

<p style="text-align: right;">1</p> <p style="text-align: center;">IN THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF WISCONSIN</p> <p>*****</p> <p>WILLIAM WHITFORD, et al.,</p> <p style="padding-left: 40px;">Plaintiffs,</p> <p>v. Case No. 15-CV-421-bbc</p> <p>GERALD NICHOL, et al.,</p> <p style="padding-left: 40px;">Defendants.</p> <p>*****</p> <p style="text-align: center;">DEPOSITION OF SIMON D. JACKMAN, Ph.D.</p> <p style="padding-left: 40px;">Friday, November 20, 2015</p> <p style="padding-left: 40px;">9:02 a.m.</p> <p style="padding-left: 40px;">Reported by: MARY L. MIXON</p>	<p style="text-align: right;">3</p> <p>1 *****</p> <p>2</p> <p>3 INDEX</p> <p>4 Examination By: Page(s)</p> <p>5 Attorney Keenan 4</p> <p>6</p> <p>7</p> <p>8 *****</p> <p>9</p> <p>10 EXHIBITS</p> <p>11 Exhibit Nos.: Page:</p> <p>12 11 - Assessing the Current Wisconsin State Legislative Districting Plan</p> <p>13 7/7/15 report 6</p> <p>14 12 - Curriculum Vitae 7</p> <p>15 13 - 11/5/14 engagement letter 12</p> <p>16 14 - Invoices 13</p> <p>17</p> <p>18 *****</p> <p>19</p> <p>20 (Attached to original transcript and copies provided to counsel)</p> <p>21</p> <p>22 *****</p> <p>23 (Original transcript is filed with Attorney Keenan)</p> <p>24</p> <p>25</p>
<p style="text-align: right;">2</p> <p>1 DEPOSITION of SIMON D. JACKMAN, Ph.D., a</p> <p>2 witness in the above-entitled action, taken at the</p> <p>3 instance of the Defendants, under the provisions of</p> <p>4 the Federal Rules of Civil Procedure, taken pursuant</p> <p>5 to notice, before MARY L. MIXON, a Court Reporter and</p> <p>6 Notary Public in and for the State of Wisconsin, at</p> <p>7 the Wisconsin Department of Justice, 17 West Main</p> <p>8 Street, in the City of Madison, County of Dane, and</p> <p>9 State of Wisconsin, on the 20th day of November 2015,</p> <p>10 commencing at 9:02 a.m.</p> <p>11</p> <p>12 *****</p> <p>13</p> <p style="text-align: center;">A P P E A R A N C E S</p> <p>14</p> <p>15 PAUL STRAUSS, RUTH GREENWOOD and ANNABELLE</p> <p>16 HARLESS, CHICAGO LAWYERS' COMMITTEE FOR</p> <p>17 CIVIL RIGHTS UNDER LAW, INC.,</p> <p>18 Attorneys at Law,</p> <p>19 100 North La Salle Street, Suite 600,</p> <p>20 Chicago, Illinois 60602, appearing</p> <p>21 on behalf of the Plaintiffs.</p> <p>22 BRIAN P. KEENAN,</p> <p>23 Assistant Attorney General,</p> <p>24 WISCONSIN DEPARTMENT OF JUSTICE,</p> <p>25 17 West Main Street,</p> <p>Madison, Wisconsin 53703, appearing</p> <p>on behalf of the Defendants.</p> <p>PETER G. EARLE,</p> <p>LAW OFFICE OF PETER EARLE, LLC,</p> <p>Attorneys at Law,</p> <p>839 North Jefferson Street, Suite 300,</p> <p>Milwaukee, Wisconsin 53202-3744,</p> <p>appearing on behalf of the Witness.</p>	<p style="text-align: right;">4</p> <p>1 SIMON D. JACKMAN, Ph.D.,</p> <p>2 called as a witness, being first duly sworn,</p> <p>3 testified under oath as follows:</p> <p>4</p> <p>5 EXAMINATION</p> <p>6 By Mr. Keenan:</p> <p>7 Q Good morning, Professor Jackman. My name is Brian</p> <p>8 Keenan, I'm the attorney for the defendants in</p> <p>9 this case and we're here for your deposition.</p> <p>10 Have you ever been deposed before?</p> <p>11 A No.</p> <p>12 Q Okay. Well, it's the first time so I'll give you</p> <p>13 a few ground rules.</p> <p>14 A Okay.</p> <p>15 Q I'll be asking you questions and you'll be giving</p> <p>16 me answers. And do you understand that you're</p> <p>17 under oath?</p> <p>18 A I do.</p> <p>19 Q And another thing is you have to answer verbally</p> <p>20 so that the court reporter here can take down your</p> <p>21 answers. Another thing is to just let me get my</p> <p>22 whole question out and then you can give your</p> <p>23 answer, and I'll try to not talk over you before</p> <p>24 my next question. So you understand that you've</p> <p>25 sworn to tell the truth to my questions to the</p>

