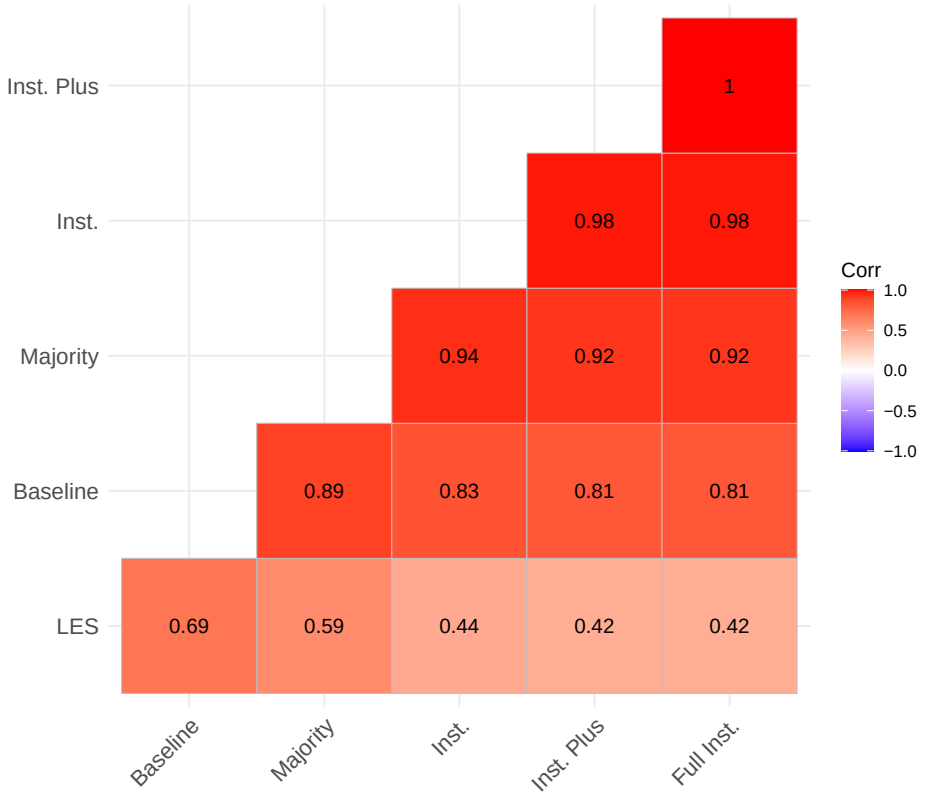


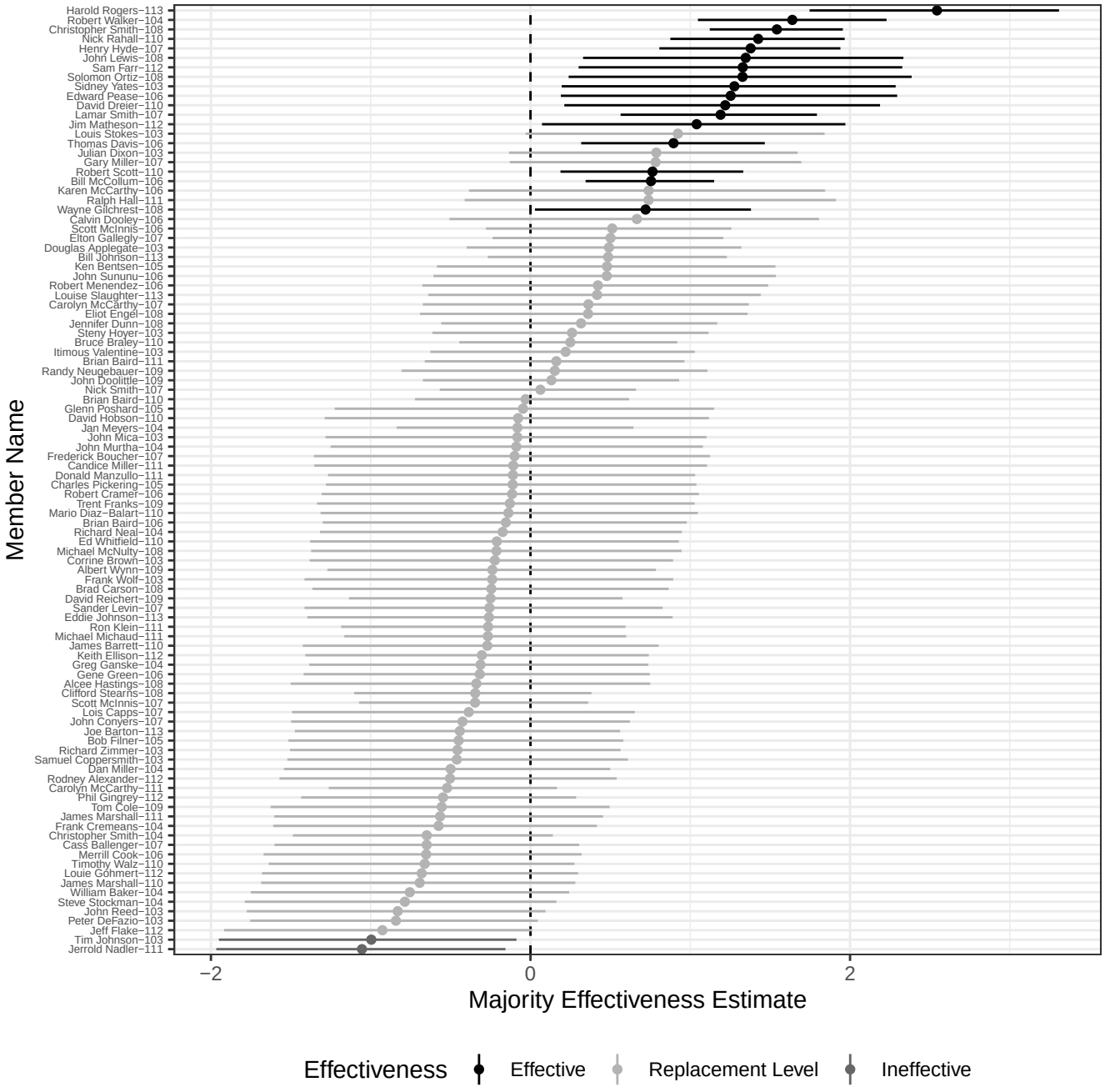
Figure 1, above, presents the correlation between these five sets of scores and the legislative effectiveness scores from Volden & Wiseman (2014). Of the five scores that we

produce, those from our Baseline model are the most highly correlated with the Volden & Wiseman (2014) legislative effectiveness scores (0.69). This is expected, as the Baseline model and the measurement strategy used by Volden & Wiseman (2014) operate under a similar implicit assumption that all variation in the likelihood of bill advancement is attributable to the identity of the sponsor.

Because our effectiveness scores are derived from a series of models, they are measured with error. This fits well with our conceptualization of legislative effectiveness, as we view our models as a series of exploratory attempts that seek to uncover a latent trait. Our expectation is that the inclusion of covariates such as majority party status and committee leadership status should leave little variation to be explained by the member-level estimates our models produce. Functionally, these intercepts are constrained to be normally distributed around zero, and we expect that, when measured with error, most of these intercepts will be statistically indistinguishable from zero.

In our scores, legislators can be considered truly effective if the lower bound of the credible interval on their intercept is above zero. Substantively, what this means is that the effect of sponsor-level characteristics, estimated independently of the structural covariates included in the model, are positively associated with the likelihood of bill advancement. Conversely, a legislator would be considered truly ineffective if the upper bound of the credible interval on their intercept is below zero. What this means substantively is that the effect of sponsor-level characteristics, estimated independently of the structural covariates included in the model, are negatively associated with the likelihood of bill advancement. We refer to legislators that have intercepts with credible intervals crossing zero as "replacement-level" legislators, because our models are not able to definitively identify them as either effective or ineffective. To illustrate the distribution of member effectiveness, Figure 2 below plots 100 randomly-drawn member-level intercepts from our Majority model, which includes an indicator variable for majority party status.

