Agenda Setting and Attention to Precedent in the US Federal Courts

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ABSTRACT

To what degree is judicial agenda setting top-down or bottom-up? Existing studies lack evidence of the frequency or magnitude of these two processes. We conceptualize the judicial agenda as the legal questions/rules receiving judicial attention, measure it using citations to Supreme Court opinions, and estimate vector autoregression models to identify how each level of court initiates or responds to variation in attention to precedent at other levels of the judiciary. The Supreme Court exerts some top-down control, but agenda setting is more often bottom-up, revealing lower courts are more integral to setting the federal judicial agenda than previously understood.

Judicial agenda-setting studies likely focus on the Supreme Court because it has discretion over which cases it hears, while lower courts generally must consider the cases presented to them by litigants (Hurwitz 2006). These studies provide considerable information regarding important factors bearing on whether the Supreme Court gives individual cases a place on its agenda (e.g., Tanenhaus et al. 1963; Caldeira and Wright 1988) and how the Court divides its attention among broad issue areas (e.g., Pacelle 1991; Baird 2004). Those that consider the broader context of the judicial hierarchy indicate a connection between the Court's individual case selection and lower court behavior (e.g., Cameron, Segal, and Songer 2000; Black and Owens 2012) and that attention to broad issue areas at

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the Supreme Court is related to attention to these issues in the appellate courts (Hurwitz 2006; Rice 2014).

While scholars have discussed bottom-up effects, there are not enough studies with broad enough data to discern to what degree judicial agenda setting is top-down versus bottom-up. Qualitative studies demonstrate how developments in the lower courts can affect the Supreme Court's agenda, such as through the efforts of mobilized litigants or issue percolation (e.g., Epstein and Kobylka 1992; Epp 1998). However, quantitative studies of bottom-up forces in judicial agenda setting are in short supply. Peters (2007) provides empirical evidence of the effect of legal mobilization efforts on the Supreme Court's agenda independent of the effects of the Court's own past salient decisions. Hurwitz (2006) provides the only quantitative study of the dynamic relationship between courts' agendas that allows for both bottom-up and top-down effects.

Hurwitz (2006) studies how the relative number of cases in three issue areas (civil liberties, criminal procedure, and economics) changes over time at the Supreme Court and the courts of appeals, allowing for cross-hierarchy dynamic effects rather than focusing solely on the impact of the Supreme Court. Hurwitz finds appellate courts influence the Supreme Court's economic agenda, while the Supreme Court affects the appellate courts' agendas in the area of civil liberties. Despite this important finding, the literature largely remains focused on the Supreme Court's ability to set the agenda. In the years since Peters (2007) and Hurwitz (2006), we have continued to expand our knowledge of agenda setting at and by the Supreme Court (Black and Owens 2009; Harvey and Friedman 2009; Owens 2010; Black and Boyd 2013; Rice 2014; Bryan 2019) without commensurate examination of bottom-up effects. The result is a lopsided literature that does not adequately address important forces in setting federal courts' agendas.[1]

We build on Hurwitz's study to provide a broad, systematic examination of the impact of courts at each level of the federal judicial hierarchy—the Supreme Court, the courts of appeals, and the district courts—on the agendas of every other level of court in the hierarchy. In other words, Hurwitz (2006) demonstrates that both top-down and bottom-up cross-hierarchy influence on courts' institutional agendas occurs; we quantify the relative frequency and magnitude of these effects.

To do so, we propose a new conception and measure of an important aspect of the federal judicial agenda: federal courts' attention to precedent. Conceptually, we view the judicial agenda as the set of legal questions (and their associated legal rules) courts address in the cases they decide. A court's agenda is thus made up of individual policy questions, such as whether a state government's search of a person's car with a drug-sniffing dog violates the search and seizure clause of the Fourth Amendment. To empirically capture

1. For example, Caldeira and Wright (1988, 1990), Perry (1991), Cameron et al. (2000), Baird (2004), Harvey and Friedman (2009), Owens (2010), Clark and Kastellec (2013), Rice (2014), and Bryan (2019), among others, focus on the Supreme Court, while only a handful of studies such as Epstein and Kobylka (1992), Epp (1998), Hurwitz (2006), and Peters (2007) discuss bottom-up forces.

which legal questions/rules are most prominent on the federal judiciary's agenda at a given point in time, we look at federal courts' attention to Supreme Court precedent. Specifically, we count the annual number of citations by the Supreme Court, courts of appeals, and district courts to Supreme Court precedents. In so doing, we capture an important aspect of the agenda: how relevant the legal questions and rules articulated in a given precedent remain in subsequent years.

More specifically, to study how courts at each level of the federal judicial hierarchy affect the agenda of courts at other levels of the hierarchy, we use decades of Supreme Court, appeals court, and district court citations to Supreme Court precedents to estimate a series of vector autoregression models. These statistical models allow us to identify how each level of court initiates or responds to variation in the attention given to a precedent in other levels of court. The results reveal that while the Supreme Court exerts some top-down control of the federal judicial agenda, there is clear evidence of lower courts playing an even more important role in influencing attention to precedent.

This discovery has important implications for studying the judicial policy-making process. Judicial policy making, including agenda setting, is often portrayed as primarily the purview of the Supreme Court (but see Klein 2002). However, we show that lower courts influence the prominence of precedents on judicial agendas more often than the Supreme Court. Given the importance of agenda setting in policy making (see, e.g., Riker 1993), this suggests a significant and previously understudied policy impact of lower courts: that agenda setting, at least with respect to attention to precedent, is more often driven by lower federal courts than a top-down process owned by the Supreme Court.

Our contribution to the study of agenda setting in the federal courts is thus twofold. First, we provide a novel concept and measure of the judicial agenda that captures how prominent specific legal questions and rules (as revealed by courts' attention to precedents) are on the judicial agenda and accounts for the lower courts in a more comprehensive way. Second, using this new approach, we provide evidence that the lower courts play an important role in setting the judicial agenda, suggesting the literature's current focus on the Supreme Court as the dominant actor in judicial agenda setting (either directly, or indirectly, through litigant mobilization) may be misplaced.

I. SETTING THE FEDERAL JUDICIAL AGENDA

For any policy-making institution, agenda setting may be the most important stage of the policy-making process (Schattschneider 1960; Riker 1993). This is just as true for the judiciary as it is for any policy-making institution (Caldeira and Wright 1990). So, who sets the federal judicial agenda? The answer to this question depends on how one conceptualizes agenda setting in the courts.

A. Conceptualizing and Measuring the Judicial Agenda

A substantial portion of the judicial agenda-setting literature has focused on the US Supreme Court's decisions to grant or deny certiorari ("cert")—its ability to select which

specific cases to hear (Tanenhaus et al. 1963; Caldeira and Wright 1988, 1990; Perry 1991; Black and Owens 2009; Owens 2010; Black and Boyd 2013; Bryan 2019). Some of these studies recognize the role events in the lower courts play in cert decisions, such as whether a circuit split exists or there is dissensus in the circuit panel below or between the trial and appellate courts (Perry 1991; Black and Owens 2009; Black and Boyd 2013). Scholars have also recognized the role of interest groups (Caldeira and Wright 1988) and public opinion (Bryan 2019) in these decisions. However, a study focused on cert decisions inherently posits the Supreme Court as the primary force in agenda setting and can only grant insight into the determinants of the Supreme Court's agenda, telling us nothing about how lower courts help structure the agenda.

Another set of studies considers not whether the Supreme Court will hear an individual case but how the Court builds its *institutional agenda*—the set of issues the Court will address (Pacelle 1991). In these studies, the Court's agenda is not operationalized as ones and zeros for whether each individual case is heard, but as counts (Baird 2004; Peters 2007) or proportions (Pacelle 1991; Flemming, Bohte, and Wood 1997; Flemming, Wood, and Bohte 1999; Hurwitz 2006) of cases in issue areas. In addition to giving a better sense of how the Court chooses which issues to adjudicate, this approach has the nice property of being able to measure the lower courts' agenda (Baird 2004; Hurwitz 2006; Rice 2014).