5	<p>1 best of your ability?</p> <p>2 A Yes.</p> <p>3 Q If ever you don't understand a question just let</p> <p>4 me know, and I'll be happy to rephrase it or we</p> <p>5 can have the court reporter read it out loud</p> <p>6 again. Do you understand?</p> <p>7 A I do.</p> <p>8 Q We can take some breaks, so if ever you feel like</p> <p>9 you have to go to the bathroom or something, just</p> <p>10 let me know and we'll take a break. I will say if</p> <p>11 there's a pending question, you'll have to answer</p> <p>12 the question and then you can take a break.</p> <p>13 A I understand.</p> <p>14 Q What did you do to prepare for the deposition</p> <p>15 today?</p> <p>16 A In addition to writing the report, we did a few</p> <p>17 phone calls with the team here and we had a</p> <p>18 day-long meeting here yesterday.</p> <p>19 Q And who all was at that meeting yesterday?</p> <p>20 A Everybody you see to my right here with the</p> <p>21 exception of Emma down at the end of the table.</p> <p>22 Q And how long do you think that meeting lasted?</p> <p>23 A About four and a half hours.</p> <p>24 Q Okay. I'm just going to mark some documents as</p> <p>25 exhibits and we'll refer to them.</p>	7	<p>1 (Exhibit 12 is marked for identification)</p> <p>2 Q And if you could identify what Exhibit 12 is for</p> <p>3 us?</p> <p>4 A It's a copy of my curriculum vita dated</p> <p>5 May 11, 2015.</p> <p>6 Q And is this a current version of your CV?</p> <p>7 A Current as of May, but yeah, there are no</p> <p>8 substantial changes.</p> <p>9 Q All right. So if I wanted to get your educational</p> <p>10 history and the jobs you've had, if I look at</p> <p>11 what's listed here in Exhibit 12, that would tell</p> <p>12 me all that information?</p> <p>13 A That's correct.</p> <p>14 Q Okay. So I don't think we need to have you repeat</p> <p>15 what's already on this page, so that's why I did</p> <p>16 that.</p> <p>17 A Okay.</p> <p>18 MR. EARLE: In deference to the</p> <p>19 snow, that's a good idea.</p> <p>20 MR. KEENAN: Yeah.</p> <p>21 Q What is your current position right now?</p> <p>22 A I'm a professor of political science at Stanford</p> <p>23 University.</p> <p>24 Q Okay. And what do you do in that position?</p> <p>25 A I teach classes in the Department of Political</p>
6	<p>1 A You bet.</p> <p>2 MR. KEENAN: I was going to</p> <p>3 continuously mark exhibits. So we had left</p> <p>4 off at 10, so I was going to mark the first</p> <p>5 one as 11.</p> <p>6 MR. STRAUSS: That's a great idea.</p> <p>7 MR. EARLE: So we're going to do</p> <p>8 this consistently through the whole case?</p> <p>9 MR. KEENAN: I'd be happy with</p> <p>10 that.</p> <p>11 MR. EARLE: Okay, go ahead.</p> <p>12 Sometimes people do that, they start that way</p> <p>13 and then they switch, and things get</p> <p>14 complicated when that happens.</p> <p>15 MR. KEENAN: Yeah. So we'll mark</p> <p>16 this as No. 11.</p> <p>17 (Exhibit 11 is marked for identification)</p> <p>18 Q So for Exhibit 11, perhaps you could just identify</p> <p>19 what Exhibit 11 is for us.</p> <p>20 A It's the report I produced at the request of the</p> <p>21 plaintiffs.</p> <p>22 Q Okay. And so keep that handy. I'm actually going</p> <p>23 to go on to some other things, but it made more</p> <p>24 sense to mark this as the first exhibit at this</p> <p>25 deposition. So I've got another one.</p>	8	<p>1 Science, I'm a researcher, and a reasonable amount</p> <p>2 of administrative responsibilities as well that</p> <p>3 accompany a professorial position.</p> <p>4 Q What classes do you teach?</p> <p>5 A Primarily statistical methods for master's and</p> <p>6 Ph.D. students in the Department of Political</p> <p>7 Science.