Figure 2: Effectiveness Estimates for 100 Randomly-Drawn Members (Majority model)



Note: Points on this plot are member-level intercepts estimated in our Majority model, which includes an indicator variable for majority party status. 80% credible intervals are shown on either side of the intercept estimates.

Testing Construct Validity

In this section, we subject our measures and those from Volden & Wiseman (2014) to a number of tests meant to evaluate construct validity. We conduct tests for three kinds of criterion-related validity: concurrent, convergent, and predictive—as well tests of content and face validity, which Trochim & Donnelly (2001) include as components of translation validity.

Concurrent Validity

Concurrent validity, according to Trochim & Donnelly (2001), is the ability of a construct to differentiate between groups that are meaningfully different with regard to the concept being measured. We first ask whether the effectiveness measures are able to successfully differentiate between legislators with prior state legislative experience and those without it. Then we ask whether the measures are able to differentiate between freshman and non-freshman members of the House. Both of these tests are based on the assumption that experience should be positively correlated with the trait of legislative effectiveness—a proposition that is more directly tested in our section on convergent validity.

Table 2 below presents the results of our first test of concurrent validity. We fit an OLS model on the effectiveness scores of freshman members of the House from the 103^{rd} to the 113^{th} Congress, with an indicator variable for prior state legislative service and fixed effects by Congress. Our expectation is that the coefficient on the indicator variable for state legislative service should be positive and statistically significant, which would demonstrate that experienced freshman are significantly more effective than their non-experienced freshman colleagues. Somewhat surprisingly, we do not find this in any of our models. Prior state legislative experience is negatively correlated with freshman LES ($p = 0.03$), and does not have a statistically significant relationship in any of the models

with our scores.

Table 2: Estimating Freshman Effectiveness as a Function of State Legislative Experience

	Dependent variable: Standardized Effectiveness Measures					
	LES	Baseline	Majority	Inst.	Inst. Plus	Full Inst.
State Leg. Experience	−0.153**	−0.082	0.039	0.003	−0.013	−0.011
	(0.071)	(0.072)	(0.072)	(0.072)	(0.072)	(0.072)
Constant	−0.393***	−0.368***	−0.384***	−0.384***	−0.381***	−0.377***
	(0.098)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)
Congress-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	761	761	761	761	761	761
R^2	0.080	0.057	0.046	0.047	0.050	0.049
Adjusted R^2	0.067	0.043	0.032	0.033	0.036	0.035
Residual Std. Error (df = 749)	0.966	0.978	0.984	0.983	0.982	0.982
F Statistic (df = 11; 749)	5.960***	4.115***	3.290***	3.387***	3.546***	3.527***

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors in parentheses. Fixed effects are included at the Congress level. Only freshmen members are included in these models.

It is unclear whether the apparent failure of this test of concurrent validity reflects a shortcoming of the various effectiveness scores. Perhaps experience in professionalized legislatures that are more similar to the U.S. Congress is positively associated with freshman effectiveness as measured by one more of these scores. This is a proposition that can be more closely examined in future work.

Our next test of concurrent validity essentially asks whether, on average, freshman members of the House have higher or lower effectiveness scores than non-freshman members. Because we are thinking about legislative effectiveness as an individual-level trait that can be improved over time, we would expect the average effectiveness of non-freshmen to be higher than that of freshmen. The OLS models presented in Table 3 below test this proposition by estimating effectiveness as a function of a freshman indicator variable and a series of fixed effects for Congress. The results are instructive. In the LES model, the Baseline model, the Majority model, and the Institutional model, the coefficient on the freshman indicator is in the expected negative direction. In the LES and Majority models, the negative effect of

freshman status on effectiveness is statistically significant at conventional levels. However, interestingly, in our Institutional Plus and Full Institutional models, freshman status is positively correlated with effectiveness ($p < 0.01$). This unexpected finding may be a result of the fact that these specific effectiveness scores are derived from bill advancement models that condition on committee chair status, subcommittee chair status, and—in the case of the Full Institutional score—committee ranking member status. Conditioning on these institutional positions, which freshman members are highly unlikely to hold, may systematically penalize the effectiveness of more senior members.