We employ a different approach to study courts' institutional agendas. Instead of examining attention to broad issue areas, we focus on attention to specific legal precedents. We thus disaggregate the previous conception/measure of the institutional agenda and look at the individual policy problems that underlie it. This conception is consistent with past work in judicial politics on the citation to precedent, as well as the literature on agenda setting in American politics. The former argues the frequency of citation to a precedent captures a case's continued importance for the law (see, e.g., Landes and Posner 1976; Spriggs and Hansford 2002; Hansford and Spriggs 2006; Fowler et al. 2007; Black and Spriggs 2013). If an opinion is never or rarely cited, that suggests it is not useful for the resolution of subsequent legal disputes. Conversely, if an opinion is frequently cited, that indicates it provides valuable information for deciding current litigation.[2] That is, frequency of citation proxies for the degree to which particular legal questions and rules remain on the judicial agenda, given that individual precedents generally serve as indicators of the legal questions asked in them and the legal answers provided by the courts. Our approach is also consistent with the broader American politics literature on agenda setting, such as Kingdon (1984), who conceives of the agenda as policy solutions meeting policy problems (e.g., traffic congestion in the 1960s being met by the solution

2. Prior research offers empirical support for this idea, showing, for instance, that the Supreme Court is more likely to legally interpret a precedent if it has greater legal and factual similarity to a case it is deciding (Spriggs and Hansford 2002; Hansford and Spriggs 2006). In addition, lower federal courts are more likely to cite a Supreme Court precedent that possesses greater legal relevance (Spriggs and Hansford 2002; Fowler et al. 2007; Black and Spriggs 2013).

of mass transit systems in the 1970s and 1980s). In our study, legal questions in court cases represent the policy problems and the legal holdings/rationales in cases are the solutions/policies crafted to answer them.

We use *Shepard's Citations* to collect data on citations to Supreme Court opinions. *Shepard's* provides a record of every citation from one American court to another, and it classifies some of them as being substantive treatments of precedent (e.g., the following or criticizing of precedent; see Hansford and Spriggs [2006]). Here, we are not concerned with how a court treats a precedent (favorably vs. unfavorably, or favorably vs. very favorably), but we focus on the degree to which courts pay attention to a precedent. We therefore include in our count of citations to a case any citation to that case in *Shepard's Citations*, regardless of whether it was a substantive treatment or a string citation. This measurement approach is consistent with past research using citations to capture the importance of precedent (see Fowler et al. 2007; Clark and Lauderdale 2010; Black and Spriggs 2013), which views all citations as being informative, regardless of whether the citing opinion references the cited precedent using a "string citation"—meaning there is no discussion of the cited case in the citing case—or it substantively interprets the precedent. As Cross et al. (2010, 41) state: "A citation to a case, even if that citation is a string citation, provides information about the continued relevance for that case for legal disputes coming before the Court. In short, we argue that citations provide meaningful information about the law."[3]

Focusing on attention to precedent, as revealed by citations, offers three advantages.[4] First, precedents are finer grained than broad issue areas and depict important variation in the types of legal questions being addressed within issue areas. For example, consider the set of all cases discussing civil liberties with the set of cases citing the precedent set in *Miranda v. Arizona*. While the annual count of citations in the area of civil liberties tells us something important, the number of citations to a particular precedent, such as *Miranda*, offers a more nuanced view and indicates which specific legal questions the Court addresses at a given point in time. Second, it allows us to study judicial agendas without a researcher-imposed typology, as precedents and their subsequent citations are judge created and are fundamental components of judicial decision-making. Third, our use of citations to measure the judicial agenda follows from the norm of stare decisis, which instructs judges to cite the most legally relevant and authoritative cases when deciding a legal dispute (Schauer 1987; Aldisert 1990). Citations, that is, are not random, and when courts cite precedents they indicate which legal questions/rules remain most relevant for contemporary legal disputes. As Fowler et al. (2007, 5) write: "Generally, each citation in an opinion represents a latent judgment by the Court about which cases are most relevant

3. See n. 9 for additional information on this point.

4. Of course, what we gain in specificity, analyzing issues in judicially created terms, and improved lower court data collection must be balanced against losing the ability to speak in terms of broad issue areas.

for addressing a legal question." Finally, while it is difficult and time-consuming to code reliably the issues dealt with in the tens of thousands of decisions handed down in the three levels of the federal judiciary over any meaningful time span, which has caused researchers to exclude district courts from their analyses (e.g., Hurwitz 2006; but see Rice 2014), *Shepard's Citations* provides highly reliable citation data that can assess attention to specific precedents throughout the federal court system.[5]

So, who determines the amount of attention paid to a particular legal precedent? To begin to answer this question, it is useful to consider that there are multiple information flows within a judicial hierarchy. The traditional view of judicial hierarchies implies that (1) information about disputes and their initial resolutions flows upward from low court to high court (Clark and Kastellec 2013), and (2) information about how the legal questions arising in these disputes should be answered flows from high court to low.[6] In other words, disputes move up the hierarchy while precedents flow downward. These two information flows suggest two distinct possibilities for agenda setting in the judicial hierarchy: a top-down, Supreme Court–driven model and a bottom-up model in which the Court responds to the attention paid to precedents in the lower courts. Alternatively, the agendas could be a function of both processes, bottom-up and top-down. Put differently, do lower courts make a precedent salient to the Supreme Court, does the Court determine the salience of a precedent for the lower courts, or are both dynamics in play?

B. The Top-Down Model

Research often uses a principal-agent perspective when considering hierarchical relationships, in which the Supreme Court is the policy-making principal and the lower courts are its agents of implementation. Lower courts decide cases based on either Supreme Court precedent or contemporary Supreme Court preferences, though there is always the potential for agency loss if lower court judges decide cases in ways that diverge from the precedent or preferences of the high court.[7] Numerous studies provide evidence that lower federal courts are responsive to changes in Supreme Court preferences (e.g., Haire, Songer, and Lindquist 2003; Randazzo 2008; Westerland et al. 2010; Black and Owens 2012) or precedent (Baum 1980; Songer, Segal, and Cameron 1994; Benesh and Reddick 2002; Hansford and Spriggs 2006).

The principal-agent model implies the Supreme Court should exert a good deal of control over the federal judicial agenda. To the extent lower court judges can reasonably be viewed as agents of the Court, we expect these judges to be responsive to agenda signals sent by the Court regarding the importance of legal questions, precedents, or issues.

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5. Spriggs and Hansford (2000) provide evidence of the reliability and validity of *Shepard's Citations* data.

6. Hansford, Spriggs, and Stenger (2013) suggest a third information flow: information regarding the current ideological location of precedents can flow upward from lower court to high court.

7. Goldman (1975) and Klein (2002), for example, find appellate judges are influenced by policy preferences, which can lead to agency loss.

Though lower courts have much less control over their agendas in terms of the cases to be decided, judges can emphasize or de-emphasize aspects of a dispute and choose the precedents used to decide a legal question. Alternatively, Supreme Court signals about its agenda preferences could indirectly control the agendas of the lower courts through the mobilization of litigants. Baird (2004) argues that when the Supreme Court issues a salient decision in a particular issue area, it signals its interest in this issue area to potential litigants. These salient decisions thus lead to subsequent, related litigation in federal courts, some fraction of which ultimately ends up before the Court.

Based on the principal-agent model, evidence that lower court decision-making is responsive to the Court's directives, and Baird's work on the mobilizing effect of salient Court decisions, the top-down hypothesis of attention to precedent contends the Supreme Court controls the degree to which precedents receive attention throughout the judicial system. Increases (decreases) in the attention paid to a precedent at the Court will lead to increases (decreases) in the attention paid to this precedent in the district and appeals courts. Benesh and Reddick (2002) and Hansford and Spriggs (2006) provide some evidence for this perspective, as they find that how the Supreme Court treats a precedent affects the extent to which lower courts use that precedent. These studies, however, do not allow for the possibility that lower court attention to a precedent might, in turn, influence the Court.

C. The Bottom-Up Model

Though there is a good deal of evidence the Supreme Court exerts some control over lower court decision-making, it is less clear the Court will necessarily control the federal judicial agenda. After all, legal cases and controversies move up the judicial hierarchy, which logically implies that changes to the federal judicial agenda may be initiated in the lower courts. Legal mobilization efforts, for instance, must begin in the lower courts.

Studies assessing bottom-up effects essentially come in two flavors. One avenue of research provides evidence of the informational importance of the lower courts to the Supreme Court. Lower court usage of precedent can provide information to the justices about the contemporary policy implications of a precedent (Hansford, Spriggs, and Stenger 2013). The legal opinions crafted by lower court judges can shape the language ultimately used in Supreme Court opinions (Corley, Collins, and Calvin 2011). Clark and Kastellec (2013) find evidence of the usefulness of the "percolation" of issues in lower courts to the Supreme Court's agenda-setting decisions.