</p> <p>8 Q And then you said primarily; are there any other</p> <p>9 classes you teach outside of --</p> <p>10 A Yeah, and American politics are the other classes</p> <p>11 I teach.</p> <p>12 Q Any specific classes in American politics?</p> <p>13 A Elections, public opinion are the topics in</p> <p>14 American politics that recent teaching has</p> <p>15 covered.</p> <p>16 Q And you said you're a researcher; what are the</p> <p>17 topics that you've researched?</p> <p>18 A Most recently I've been directing the American</p> <p>19 National Election Studies, but over my career I've</p> <p>20 done a lot of work on electoral systems, on the</p> <p>21 application of statistical methods in many realms</p> <p>22 of political science but again with a heavy</p> <p>23 emphasis on American politics.</p> <p>24 Q You mentioned the American National Elections</p> <p>25 Studies.</p>

9	<p>1 A Uh-huh.</p> <p>2 Q What is that organization?</p> <p>3 A Okay, sure. That is a large survey-based study of</p> <p>4 American political attitudes. It is the single</p> <p>5 biggest piece of political science funded by the</p> <p>6 National Science Foundation. It's a study that</p> <p>7 has been in existence in one form or another since</p> <p>8 1952 and is currently a co-production of Stanford</p> <p>9 University and the University of Michigan.</p> <p>10 Q And then I see on your CV that it says principal</p> <p>11 investigator; is that your title?</p> <p>12 A Yeah. For the purposes of that project, that is</p> <p>13 my title.</p> <p>14 Q And then what are your responsibilities as the</p> <p>15 principal investigator?</p> <p>16 A Stewardship of the NSF grant dollars, making</p> <p>17 decisions about the science that we're conducting,</p> <p>18 the design of given presidential cycles, survey</p> <p>19 work, the dissemination of the data, the extent to</p> <p>20 which we rely on our Advisory Board for</p> <p>21 assistance, directing a small staff at Stanford</p> <p>22 and partnering with our opposite numbers at the</p> <p>23 University of Michigan.</p> <p>24 Q And then I see that there's a website listed here,</p> <p>25 www.electionstudies.org; is that the website for</p>	11	<p>1 about computing it, examining the robustness of</p> <p>2 the resulting estimates of the efficiency gap and</p> <p>3 ultimately to produce an assessment of the extent</p> <p>4 to which recent values of the efficiency gap from</p> <p>5 Wisconsin, how they stacked up against that -- in</p> <p>6 light of that historical analysis.</p> <p>7 Q You used the term "robustness" which is a term</p> <p>8 I've seen. Could you explain what you mean by</p> <p>9 that?</p> <p>10 A Yeah. A simple definition might be the extent to</p> <p>11 which you get the same answer when you do</p> <p>12 different things and make different assumptions</p> <p>13 about the way you treat the data.</p> <p>14 Q And you also mentioned a Law Review article by</p> <p>15 McGhee and Stephanopoulos. At the time you had</p> <p>16 first been --</p> <p>17 MR. EARLE: Excuse me, did you say</p> <p>18 large?</p> <p>19 MR. KEENAN: Law Review.</p> <p>20 MR. EARLE: Oh, Law Review, okay.</p> <p>21 I thought you said large. I'm sorry, go</p> <p>22 ahead.</p> <p>23 Q Law Review article by McGhee and Stephanopoulos.</p> <p>24 At the time you were approached to work on this</p> <p>25 case, were you already familiar with that Law</p>