Table 3: Estimating Effectiveness as a Function of Freshman Status

	Dependent variable: Standardized Effectiveness Measures					
	LES	Baseline	Majority	Inst.	Inst. Plus	Full Inst.
Freshman	−0.339***	−0.026	−0.102**	−0.009	0.106***	0.116***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Constant	0.072	−0.130***	−0.159***	−0.198***	−0.265***	−0.270***
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Congress-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,657	4,657	4,657	4,657	4,657	4,657
R^2	0.015	0.009	0.012	0.012	0.016	0.016
Adjusted R^2	0.013	0.006	0.010	0.010	0.013	0.014
Residual Std. Error (df = 4645)	0.993	0.997	0.995	0.995	0.993	0.993
F Statistic (df = 11; 4645)	6.631***	3.738***	5.323***	5.252***	6.757***	6.970***

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors in parentheses. Fixed effects are included at the Congress level.

Convergent Validity

Tests of convergent validity evaluate the extent to which an operationalization of a concept is similar to other theoretically-related concepts (Trochim & Donnelly 2001). The relatively high correlations between our scores and LES, presented in Figure 1 above, demonstrate that our operationalizations of effectiveness are similar to Volden and Wiseman's (which we think of as closely linked to productivity). While we argue above that productivity and

effectiveness are not identical concepts, it is reassuring that they are positively correlated with one another, as we believe productivity is a useful, if noisy, signal about effectiveness.

Closely related to the last test we performed, we believe that our operationalizations of legislative effectiveness should be similar to the concept of legislative experience. This latter concept is rather easy to observe directly and measure, as we can simply use the tenure of a member of Congress as a measurement of their experience. Our question in this particular test is whether effectiveness, however measured, is positively related to experience, such that a given legislator would become more effective over time. Table 4 below presents the results of a series of OLS models that regress different effectiveness measures on a seniority variable with member-level fixed effects. The member-level fixed effects hold constant all time-invariant legislator characteristics, so that the coefficient on the seniority variable can be thought of as the expected increase in effectiveness attributable to an additional two-year term of service for a member.

Table 4: Estimating Effectiveness as a Function of Seniority

	Dependent variable: Standardized Effectiveness Measures					
	LES	Baseline	Majority	Inst.	Inst. Plus	Full Inst.
Seniority	0.061***	0.040***	0.041***	0.024***	0.016**	0.013*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Member-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,657	4,657	4,657	4,657	4,657	4,657
R^2	0.444	0.420	0.414	0.397	0.385	0.385
Adjusted R^2	0.273	0.242	0.235	0.212	0.196	0.196

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors, clustered by member, in parentheses. Fixed effects are included at the member level.

All of the measures of legislative effectiveness pass this convergent validity test. The modestly-sized coefficients (which can be interpreted in terms of standard deviations since

all DVs are standardized) are reassuring, as we would not expect huge jumps in effectiveness to be achieved with each additional term.

Predictive Validity

Operationalizations of legislative effectiveness at time t should ideally help us to predict outcomes associated with legislative effectiveness at time $t + 1$. In this section, we test whether or not legislative effectiveness measures from early in a legislator's career can help predict that legislator's future advancement within the chamber. There are a number of ways such a proposition could be tested, and the models we present below in no way represent an exhaustive investigation of the important questions about legislative effectiveness and institutional advancement. Our relatively rudimentary tests look at the Republican freshman class that came to office in the 104^{th} Congress, when the party regained a majority in the House for the first time in over 40 years. Our data for the models presented below follow the 32 GOP members who were freshman in the 104^{th} Congress and were still serving in the 109^{th} Congress. We figured that this 12-year period of uninterrupted Republican majorities would give these members a chance to ascend to a committee chairmanship at some point along the way.[8] The logit models presented in Table 5 below test whether members' effectiveness scores as freshmen, along with other covariates discussed in the note below the table, help to predict their future advancement to committee chair status.