Another vein of research directly addresses bottom-up effects in judicial agenda setting. Pacelle (1991) explains the Supreme Court's agenda can be bifurcated into those issues it wants to address (the "volitional agenda") and those it must address to resolve lower court disputes (the "exigent agenda"). Epp (1998) and Epstein and Kobylka (1992) argue interest groups and advocates are responsible for pushing issues up through the judicial hierarchy to the Court; as Epp (1998, 2) states, "Sustained judicial attention and approval

for individual rights grew primarily out of pressure from below, not leadership from above." However, quantitative studies of bottom-up effects in judicial agenda setting are in shorter supply than studies on the Supreme Court's ability to set the agenda.

Notable exceptions are Peters (2007) and Hurwitz (2006). While Baird (2004) explored a top-down view of legal mobilization effects, finding salient Supreme Court decisions in an issue area spurred increased attention to that issue area in both the Supreme Court and the courts of appeals, Peters (2007) shows an independent effect of legal mobilization efforts even after accounting for the effects of salient Supreme Court decisions. Hurwitz (2006) uniquely allows for a direct, dynamic effect of changes in the appellate courts' agendas on the makeup of the Supreme Court's agenda. He finds increased attention to economic issues on the courts of appeals leads to more attention to economic cases on the Supreme Court. Note that due to the nature of the data, Hurwitz did not assess the influence, if any, US district courts have on other courts' agendas. Our measurement approach allows us to include district courts in our analysis, as well as to assess attention to precedents decided across all issue areas addressed by the Court.

There is thus both evidence and theory for an important "bottom-up" component to the federal judicial hierarchy. The accompanying hypothesis regarding attention to precedent is that the Supreme Court will be responsive to the relative attention paid to a precedent in the lower courts. An increase (decrease) in lower court attention to a given precedent will subsequently lead to an increase (decrease) in attention to this precedent at the Court. Note that increases in attention paid to a precedent in the lower courts need not necessarily result only from conscious choices by lower court judges. The extent to which a precedent is on the agenda of the lower courts will be a function of choices made by litigants (the decision to rely on the precedent in argumentation) and judges (i.e., the decision to cite the precedent in opinions).[8]

8. With respect to whether citations are litigant or judge driven, we suspect that, generally speaking, given the adversarial nature of the legal system, in most cases the litigants will cite most of the relevant precedents judges will cite. While there is little data on the frequency with which judges cite cases that litigants do not, we know (1) in the 182 cases decided by the Supreme Court in the 1991 and 1995 terms, the litigants cited a total of 10,842 precedents, and in only 26 instances did the Supreme Court legally interpret a case not cited by the litigants; in those 26 instances, the cases the Court interpreted were closely aligned with the ones cited by the litigants (see Spriggs and Hansford 2002); and (2) the Supreme Court does not overrule precedent unless litigants ask it to do so (see Segal and Howard 2002). Likewise, since our purpose in this paper is descriptive, and not explanatory, we see it as less essential to determine if a litigant was the source of a cite. The reason is because even if a litigant does drive the citation, once a judge cites the case in an opinion, the court is indicating which legal questions and legal rules remain relevant for contemporary disputes. That is, our purpose is to determine which legal policies are on the agenda, not the reason they are on the agenda. Finally, the empirical work dealing with the citation of precedent (see Spriggs and Hansford 2002; Fowler et al. 2007; Clark and Lauderdale 2010; Black and Spriggs 2013) views all cites, regardless of their origin, as an indication of which questions and legal rules remain important and thus germane for deciding contemporary cases.

D. A Mixed Model of Agenda Dynamics

A third possibility is that the agenda of the federal judicial hierarchy has both top-down and bottom-up components. This is essentially the point made by Pacelle (1991) when he argues the Supreme Court's agenda can be divided into "volitional" and "exigent" parts. The former contains legal issues the Court wants to address, while the latter contains issues the Court must deal with, perhaps owing to the Court's involvement in this issue area in the past and subsequent lower court litigation.

Hurwitz (2006) is, to our knowledge, the only quantitative study to allow for a mixed model of agenda dynamics. Hurwitz examines the attention to broad issue areas at the Supreme Court and the appeals courts and finds that attention to economics moves upwards from the appeals courts while attention to civil liberties moves downwards from the Court. However, Hurwitz does not incorporate the US district courts in his analysis and his focus was limited to two issue areas. Our conceptual approach, coupled with decades of citations to Supreme Court opinions, allows us to engage in a much broader study of the overall cross-hierarchy dynamics in courts' institutional agendas.

II. DATA AND METHODS

In order to test whether attention to precedent flows downward from the Supreme Court, upward from the lower courts, or in both directions, we analyze the annual number of citations to Supreme Court precedents in the district courts, appeals courts, and Supreme Court.[9] We consider Supreme Court precedents decided during the 1946 through 1986

9. See Fowler et al. (2007, n. 12) for a detailed justification for using all citations to measure legal relevance/importance, rather than rely only on "substantive treatments" of precedent. Their argument that all cites are informative (though there is variation in how informative) applies equally to our use of citations to study agenda setting. Hansford et al. (2013) and Clark and Lauderdale (2010) also view all citations as being informative rather than seeing only the narrower category of substantive treatments as informative. Finally, work by Hansford and Spriggs (2006), Fowler et al. (2007), and Black and Spriggs (2013), among others, empirically shows the continuing relevance of a case for the law depends on whether a case is cited, regardless of the substantive nature of that citation. To empirically address this issue, we looked through all the citation dyads where both the citing and cited case was a Supreme Court case. We then used the US Supreme Court Database to determine the issue area for each of those citing and cited cases (which is why we only consider the subset for which the Supreme Court was the citing court). For each citing case, we calculated the proportion of the cases that it cited that were in its same issue area; and for each cited case, we calculated the proportion of the cases citing it that were in its same issue area. The median proportion of the citing cases' proportions was 0.7 and the median proportion of the cited cases' proportions was 0.67, with overall 0.63 of the dyads being in the same issue area. So, while some citations are to cases outside the main substantive focus of a case, largely this is not so, and we have no reason to believe that citations to cases outside the main substantive focus of a case would drive the phenomenon we observe. Additionally, we took 30 randomly selected cases from our data and generated time series as in our paper, but we counted only substantive treatments of the precedents (e.g., followed, distinguished), rather than all citations, to compare our results with the models for the same cases where all citations were counted. The results were largely congruous, with lag coefficients being reliably of the same sign, or not reliably of either sign, 0.83 of the time when compared to the citation results originally obtained. Therefore, we seem to get the same story, even if we examine treatments rather than citations.

terms (the Vinson, Warren, and Burger Courts). We do not analyze precedents from more recent terms to ensure we have a sufficient number of observations in each time series.

We construct three time series for each of these 5,240 precedents: annual Supreme Court citations to the precedent (Supreme Court Cites), annual appeals court citations to the precedent (Appeals Court Cites), and annual district court citations (District Court Cites).[10] Of these, we are able to analyze 4,661; for the remaining 579 precedents, for at least one of the time series the precedent was not cited at all.[11] For each precedent, the time series begins the year the Supreme Court established the precedent and ends in 2015. On average, a precedent in our sample was annually cited once by the Supreme Court, eight times in appeals courts, and 17 times in district courts.[12]

We are interested in the dynamic relationship between these time series, such as how changes in the citation patterns of district courts affect the citation patterns of the Supreme Court. Such autoregressive dynamics, or impacts of lagged values of the time series on their present values, are often studied using vector autoregression (VAR) models.[13] A VAR model takes the following form:

$$\begin{aligned} Y_t &= AY_{t-1} + X_t\beta + \varepsilon_t, \\ E(\varepsilon_t) &= 0, \end{aligned}$$

where Y_t is the vector of dependent variables at time t, X_t and β are the exogenous variables and their coefficients, A is a matrix of lag coefficients, and ε_t is the vector of errors.[14] However, while this model is appropriate for data that can take any real value, the assumed linear relationship is inappropriate for time series of counts; for example, in our context, there cannot be a negative number of citations to a Supreme Court precedent, though a typical VAR would allow for that. Indeed, analyzing time series of

10. We follow the approach in Fowler et al. (2007) and Black and Spriggs (2013), who gathered citation data from *Shepard's Citations*, and update their data to include more recent citations through the end of 2015.

11. That some precedents never get cited by any American court indicates that the creation of a legal rule by the Court does not guarantee that it will be used by other courts. Put another way, there is heterogeneity in the attention paid to precedent, with some getting zero attention, that is not a function of how much attention is paid to it at another level of the judiciary.