10	<p>1 the American National Election Studies?</p> <p>2 A It is, yeah. That's hosted out of the University</p> <p>3 of Michigan.</p> <p>4 Q Have you ever served as an expert witness in a</p> <p>5 legal case before?</p> <p>6 A No.</p> <p>7 Q All right. When did you start working as an</p> <p>8 expert in this case?</p> <p>9 A Late last year.</p> <p>10 Q And how did it come about that you ended up</p> <p>11 getting involved with this case?</p> <p>12 A I don't exactly recall, but I believe it was I</p> <p>13 think Ruth Greenwood e-mailed me and asked me if</p> <p>14 I'd be interested in coming on board, either Ruth</p> <p>15 or Nick Stephanopoulos.</p> <p>16 Q And during that initial contact with you, what was</p> <p>17 it suggested that you would do on behalf of the</p> <p>18 plaintiffs in this case?</p> <p>19 A Would I look at the properties of this measure</p> <p>20 that McGhee and Stephanopoulos had written about</p> <p>21 in a Law Review article, examine its -- generate</p> <p>22 measures of the efficiency gap for a large set of</p> <p>23 state legislative elections, as many as we could</p> <p>24 possibly manage, examining the properties of that</p> <p>25 measure, examining some of the ways we might go</p>	12	<p>1 Review article?</p> <p>2 A No, I was not.</p> <p>3 Q Were you familiar with the, not the specific</p> <p>4 article, with the efficiency gap measure that was</p> <p>5 outlined in the article?</p> <p>6 A No.</p> <p>7 (Exhibit 13 is marked for identification)</p> <p>8 Q Could you identify what Exhibit 13 is?</p> <p>9 A It's my letter of engagement.</p> <p>10 Q For your work in this case?</p> <p>11 A Uh-huh.</p> <p>12 Q All right. I think the copy that I received from</p> <p>13 your attorneys doesn't have your signature on it,</p> <p>14 but is this still the engagement letter even</p> <p>15 though it doesn't look like it has your signature</p> <p>16 on it?</p> <p>17 A Yes.</p> <p>18 Q You're not disputing that it's the engagement</p> <p>19 letter?</p> <p>20 A No, no.</p> <p>21 Q All right. And then looking at the engagement</p> <p>22 letter, is it your understanding that this</p> <p>23 encapsulates what you were asked to do in this</p> <p>24 case?</p> <p>25 A Uh-huh.</p>

13	<p>1 Q And if you look at the second page, there's a</p> <p>2 series of numbers. The number 3 you can see, it's</p> <p>3 italicized, it says Partisan Gerrymandering and</p> <p>4 the Efficiency Gap, 82 U.Chi.L.Rev. Is that the</p> <p>5 Stephanopoulos and McGhee article you were</p> <p>6 referencing?</p> <p>7 A Yes, that's right.</p> <p>8 Q Okay, let's put that aside. And then your rate is</p> <p>9 \$250 per hour; is that correct?</p> <p>10 A That's correct.</p> <p>11 (Exhibit 14 is marked for identification)</p> <p>12 Q And perhaps I should back up. You understood that</p> <p>13 you were supposed to produce documents in your</p> <p>14 possession to your attorney that then would be</p> <p>15 produced to me, correct?</p> <p>16 A Yes.</p> <p>17 Q And you produced all the materials that you relied</p> <p>18 on in formulating your report to your attorneys,</p> <p>19 correct?</p> <p>20 A Yes, I did.</p> <p>21 Q All right. When I went through those materials, I</p> <p>22 found these two invoices which are contained in</p> <p>23 Exhibit 14.</p> <p>24 A Uh-huh.</p> <p>25 Q And my main question is are these the only two</p>	15	<p>1 and ask you questions about it.</p> <p>2 A Okay.</p> <p>3 Q And the way it's organized, it has an introduction</p> <p>4 section and then some more detail behind. So I</p> <p>5 thought maybe we could start with the introduction</p> <p>6 but then perhaps jump to the substance later and</p> <p>7 then we might have to jump back and forth.</p> <p>8 MR. EARLE: Why don't we -- okay.</p> <p>9 MS. GREENWOOD: Yeah, just let</p> <p>10 Simon look on his own copy there.</p> <p>11 MR. EARLE: Okay.</p> <p>12 Q So I understand you have your own copy.</p> <p>13 A Yeah.</p> <p>14 Q But I believe it's the same document.</p> <p>15 A It is the same document, right.</p> <p>16 Q All right. If you look at No. 3, Section 3 is the</p> <p>17 Summary.</p> <p>18 A Uh-huh.</p> <p>19 Q Start with Paragraph 1 there.</p> <p>20 A Uh-huh.</p> <p>21 MR. EARLE: Can we pause for a</p> <p>22 second?</p> <p>23 MR. KEENAN: Sure.</p> <p>24 (Discussion off the record)</p> <p>25 Q So just looking at that first paragraph,</p>