[8]Four of these 32 members did, in fact, become committee chairs over this period.

Table 5: Modeling Advancement to Committee Chair Status as a Function of Effectiveness

	Dependent variable:					
	Future Advancement to Cmte. Chair Status					
LES	1.291					
	(0.787)					
Baseline		0.692				
		(0.878)				
Majority			0.895			
			(1.292)			
Institutional				1.266		
				(1.512)		
Institutional Plus					0.970	
					(1.449)	
Full Institutional						1.041
						(1.455)
Constant	−1.495	−1.113	−0.952	−1.028	−1.045	−1.052
	(1.246)	(1.162)	(1.109)	(1.136)	(1.128)	(1.131)
Covariates Included	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32	32	32	32	32	32
Log Likelihood	−8.817	−10.268	−10.347	−10.231	−10.370	−10.337
Akaike Inf. Crit.	25.634	28.536	28.695	28.463	28.739	28.675

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents logit coefficients with standard errors in parentheses. Only Republican members who were freshmen during the 104 $^{\text{th}}$ Congress and served through the 109$^{\text{th}}$ Congress were included in the models. Covariates included: average number of campaign contributions made to colleagues per term; absolute distance from majority party median (DW-NOMINATE).

While these results do not confirm the predictive validity of any effectiveness measurement we tested, there are a number of reasons they should not be viewed as definitive. For one, these particular tests focus on a small group of members from one party at one particular point in time. For another, there are selection effects that might be at play here. Republican members of the freshman class of the 104$^{\text{th}}$ Congress who dropped out of our data before the 109$^{\text{th}}$ Congress may have done so for a number of reasons that may be correlated with legislative effectiveness. For example, it could be the case that some of the most effective members dropped out of the data because they advanced to a career in the Senate, or that some of the least effective dropped out by losing an election. A closer examination of these

factors would be necessary in order to fully contextualize the results presented above.[9]

Content Validity

In this section, we attempt to test content validity, which checks an operationalization against the relevant content domain for the construct being measured (Trochim & Donnelly 2001). The content domain, in this context, essentially refers to the different criteria that should be met by an operationalization of legislative effectiveness. Drawing on our discussion above, we posit that a measure of legislative effectiveness should be tied to individual-level characteristics, and not institutional or structural characteristics largely beyond the control of an individual legislator. From this, we can derive a number of criteria that our measures should meet—all involving some degree of stability over time. For example, when a member serves multiple terms, their effectiveness scores in each term should be positively correlated over time. Further, if our measurements are truly picking up an individual-level trait, they should not change drastically when a legislator gains or loses majority party status or a position of leadership within the institution.

Our first test of content validity simply tests the stability of effectiveness scores within members and over time. Table 5 below presents the results of a series of OLS models that estimate current effectiveness scores as a function of lagged scores. The models employ 2-way fixed effects, controlling for both the time-invariant characteristics of each legislator and the period-effects associated with each Congress in our data. We expect the lagged measures to be positively correlated with the current measures in all cases.

[9]Additionally, it may well be the case that the measures of legislative effectiveness we test here do have predictive validity, but that committee chairmanships are allocated on a basis other than legislative effectiveness.

Table 6: Current Scores as a Function of Lagged Scores

	Dependent variable:					
	LES	Baseline	Majority	Institutional	Institutional Plus	Full Institutional
Lagged LES	0.223***					
	(0.037)					
Lagged Baseline		0.076***				
		(0.020)				
Lagged Majority			0.036			
			(0.022)			
Lagged Inst.				−0.012		
				(0.021)		
Lagged Inst. Plus					−0.018	
					(0.022)	
Lagged Full Inst.						−0.017
						(0.022)
Member-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Congress-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,922	3,576	3,576	3,576	3,576	3,576
R^2	0.467	0.502	0.465	0.446	0.428	0.428
Adjusted R^2	0.303	0.347	0.298	0.272	0.249	0.249

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors, clustered by member, in parentheses. Fixed effects are included at the member level and at the Congress level.