12. These figures are rounded to the nearest integer. More precise means are 0.82, 7.54, and 17.30, respectively. One might be concerned that because the number of cited cases in precedents increases over time, this could affect our results. To empirically examine this, we restricted our attention to only the most recently decided cases in our data. For those cases, citations from the more recent "high citation" period will dominate the time series. Looking at models only for cases decided after 1980, we see a similar pattern to the phenomenon we find in the larger data in the paper. In table A1, we reformulate table 1 in terms of the proportions, and show side-by-side the corresponding data using only cases decided after 1980. One can see that for both the full data and the subset, lower courts' lag coefficients on current Supreme Court cites reliably differ from zero much more often than the other way around.

13. See Freeman, Williams, and Lin (1989) for an introduction to VAR models in political science.

14. Some sources reserve the term VAR for models that do not include exogenous predictors, using the label VARX for models with exogenous predictors. We use the same term for both models.

counts in that way will produce biased and inefficient estimates (King 1988; Brandt et al. 2000; Brandt and Williams 2001; Brandt and Sandler 2012). We therefore utilize the Bayesian Poisson VAR (BaP-VAR) model from Brandt and Sandler (2012).

This model assumes the series of grouped counts have marginal Poisson distributions:

$$y_{tj} \vee b_t, \beta, A \sim \text{Poisson}\left(\mu_{tj}\right),$$
$$\mu_t = Ay_{t-1} + \exp(X_t\beta + b_t),$$

where y_{tj} is the number of citations in equation j at time t, X_t and β are the exogenous variables and their coefficients, A is a matrix of lag coefficients, and b_{tj} are equation and observation specific latent effects, so that their covariance matrix D captures the contemporaneous correlation between the count series (Brandt and Sandler 2012). This allows one to capture both contemporaneous correlations via the estimates of D and autoregressive dynamics via the estimates of A, while controlling for the effects of the exogenous variables. Modeling the time series of counts in this way eliminates the bias that using a linear-regression based model would introduce (Brandt and Sandler 2012).

We use the same priors to complete the model as in Brandt and Sandler (2012), and use the Markov Chain Monte Carlo algorithm given in their appendix to simulate the posterior distribution for the model parameters. Specifically, our priors are:

$$\text{Exogenous coefficients: } \beta \sim N\left(0, I_4 \odot \left(1_4^T \otimes \left(\frac{10}{3}, \frac{5}{3}, \frac{5}{3}, \frac{5}{3}\right)\right)\right),$$

$$\text{Scale matrix for } D\text{: } R \sim \textit{Wishart}(I, 3),$$

$$\text{Diagonal element of lag coefficient matrix for lag } L\text{: } A_{i,i}^L \sim N\left(0, \frac{1}{L}\right)$$

$$\text{Off-diagonal element of lag coefficient matrix for lag } L\text{: } A_{i,j\neq i}^L \sim N\left(0, \frac{1}{2^L}\right)$$

As in Brandt and Sandler (2012), we use a combination of the JAGS program (Plummer 2017), the R statistical computing environment (R Core Team 2018), and the R extension package rjags (Plummer 2016) to run the BaP-VAR models.[15] For each precedent, we run BaP-VAR models with 1, 2, and 3 lags, each with two chains run in an

15. Since the models take a long time to estimate, we tried several ways to improve execution time relative to the Bayesian Poisson VAR JAGS code available from Brandt and Sandler's replication code. We first tried a bespoke random walk Metropolis MCMC sampler written in C++. We also tried Hamiltonian Monte Carlo (HMC) using Stan. However, neither method resulted in convergence as quickly as the BaP-VAR code from Brandt and Sandler's replication archive. So, while JAGS is notoriously slow, its slice sampling routine seems to be the most robust to simulate the posterior of this model given sufficient adaptation iterations. We suspect this is because HMC is a gradient-based method, which may be the same reason random walk Metropolis does not work well either. See Betancourt (2017, esp. sec. 6) for a discussion of potential pathologies that may result in poor HMC performance as well as why random walk Metropolis is affected by ill-conditioned gradients.

adaptive phase of 1,000,000 iterations followed by drawing 250,000 posterior samples. For the vast majority of precedents, comparing Deviance Information Criteria suggests the optimal number of lags is one (see Brandt and Sandler 2012, 298–99).[16] We find evidence of autoregressive dynamics when lag coefficients affect a time series positively or negatively; that is, when the 95% credible interval for the lag coefficient does not bound zero. We further consider such evidence, combined with a lack of evidence that other lag coefficients differ from zero, to indicate Granger causality (see Brandt and Sandler 2012, 301); or, in other words, that the time series' current values are better predicted including the term for lagged values of the other time series than from its own past values alone.[17]

It is important to note we are not interested in determining whether any lower court responsiveness to the Supreme Court's attention to a precedent is fundamentally a function of litigant behavior (e.g., Baird 2004) or the lower court judges themselves.[18] The same is true for any effect that lower court attention to precedent might have on the Court. Here, we simply examine whether this form of agenda setting is driven by the Supreme Court or by the lower courts, whose citations to precedent could be a function of the

16. One might be surprised that the influence of citations across courts generally occurs within one year. Our interpretation of this result is that if, as we argue, citations signal the *contemporary* significance of a given precedent/legal rule, then a one-year lag seems reasonable. As subsequent research builds on the descriptive purpose of this paper (i.e., to quantify the frequency and magnitude of bottom-up and top-down effects) and delves into the *reasons* why there is variation across cases or within cases over time, then this empirical regularity will be better understood.

17. While in a traditional VAR setting one might conduct Granger causality tests, the closest analogies in this context (e.g., Bayes factors) would require running each model several times with different predictors included; as estimating the 4,661 full models alone took several months on a computing cluster with 16 core nodes at 2.4 GHz, this is infeasible. We therefore follow the approach of Brandt and Sandler (2012, 301): we equate evidence that a lag coefficient differs from zero, combined with a lack of evidence that other lag coefficients differ from zero, with an implication of Granger causation. We take a conservative approach and require a lack of evidence that all other endogenous variables' lag coefficients differ from zero. A less stringent approach would require evidence that a lag coefficient differs from zero while the outcome variable's own lag coefficient does not differ from zero (without considering the third endogenous variable's lag coefficient). This less stringent approach yields substantively similar results. Granger causality is widely used in the social sciences and sciences as a way to establish causal relationships when examining time series. Of course, Granger causality does not necessarily denote there is a "true" relationship between time series (see Eichler 2013), most notably due to the possibility of omitted variable bias and thus spurious correlation (see 9–11). We are thus cautious in equating Granger causality with actual causality. Nonetheless, we agree with Eichler, who writes: "While it is true that association—even though between lagged variables—does not necessarily constitute a causal link, the concept of Granger causality still remains a useful tool for causal learning" (1). Thus, when discussing the relationship between two time series, we are careful to refer to the influence of one on the other as a "Granger cause" rather than a "cause."

18. Additionally, in a context where every relevant actor perfectly complies with a Supreme Court precedent such that courts never need cite it, our measure would not pick up any attention to that precedent even though it is very influential. However, as discussed by Cross and Spriggs (2010, 422–23), such "superprecedents" are rare—even attempted perfect compliance is likely to raise unanticipated disputes regarding the precedent's application—and when there *are* recognized superprecedents such as *Marbury v. Madison*, they are highly cited.

choices made by both litigants and judges. Future work, of course, should address the issue of litigant effects.

In addition to the three endogenous variables of interest, we include three exogenous predictors. First, we include Precedent–Court Distance, which we measure as the absolute value of the difference between the Martin-Quinn score for the median justice in the majority opinion coalition for the precedent and the score for the median justice on the Supreme Court in the year under analysis (Martin and Quinn 2002).[19] This variable is intended to control for any effect the Court's orientation towards a precedent might have on attention to the precedent throughout the system. Second, given the evidence that citations to a precedent typically decrease over time (Black and Spriggs 2013), we include the age of the precedent in years (Precedent Age). Third, some precedents in our sample experienced some sort of formal reversal by either the Supreme Court or Congress. For these precedents, Altered Precedent equals one on the year of the reversal and then for every subsequent year.[20]

III. RESULTS

While we find evidence of influence on attention to precedent from all levels of the judicial hierarchy, our results indicate lower courts play a more important role than the Supreme Court. Lower courts drive precedent citation agendas far more often and more consistently than the Supreme Court, though we see that in some cases the Supreme Court can have a large effect on the attention paid to a particular precedent. In other words, we can think about courts' impact on attention to precedent in two ways: either how often they influence other courts' choices or the size of that effect when it occurs. We find that bottom-up effects are more prevalent, and that the effect size is moderate and less variable than top-down effects. By contrast, top-down effects occur far less often than bottom-up effects, and the effect sizes are much more variable than bottom-up effects. We first detail how often each level of the judicial hierarchy influences other levels and then discuss relative effect sizes.[21]

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19. Clark and Lauderdale (2010) and Carrubba et al. (2012) indicate that the median justice in the precedent-setting majority has the most influence over the content of the precedent. This measure is also the one employed in most prior research on the citation and interpretation of precedent (e.g., Hansford and Spriggs 2006; Black and Spriggs 2013; Hansford et al. 2013).

20. We employ a conservative approach and include any *Shepard's*-based indication of an override. Note that we cannot include Altered Precedent in models where it equals one for all of the years under analysis.

21. While the control variables do not have real substantive meaning for the present study, for the interested reader, we also briefly detail the results for the controls here. Age was reliably negative in the Supreme Court equation for roughly 78% of precedents and generally not reliably negative or positive for the remainder; a similar but less pronounced pattern is observed in the appeals courts equations, with Age being reliably negative for 55% of precedents. These findings are in line with prior results in the literature (Hansford and Spriggs 2006; Black and Spriggs 2013). In the district courts equations, Age did not exhibit a pattern of being reliably positive or negative, which contrasts with the findings in the higher court equations but does not contrast with prior results on depreciation of citations with age,

A. Frequency of Top-Down and Bottom-Up Effects

To examine which levels of the hierarchy more frequently influence attention to precedent, we first determine the relative numbers of precedents for which lags of each level of court's citations have a reliably positive or negative impact on other citation time series. We then examine how often the courts' lagged citations "Granger cause" other courts' citations, or how often the lagged citations from one court better explain the current citation count of another court than its own lagged values alone.[22] Finally, we consider more complex dynamic patterns of citations by determining the number of citations for which only lower (or higher) courts' lag coefficients reliably differ from zero.

Let us consider the number of precedents for which a lag coefficient was reliably different from zero, reported in table 1. A few important patterns are readily observable. First, the Supreme Court's attention to precedents is more often affected by the lower courts' citation patterns than the lower courts' attention to precedents are affected by the Supreme Court's citation patterns. Consider that if we arrange the cells of table 1 in order from greatest to least, effects of lagged values of Supreme Court cites take the last three places, while the top two are the lower courts' relationship with Supreme Court attention to precedent. The lag coefficient for Supreme Court Citations only reliably differs from zero for 458 precedents in the equation for District Court Citations, 422 in the equation for Appellate Court Citations, and 652 in the equation for Supreme Court Citations. In contrast, the lag coefficient for Appellate Court Citations is reliably different from zero for 1,017 precedents in the equation for District Court Citations, 1,317 in the equation for Appellate Court Citations, and 1,919 in the equation for Supreme Court Citations. In other words, there are about three times as many Supreme Court precedents for which lagged appellate court citations affect current Supreme Court citations than those for which lagged Supreme Court citations affect current Supreme Court citations.[23]

The district courts have an even larger role in the Supreme Court's citations to precedent, with the lag coefficient for District Court Citations reliably differing from zero for 2,185 precedents in the equation for Supreme Court Citations, 1,111 in the equation for Appellate Court Citations, and 1,696 in the equation for District Court Citations. The Supreme Court affects the citation patterns of itself more than it affects either of the other

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as district court citations were not studied. The Distance and Overruled controls were generally neither reliably positive nor negative for any level of court. The result for the Overruled variable differs from the findings of Hansford and Spriggs (2006), as those were pooled models, whereas our models account for within precedent change. The Distance results are neither in conflict nor accordance with prior literature, which either finds that ideological distance is more likely to result in "negative" citations (criticizing or distinguishing, etc.; e.g., Westerland et al. 2010), or that the effect of ideological distance is conditional on other factors such as precedent vitality (e.g., Hansford and Spriggs 2006).

22. See sec. II and n. 17 for details.

23. Most dynamic effects we see are courts' ability to encourage other courts' citation of a precedent, but in a small number of cases we also see that courts can discourage citation. Of the 10,777 total lag coefficients whose 95% credible intervals do not bound zero, 1.7% of them are reliably negative, while the remaining 98.3% are reliably positive.

Table 1. Number of Supreme Court Precedents with Each Autoregressive Dynamic

	SC Cites$_t$	AC Cites$_t$	DC Cites$_t$
SC Cites$_{t-1}$	652	422	458
AC Cites$_{t-1}$	1,919	1,317	1,017
DC Cites$_{t-1}$	2,185	1,111	1,696

Note.—Each row gives the number of the 4,661 precedents analyzed for which the lag coefficient's 95% credible intervals do not bound zero, for each equation. Supreme Court is abbreviated as SC, appellate courts as AC, and district courts as DC.

two levels of the judicial hierarchy, while both the appellate and the district courts affect the citation patterns of the Supreme Court more often than themselves or each other. Rather than a top-down process, with the Supreme Court dominating the federal judicial agenda, we see that, in general, lower courts are more likely to impact the Supreme Court's attention to precedent.

We can dig further into this question by considering the number of precedents for which only one level of the hierarchy influences the attention of another level, reported in figure 1. We see, again, that the autoregressive dynamics flowing "up" the judicial hierarchy are more prevalent than those flowing "down." While there are only 158 Supreme Court precedents for which Supreme Court Citations Granger cause District Court Citations, there are over three times as many (570) precedents for which District Court Citations Granger cause Supreme Court Citations. We see a similar but less pronounced pattern for Appellate Court Citations; there are 312 precedents for which Appellate Court

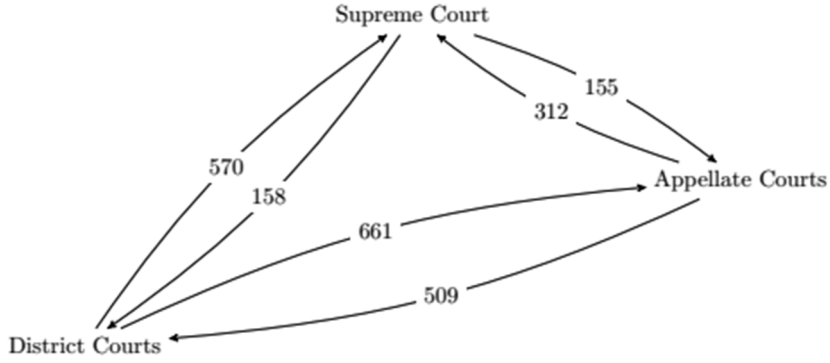

Figure 1. Number of Precedents that Granger cause each time series. Each labeled arrow gives the number of the 4,661 precedents analyzed for which only evidence of one autoregressive dynamic is found in an equation; that is, the arrow from Supreme Court to appellate courts indicates the number of Appellate Court Citations equations for which the Supreme Court Citations lag coefficient differs from zero without evidence that any other lag coefficients differ from zero.

Table 2. Observed Patterns in Autoregressive Dynamics

	Time Series Granger Causes Both Other Time Series
SC cites	15
AC cites	63
DC cites	97
	Only Lag Coefficients in One Direction Differ from Zero
Top-Down	30
Bottom-Up	324

Note.—A lag coefficient differs from zero if its 95% credible interval does not bound zero. We say a time series Granger causes another if its lag coefficient in that equation differs from zero and others in that equation do not. A top-down autoregressive dynamic is one in which the lag coefficients for higher courts differ from zero in lower court equations while lower court lag coefficients do not differ from zero in higher court equations, and analogously for bottom-up.

Citations Granger cause Supreme Court Citations, but only 155 (fewer than half as many) for which the opposite is true.

We may take this further to examine more elaborate patterns, reported in table 2. First, we may be interested to see which level of the hierarchy is most influential by considering whether lags from that level Granger cause both other time series. Next, we may want to know the number of precedents for which, considering all three time series, we only find evidence of upward- or downward-flowing autoregressive dynamics, which we call a "bottom-up" or "top-down" pattern, respectively.[24]

Again, we see strong evidence that lower courts impact attention to precedent much more often than the Supreme Court, and even that district courts are more influential in this regard than appellate courts. There are roughly four times as many precedents for which appellate court citations Granger cause both other time series than for the Supreme Court, and roughly 1.5 times again as many precedents for which this is true of district court citations. Even more impressively, there are about 10 times as many precedents for which only lag coefficients pointing "upward" reliably differ from zero than precedents where only lag coefficients pointing "downward" reliably differ from zero.