Our expectation holds for Volden and Wiseman's LES and for our Baseline measure—which is comprised of member-level intercepts estimated by a multilevel ordered logistic model of bill progression fit with no covariates. However, our other measures—Majority, Institutional, Institutional Plus, and Full Institutional, do not perform well.[10]

The results of our next content validity tests are displayed in Tables 7 and 8 below. Table 7 presents results of OLS models estimating effectiveness as a function of committee chair status, with member-level fixed effects. The inclusion of member-level fixed effects allows for an interpretation of the committee chair coefficients as the effect that becoming a chair has on a member's legislative effectiveness. Becoming a chair may amplify whatever skill-level or effectiveness a legislator may have in a way that should be picked up by productivity-

[10]We acknowledge this jumpiness as a shortcoming of our current measurement strategy, and in ongoing work we are developing different "smoothing" strategies to link members across terms.

oriented measures, but we argue that chair status should not fundamentally alter a member's latent effectiveness. The results in Table 7 demonstrate that becoming a committee chair is expected to increase a member's LES by over two standard deviations. Additionally, becoming a committee chair is expected to increase our Baseline effectiveness measure by nearly two standard deviations, and our Majority effectiveness measure by close to one and a half standard deviations. These results, we argue, cast some doubt on the content validity of these measures. However, the results from our Institutional, Institutional Plus, and Full Institutional models are encouraging, as they show no statistically significant effect of committee chair status on legislative effectiveness.

Table 7: Estimating Effectiveness as a Functionn of Committee Chair Status

	Dependent variable: Standardized Effectiveness Measures					
	LES	Baseline	Majority	Inst.	Inst. Plus	Full Inst.
Committee Chair	2.366***	1.745***	1.339***	−0.186	−0.133	−0.068
	(0.196)	(0.100)	(0.111)	(0.117)	(0.125)	(0.125)
Member-Level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,657	4,657	4,657	4,657	4,657	4,657
R^2	0.591	0.501	0.458	0.395	0.383	0.383
Adjusted R^2	0.468	0.350	0.294	0.211	0.196	0.197

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors, clustered by member, in parentheses. Fixed effects are included at the member level.

Table 8, below, presents the results of tests that are very substantively similar to those in Table 7. Instead of committee chair status, the models in Table 8 look at the effect of becoming a newly-minted majority party member on legislative effectiveness. Partisan control of the House switched three times during the time period of our data (from Democratic to Republican control in the 104$^{\text{th}}$ Congress, back to Democratic control in the 110$^{\text{th}}$ Congress, and then back to Republican control again in the 112$^{\text{th}}$ Congress). We would expect measures

of legislative effectiveness to remain relatively stable across these changes in partisan control. While becoming a member of the majority party clearly increases the number of opportunities that a legislator may have to successfully advance their proposals, we do not believe that this switch in partisan control fundamentally alters that legislator's latent ability.

Table 8

	Dependent variable: Standardized Effectiveness Measures					
	LES	Baseline	Maj.	Inst.	Inst. Plus	Full Inst.
Majority Party	0.759***	0.793***	−0.060	−0.089**	−0.116***	−0.111***
	(0.044)	(0.036)	(0.041)	(0.039)	(0.039)	(0.039)
Observations	4,657	4,657	4,657	4,657	4,657	4,657
R^2	0.539	0.532	0.425	0.409	0.398	0.399
Adjusted R^2	0.398	0.389	0.249	0.228	0.214	0.215
Residual Std. Error (df = 3565)	0.776	0.782	0.867	0.878	0.886	0.886

*p<0.1; **p<0.05; ***p<0.01

Note: The table presents OLS coefficients with standard errors, clustered by member, in parentheses. Fixed effects are included at the member and Congress levels.

Our Majority measure of effectiveness is the only measure that performs well by this test. The models using both LES and our Baseline measure as DVs show that gaining the majority is associated with an expected increase of over three-quarters of a standard deviation in effectiveness. Conversely, gaining majority status is negatively correlated with our Institutional, Institutional Plus, and Full Institutional measures, which is equally concerning. However, our Majority measure of effectiveness shows the stability that we are looking for in the face of changing partisan majorities.

Face Validity

Whereas the correlations in Table 1, above, provide for general comparisons between our legislative effective scores and those produced by Volden & Wiseman (2014), more granular

comparisons are necessary to explore how these measures differ. Below, we focus on three members whose Volden & Wiseman (2014) scores differ substantially from the scores that we have generated. Because legislative effectiveness is a trait that we cannot observe and can only measure indirectly, it is not possible to objectively determine which of the member-level scores we present below are "correct." However, these comparisons are still helpful to clarify the implications of our measurement choices. While it is not advisable to evaluate measures by looking only at a select handful of individual comparisons, the members we have selected illustrate systematic differences between our measures and those created by Volden and Wiseman.

Debbie Wasserman Schultz (D-FL) 113th Congress

The table below reports different legislative effectiveness scores for Debbie Wasserman Schultz, the Democratic congresswoman representing Florida's 23rd district. These particular scores were taken for the 113th Congress, during a Republican-controlled House.

	Score	Ranking
LES	1.396	103rd
Baseline	1.756	11th
Maj. Party	1.898	2nd
Institutional	1.53	3rd
Institutional Plus	1.459	3rd
Full Institutional	1.476	3rd

The discrepancy between Wasserman Schultz's rankings on our measures versus Volden and Wiseman's is largely driven by her status as a minority party legislator in the 113th Congress. After conditioning out the effects of majority party status and leadership positions

on standing committees, our measures reveal Representative Wasserman Schultz to be a particularly effective legislator—the second or third most effective in the House, depending on which of our measures you consider. It is worth mentioning that Volden and Wiseman's legislative effectiveness scores still place Wasserman Schultz within the top 25% of legislators in the House, which is an impressive showing for a member of the minority party. However, a discrepancy of around 100 spots between the rankings created by different measurement methods is worth investigating further.

In the 113th Congress, Representative Wasserman Schultz introduced six bills, all of which were categorized as "substantive" by Volden & Wiseman (2014). While only one of these bills, the STOP Identity Theft Act of 2014, was marked up and reported by a committee, two of the other bills were brought to the floor under suspension of the rules without having been considered in committee. These two bills—the EARLY Reauthorization Act of 2014 and the Longshore and Harbor Workers' Compensation Clarification Act of 2014—along with the STOP Identity Theft Act of 2014, went on to pass the House. Three out of the six bills originally introduced by this minority party member of the House eventually passed that chamber, and one of them—the EARLY Reauthorization Act of 2014—went on to become law.

As the table above shows, Debbie Wasserman Schultz is ranked as the second most effective legislator by our effectiveness scores generated with a majority party covariate, and the third most effective legislator by our scores that integrate the effect of committee leadership positions. Readers may be interested to know who holds these respective spots by the Volden & Wiseman (2014) scores. In the 113th Congress, these spots are held by Darrell Issa and Royce Edwards, respectively—both Republicans with standing committee chairmanships.

Darrell Issa (R-CA), at the time serving as chairman of the House Oversight and Government Reform Committee, introduced 36 bills in the 113th Congress. 23 of these

36 bills were referred to the committee that Issa chaired, and of the 21 Issa-sponsored bills that were given consideration in committee, all but three of them were marked up by his own committee. 10 bills that Issa sponsored made it to the House floor, and all 10 of these bills had been favorably reported by the House Oversight and Government Reform Committee over which he presided as chair. Three of these bills—the Government Reports Elimination Act of 2014, the Smart Savings Act, and a bill regulating the heights of penthouses in the District of Columbia—went on to become law.