To get a better sense of these top-down and bottom-up patterns, let us consider the impulse response functions for two illustrative precedents, *Smith v. California* (361 U.S. 147 [1959]) and *Watts v. United States* (394 U.S. 705 [1969]).[25] The impulse response

24. That is, we code a case as "bottom-up" when (1) the lag coefficients for District Court Cites reliably differ from zero in the Appellate Court Cites equation; (2) the lag coefficients for Appellate Court Cites reliably differ from zero in the Supreme Court Cites equation; and (3) none of the Supreme Court Cites_{t-1} or Appellate Court Cites_{t-1} coefficients in the District Court Cites_t equation or the Supreme Court Cites_{t-1} coefficient in the Appellate Court Cites_t equation reliably differs from zero. We analogously code the "top-down" cases.

25. The citation dynamics for these two precedents are illustrative of those similarly categorized. *Smith* is one of the 30 precedents demonstrating a top-down pattern, while *Watts* is one of the 324 precedents exhibiting bottom-up dynamics. We chose these two exemplars because they are relatively-better-known First Amendment cases, and they are reasonably representative. The *Smith* lag coefficient

function (IRF) traces out the effect of a one standard deviation shock to one of the three equations; it gives the response of the time series to a one-time, one standard deviation impulse to one of the equations in the system.[26] It gives the contemporaneous effect on each equation from the shock, then the effect in period two from a shock in period one, then the effect in period three from a shock in period one, and so on. So, if the plot of an IRF initially trends upward, then back downward, it means a shock has a lagged positive effect that eventually decays, not that there is a quadratic or negative effect.

Smith, bolstering the First Amendment's freedom of the press by imposing an intent requirement for obscenity laws, demonstrates a top-down pattern. We present the mean of the posterior draws for the lag coefficients and their 95% credible intervals in table 3 and depict the IRF in figure 2.[27] The coefficient for the effect of lagged Supreme Court citations on the expected count of appellate court citations is reliably positive. Similarly, the coefficient for the effect of lagged appellate court citations on the expected count of district court citations is reliably positive. However, the credible interval for "upward"-facing lag coefficients bounds zero (generally tightly so).

Considering the impulse response function, we see that following a one standard deviation shock in the number of Supreme Court citations (a shock of about four citations) to *Smith*, there is an initial dip in appellate court citations followed by an increase of almost six citations (about 1.5 standard deviations for the appellate court citations series), with continuing effects that last several periods. Similarly, we see a lagged increase in district court citations following a shock to appellate court citations; in the period after a four-citation shock to appellate court cites, district courts cite *Smith* nine additional times (about a 1.5 standard deviation increase). However, there is essentially no effect on Supreme Court citations from a shock to district or appellate court citations, and the median effect of a shock to district court citations on appellate court citations is much smaller than the median effect of a shock to Supreme Court cites, in addition to the credible region for the response function bounding zero.

In contrast, *Watts*, establishing the famous "true threat" First Amendment doctrine (which holds that speech constituting a true threat is not protected by the First Amendment), demonstrates a bottom-up pattern. We present the mean of the posterior draws for the lag coefficients and their 95% credible intervals in table 4 and depict the IRF in figure 3. The mean of the posterior draws for the coefficient for the effect of lagged district

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means (divided by dependent variable standard deviation) are all within the .2 and .6 quantiles within the top-down cases, except the lag coefficient for district court cites in the district court equation, which is at the .17 quantile. *Watts*'s lag coefficient means are all within the .2 and .35 quantiles within the bottom-up cases, except the lag coefficients for district court cites in the Supreme Court equation, which is at the .025 quantile, and for appellate court cites in the district court equation, which is at the .034 quantile.

26. See Brandt and Sandler (2012, 312–13) for the derivation of the IRF with one standard deviation shocks. See 296–97 for the derivation of an IRF for a unit shock.

27. For the IRF plots, we use 68% credible intervals (corresponding to about one standard deviation to each side of the estimate), as in Brandt and Sandler (2012, 301–2).

Table 3. Lag Coefficients for *Smith v. California*

	SC Cites$_t$	AC Cites$_t$	DC Cites$_t$
SC Cites$_{t-1}$	**.265**	**.281**	−.017
	(.044, .466)	(.003, .557)	(−.412, .289)
AC Cites$_{t-1}$	.017	**.27**	**.364**
	(−.022, .083)	(.044, .472)	(.111, .600)
DC Cites$_{t-1}$	.003	.054	.035
	(−.028, .038)	(−.089, .219)	(−.154, .224)

Note.—Mean of posterior draws for the lag coefficients for *Smith v. California*, with 95% credible intervals in parentheses. Supreme Court is abbreviated as SC, appellate courts as AC, and district courts as DC. Bold typeface indicates estimates for which the 95% credible interval does not include zero.

court citations on the expected count of appellate court citations is large and reliably positive. Similarly, the coefficient for the effect of lagged appellate court citations on the expected count of Supreme Court citations is reliably positive, though relatively small. However, the credible interval for "downward" facing lag coefficients bounds zero.

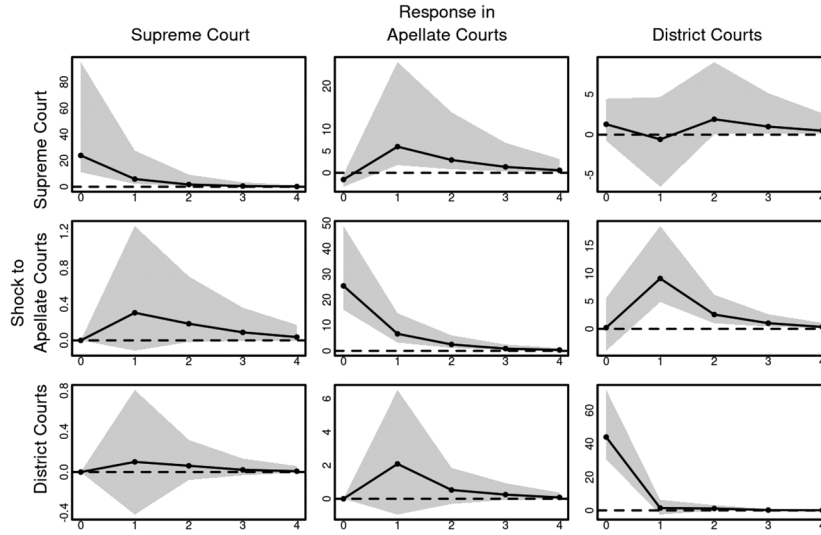

Figure 2. Impulse responses for *Smith v. California*. We computed the impulse responses for each posterior draw; the median response is plotted with solid lines, and the 68% credible regions (corresponding to about one standard deviation to each side of the estimate) are marked with shading. Zero is marked by the dashed horizontal line. The first column gives the response in Supreme Court cites, the second column response in appellate court cites, and the third column response in district court cites. The first row shows responses to the respective equations from a one standard deviation shock in Supreme Court cites, the second row responses from a shock to appellate court cites, and the third row responses from a shock to district court cites.

Table 4. Lag Coefficients for *Watts v. United States*

	SC Cites$_t$	AC Cites$_t$	DC Cites$_t$
SC Cites$_{t-1}$	.098	.123	−.146
	(−.054, .371)	(−.766, .984)	(−.523, .310)
AC Cites$_{t-1}$	**.033**	−.018	−.02
	(.008, .059)	(−.243, .198)	(−.184, .142)
DC Cites$_{t-1}$	.002	**.439**	.237
	(−.014, .027)	(.138, .690)	(−.080, .569)

Note.—Mean of posterior draws for the lag coefficients for *Watts v. United States*, with 95% credible intervals in parentheses. Supreme Court is abbreviated as SC, appellate courts as AC, and district courts as DC. Bold typeface indicates estimates for which the 95% credible interval does not include zero.