Ranked as the second most effective representative in the 113th Congress by Volden & Wiseman (2014), Darrell Issa is ranked 20th by our Baseline score, 33rd by our Majority Party score, 250th by our Institutional score, 215th by our Institutional Plus score, and 216th by our Full Institutional score. All of our scores that take into consideration members' committee leadership positions characterize Representative Issa as a middle-to-back of the pack legislator when it comes to effectiveness. The brief overview of his legislative record from the 113th Congress, provided in the previous paragraph, demonstrates that Issa used his position as a committee chair to help move his sponsored bills forward. Fully half of the 36 bills that Representative Issa sponsored in the 113th Congress were marked up and reported by the House Oversight and Government Reform Committee, over which he presided as chair. Given the considerable agenda setting power that committee chairs have within their own committees, it is unclear how much of this early-stage bill advancement should be attributed to Representative Issa's skill as a legislator, and how much should be attributed to his institutional power as chair.

Don Young (R-AK) 108th Congress

Don Young (R-AK) is another member who is evaluated quite differently under our scores than under Volden and Wiseman's. The table below shows Representative Young's effectiveness scores and rankings by various measures. The large discrepancies between our

measures—specifically the Institutional, Institutional Plus, and Full Institutional scores—and Volden and Wiseman's is that our measurement strategy explicitly accounts for Young's status as chairman of the House Transportation and Infrastructure Committee during the 108th Congress.

	Score	Ranking
LES	16.3	1st
Baseline	2.181	12th
Maj. Party	1.476	13th
Institutional	0.368	94th
Institutional Plus	0.446	76th
Full Institutional	0.45	69th

Our discussion of the discrepancies apparent in the table above largely follows our previous discussion about Darrell Issa (R-CA) as chair of the House Oversight and Government Reform Committee. Like Issa, Representative Young was very active in introducing legislation. Young introduced 52 bills in the 108th Congress, and 36 of those 52 bills were referred to the House Transportation and Infrastructure Committee, which he chaired. Of the 20 Young-sponsored measures considered on the House floor, 18 were reported by that committee.

Representative Young was the sponsor of 10 bills that became law in the 108th Congress —certainly a strong record of legislative accomplishment. This, to some extent, is reflected in all of the scores presented in the table above. Even our lowest score for Representative Young, produced by our Institutional model which includes a covariate for majority party status and committee chairmanship, places him near the top 20% of legislators in the House. However, our scores and rankings are all a far cry from those produced by Volden & Wiseman (2014), which characterizes Representative Young as over 16 times more effective than the average House member in the 108th Congress.

All 10 of the Young-sponsored bills that went on to become law were closely related to the policy areas over which his Transportation and Infrastructure Committee has jurisdiction. Five of these bills were related to the reauthorization of federal surface transportation funding and projects, one reauthorized the Federal Aviation Administration, and one reauthorized the Coast Guard. These types of bills are collective work products of the Transportation and Infrastructure Committee and are essentially must-pass legislation. While Representative Young, as the chair of this committee, may have performed an important coordinating role in the development and reporting of these bills, our measures do not assume that he unilaterally enacted them through a sheer display of legislative effectiveness.

Ron Paul (R-TX) 108th Congress

This last case, of Ron Paul (R-TX) in the 108th Congress, may be the most straightforward of the ones we have included here. Volden & Wiseman (2014) have Representative Paul ranked 107th, with an above-average legislative effectiveness score that places him within the top 25% of legislators in the House. Our rankings and scores, on the other hand, all place Representative Paul very near the bottom of the House.

	Score	Ranking
LES	1.249	107th
Baseline	-1.588	428th
Maj. Party	-1.643	429th
Institutional	-1.362	428th
Institutional Plus	-1.177	428th
Full Institutional	-1.181	428th

In the 108th Congress, Ron Paul introduced 62 bills. One of these bills received

consideration in committee, and none of them made it to the House floor. It seems to be the case that Representative Paul is disproportionately rewarded by the Volden & Wiseman (2014) measure for being extremely active at the bill introduction stage.

Conclusions

The work of Volden & Wiseman (2014) on legislative effectiveness in the U.S. Congress has prompted an important reevaluation of the institution and the role of the legislators within it. Our early work should be seen as an exploratory search for legislative effectiveness as a true individual-level trait—which requires an attempt to distinguish between the institutional and individual determinants of legislative success.

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