After an initial shock to appellate court citations to *Watts*, there is a lagged positive impact on Supreme Court cites; a one standard deviation shock to appellate court cites (an increase of about six citations) leads to a two standard deviation lagged response in Supreme Court cites (about two citations). After a one standard deviation shock to district court cites (about nine citations), there is a one-period lagged effect on appellate court cites of

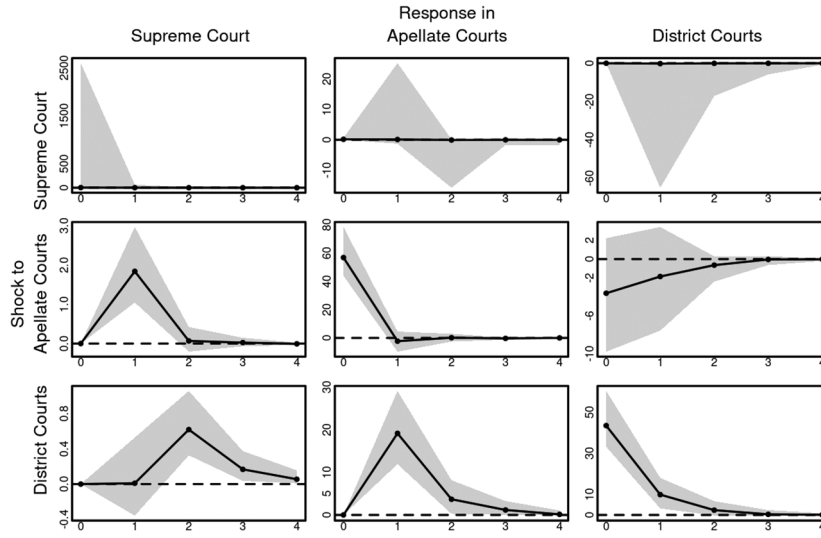

Figure 3. Impulse responses for *Watts v. United States*. We computed the impulse responses for each posterior draw; the median response is plotted with solid lines, and the 68% credible regions are marked with shading. Zero is marked by the dashed horizontal line. The first column gives the response in Supreme Court cites, the second column response in appellate court cites, and the third column response in district court cites. The first row shows responses to the respective equations from a one standard deviation shock in Supreme Court cites, the second row responses from a shock to appellate court cites, and the third row responses from a shock to district court cites.

over three standard deviations (about 19 additional citations), and in the period following that, a smaller impact on Supreme Court cites. However, the median impact of a shock to Supreme Court cites on other levels of the hierarchy is small, and the credible region in all cases bounds zero, and similarly for the impact of a shock to appellate court cites on district court cites.

Bottom-up patterns are more prevalent than top-down patterns of control over attention to precedent. As listed in table 2, there are about 10 times more cases like *Watts* than there are cases like *Smith*. Moreover, generally, there are vastly more cases for which lower courts' citation patterns have a reliable impact on the Supreme Court's citation patterns than the reverse, as reported in table 1. There are also more cases for which a lower court Granger causes citations from a court above it than the reverse, as shown in figure 1.

B. The Magnitude of Top-Down and Bottom-Up Effects

One might also wonder how much each level of court affects other courts' attention to precedent rather than just how often. Comparing lag coefficients across models is difficult, and in particular can be complicated by two issues. First, there is wide variability in how often the precedents are cited overall. Additionally, considering the distribution of effect sizes alone ignores the uncertainty in those estimates.[28]

For an example of the first issue, consider the *Smith* and *Watts* cases discussed above. The lag coefficient estimate for Supreme Court Citations in the appellate court citations equation for *Smith* was about 0.28. A Supreme Court Citations lag coefficient estimate of that value has a much different meaning in *Smith*, which appellate courts cite on average five times per year than it would in the *Watts* case discussed above, which appellate courts cite on average 10 times per year. To address this issue in the discussion below, we divide the lag coefficient posterior draws by the standard deviation of the equations' dependent variables so that a lag coefficient draw is expressed as the standard deviation increase (or decrease) in the expected count of the outcome variable from a one-unit increase in the lagged citations of interest. In our *Smith* example, the coefficient estimate then becomes 0.07—a one-unit change in the lagged value of Supreme Court cites to *Smith* increases the expected current count of appellate court cites to *Smith* by 0.07 standard deviations.

For an example of the second issue, consider that for the *Watts* appellate court citations equation, the posterior mean for the Supreme Court cites lag coefficient estimate is 0.123. Considering this data point when describing the distribution of coefficient magnitudes would ignore that its credible interval is [−0.766, 0.984]; in other words, we cannot say with much confidence that lagged Supreme Court cites positively (or negatively) affect appellate court citations to *Watts*. For that reason, we consider the distribution of estimates as well as the means across models of the posterior draw quantiles.

28. Or, in other words, studying the distribution of coefficients' posterior means across models does not fully summarize across models the coefficients' full posterior distributions.

Figures 4 and 5 depict these distributions. Figure 4 shows the middle 50% of coefficient estimates across all models. Across the middle two quartiles of coefficient estimates there is much more variability for Supreme Court lag coefficients, with a higher top end but also a lower low end. The interquartile range of the coefficient estimates for lagged Supreme Court cites in the appellate court and district court equations dips below zero, while in all equations the 25% quantile of the lag coefficient estimates for appellate court and district court cites is positive. In figure 5, depicting the mean across models for each lag coefficient's posterior mean and 95% credible interval, we see the mean of credible intervals for lagged Supreme Court citations again reaches higher, but still with much more variability overall. Importantly, in the appellate court and district court equations, while the mean across models of posterior draws for lagged Supreme Court cites is similar to the other lag coefficient means, the mean across models of credible intervals is much closer to being centered at zero for lagged Supreme Court cites than the other lag coefficients in these equations.

Another way to explore how much one court affects another court's agenda is to consider forecast error variance decomposition (FEVD), which is a calculation of the proportion of the variance in each equation explained by shocks to each of the time series in a previous period. FEVD can be calculated for any arbitrary number of "steps ahead." We focus on the period one term after a shock given that Deviance Information Criteria

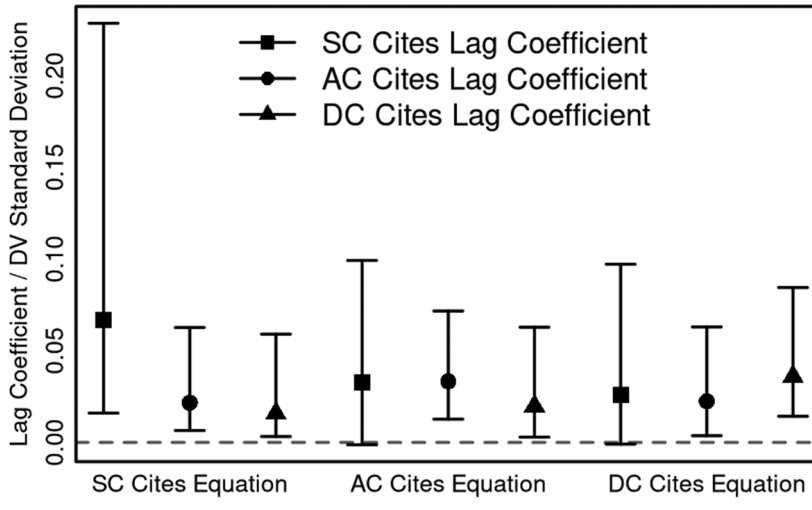

Figure 4. Summarizing all models' lag coefficient posterior means. The lag coefficients are divided by the dependent variables' standard deviations for comparability. Dots indicate the median of all models' lag coefficient posterior means, and whiskers indicate the .25 and .75 quantiles of all models' lag coefficient posterior means. The lag coefficients for Supreme Court cites are shown using squares, for appellate court cites using circles, and for district court cites using triangles.

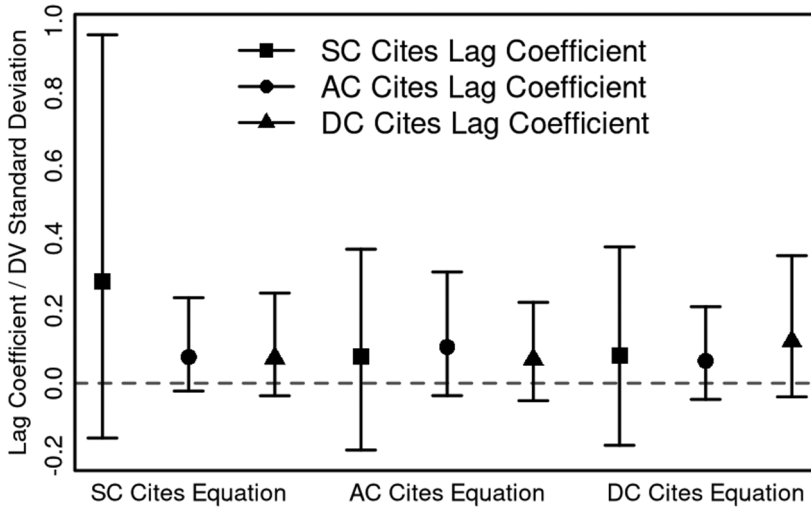

Figure 5. Summarizing all models' lag coefficient posterior 95% credible intervals. The lag coefficients are divided by the dependent variables' standard deviations for comparability. Dots indicate the mean of all models' lag coefficient posterior means, and whiskers indicate the means of all models' .025 and .975 lag coefficient posterior quantiles. The lag coefficients for Supreme Court cites are shown using squares, for appellate court cites using circles and lines, and for district court cites using triangles.

suggests the optimal number of lags in these models is generally one. For example, a one step ahead FEVD for a model we have estimated could be (0.6, 0.25, 0.15) in the Supreme Court Cites equation, which would indicate that 60% of the variation in the Supreme Court cites to the precedent is explained by its own lagged values, 25% would be explained by lagged values of appellate court citations, and 15% would be explained by lagged values of district court citations.

We calculate the one step ahead FEVD for each posterior draw for each model, then take the mean, median, .16 quantile, and .84 quantile for these draws.[29] Figure 6 depicts the middle two quartiles of the FEVD means across models, and figure 7 depicts the mean across models of the .16, .5, and .84 quantiles. These figures show that a majority of the variation across models is not due to lagged citations from other courts. This accords with the results depicted in figure 1, where we observe what we equate with Granger causation in less than half of the precedents we study. However, we also see that, for both ways of summarizing the FEVD across models, around one-third of the variation in each level of the hierarchy's precedent citation agenda is explained by other courts' citation patterns, showing substantial cross-hierarchy influence on attention to precedent.

29. This mirrors the quantiles depicted in our discussion of the impulse responses, which are used in computing FEVD.

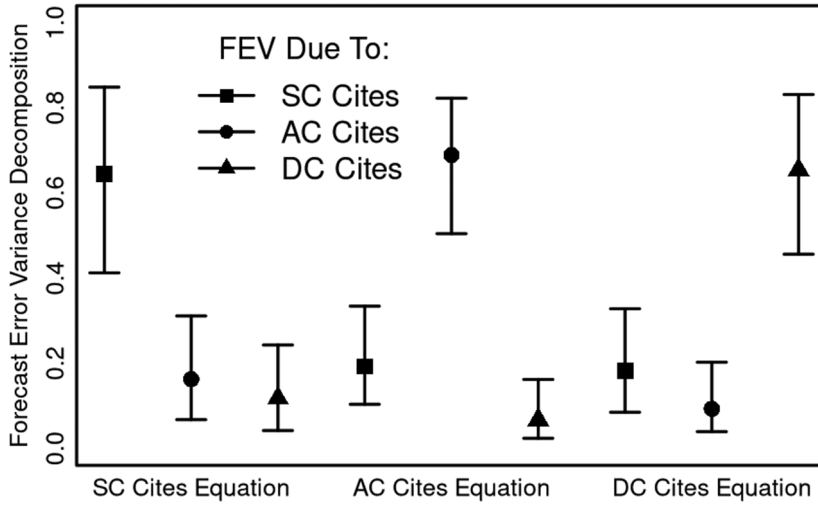

Figure 6. Summarizing all models' forecast error variance decomposition draw means. We computed the models' one step ahead forecast error variance decomposition (FEVD) for each posterior draw; this represents the proportion of error variance in each time series accounted for by shocks to each of the time series in the previous period. Dots indicate the median of all models' FEVD draw means, and whiskers indicate the .25 and .75 quantiles. The FEV due to Supreme Court cites is shown using squares, FEV due to appellate court cites using circles, and FEV due to district court cites using triangles.

Taken together, the evidence presented in figures 4–7 and Section III.A implies lagged lower court citations have a consistent moderate effect on lower courts' attention to precedent, while there is much more variability in the Supreme Court's impact. The Court can generate a large impact on other courts' agenda-setting decisions, but in practice it does so only rarely, while it often alters its own precedent citation agenda in response to the lower courts' citation practices.

IV. CONCLUSION

Which level(s) of the federal judicial hierarchy set the federal judicial agenda? Past studies have focused on the Supreme Court as the dominant agenda setter in the judicial hierarchy, analyzing the Court's individual case selection and attention to broad issue areas, and how those decisions affect the lower courts. While a handful of studies examine bottom-up effects, either qualitatively (e.g., Epstein and Kobylka 1992; Epp 1998) or quantitatively (Hurwitz 2006), we still know relatively little about either the frequency or magnitude of bottom-up versus top-down agenda setting in the federal courts. Using a new conception and measure of the judicial agenda—attention to precedent (i.e., legal rules), as measured by citations to precedent—we offer the first comprehensive analysis of the influence of each layer of the federal judiciary on the others. We therefore examine all federal courts'

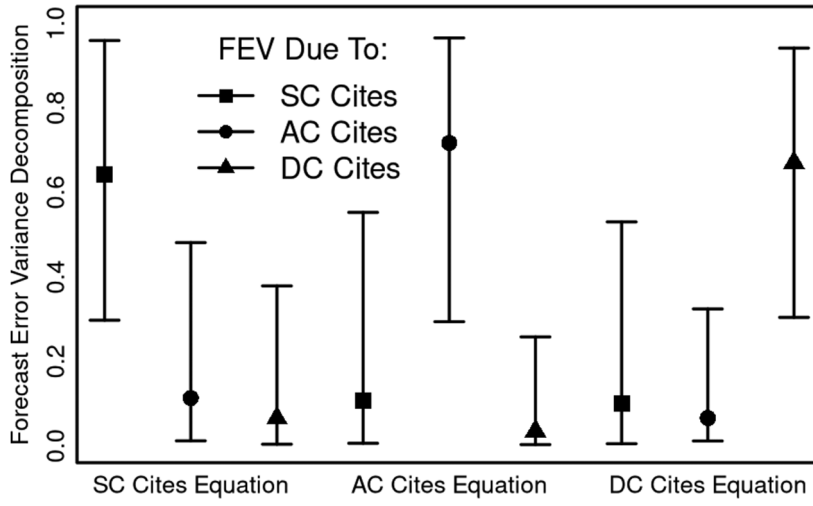

Figure 7. Summarizing all models' forecast error variance decomposition draw 68% credible intervals. Dots indicate the mean of all models' FEVD draw medians; whiskers indicate the means of all models' .16 and .84 FEVD draw quantiles. The FEV due to Supreme Court cites is shown using squares, FEV due to appellate court cites using circles, and FEV due to district court cites using triangles.

ability to influence attention to precedent in the federal judicial hierarchy—to affect which precedents are on the agenda for other courts, and thus which legal rules are applied and interpreted. Our analysis of citations to Supreme Court precedents demonstrates there are precedents for which the Supreme Court exerts top-down control of the judicial agenda, but that much more commonly the lower courts drive attention to precedent.

These results have important implications for judicial policy making. While studies of the federal judicial hierarchy find that the Supreme Court exerts control over how the lower courts decide cases (Baum 1980; Songer, Segal, and Cameron 1994; Haire, Songer, and Lindquist 2003; Randazzo 2008; Westerland et al. 2010; Black and Owens 2012), it is not at all clear that the Court exerts the same sort of control over an important element of the agenda of the lower courts—the relative attention paid to Supreme Court precedents. In fact, it appears that the lower courts may encourage the Supreme Court to continue revisiting existing precedents. Put in Pacelle's (1991) terms, the lower courts may be responsible for keeping a precedent on the Supreme Court's exigent agenda. Given the importance of agenda setting in policy making (Riker 1993), this suggests a more significant role for lower courts in judicial policy making than previously recognized. Finally, while our goal, to offer a broad, systematic empirical examination of top-down versus bottom-up effects, is an important step in better understanding agenda setting in the federal courts, much remains to be done. Specifically, subsequent research must tackle the vital question

of why variation exists in the impact of these courts on one another. By marrying our approach and data with fresh theorizing future studies, we can provide considerable new insight into judicial policy making.

APPENDIX

Table A1. Comparing the Results for All Precedents with the Most Recently Decided Cases

	All Precedents				Precedents Decided after 1980		
	SC Cites	AC Cites	DC Cites		SC Cites	AC Cites	DC Cites
SC Cites$_{t-1}$	.06	.04	.04	SC Cites$_{t-1}$	.05	.03	.03
AC Cites$_{t-1}$	.18	.12	.09	AC Cites$_{t-1}$	.14	.15	.10
DC Cites$_{t-1}$	.20	.10	.16	DC Cites$_{t-1}$	.18	.10	.22

Note.—Each cell reports the proportion of all reliable coefficients represented by that specific coefficient; for example, in the full results, there are 10,777 coefficients that reliably differ from zero in total, 652 (or 6%) of which are accounted for by the lag coefficients on Supreme Court cites in the Supreme Court equations that reliably differ from zero.

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