14	<p>1 invoices you've submitted to the plaintiffs in the</p> <p>2 case?</p> <p>3 A That's correct.</p> <p>4 Q And the first invoice is dated June 8th, 2015.</p> <p>5 And if I understand that correctly, that would</p> <p>6 cover all of the work you did from whenever the</p> <p>7 first engagement was up until that date?</p> <p>8 A That's correct.</p> <p>9 Q And then have the plaintiffs paid the invoices</p> <p>10 that you submitted to them?</p> <p>11 A Yes.</p> <p>12 Q Are there any other outstanding invoices, not</p> <p>13 invoices I guess, but any outstanding work that</p> <p>14 you haven't billed yet to the plaintiffs?</p> <p>15 A Yes.</p> <p>16 Q Okay. And do you have any estimate of how much</p> <p>17 that is?</p> <p>18 A Ten to 12 hours.</p> <p>19 Q Okay. But you will be submitting an invoice for</p> <p>20 that to the plaintiffs?</p> <p>21 A I will.</p> <p>22 Q All right. So now we can get back to your report.</p> <p>23 You can maybe have Exhibit 11 in front of you.</p> <p>24 A Uh-huh.</p> <p>25 Q And I thought I would just go through the report</p>	16	<p>1 Paragraph 1, the second sentence says, "Wasted</p> <p>2 votes are votes for a party in excess of what the</p> <p>3 party needed to win a given district or votes cast</p> <p>4 for a party in districts that the party doesn't</p> <p>5 win."</p> <p>6 Where did you get that definition of wasted</p> <p>7 votes from?</p> <p>8 A From McGhee and Stephanopoulos.</p> <p>9 Q And what's your understanding of -- did McGhee and</p> <p>10 Stephanopoulos, I guess for lack of a better word,</p> <p>11 create this wasted votes measure?</p> <p>12 A I think the concept of wasted votes is well</p> <p>13 rehearsed in the literature. I think it's given</p> <p>14 an extremely precise definition here, but I think</p> <p>15 the concept itself is well known in the literature</p> <p>16 on partisan gerrymandering.</p> <p>17 Q And then continue on, "Differences in wasted vote</p> <p>18 rates between political parties measure the extent</p> <p>19 of partisan gerrymandering."</p> <p>20 Why is it your opinion that differences in</p> <p>21 wasted votes measure the extent of partisan</p> <p>22 gerrymandering?</p> <p>23 A Because fundamentally differences in wasted vote</p> <p>24 rates between parties are measuring the extent to</p> <p>25 which district lines are systematically treating</p>

17	<p>1 voters of different parties unequally.</p> <p>2 Q And is it your opinion that any districting system</p> <p>3 that systematically treats voters of different</p> <p>4 parties unequally is a product of gerrymandering?</p> <p>5 A No. I think very specifically it's through the</p> <p>6 districting or it's the districting that generates</p> <p>7 that unequal treatment. You know, there are other</p> <p>8 ways an electoral system might treat voters</p> <p>9 unequally. But this is a very precise meaning in</p> <p>10 this context, and it's with respect to the</p> <p>11 districts and the district boundaries.</p> <p>12 Q Okay. So any decision on districting that treats</p> <p>13 voters of different parties unequally would be</p> <p>14 considered gerrymandering?</p> <p>15 MR. EARLE: I'm going to object to</p> <p>16 the form of the question and to the extent</p> <p>17 that you're asking him for a legal</p> <p>18 conclusion. Subject to that objection, you</p> <p>19 can answer the question if you understand it.</p> <p>20 A Yeah. Could you repeat the question then?</p> <p>21 Q Sure. Is it your opinion that any districting</p> <p>22 decision that results in districts that treat</p> <p>23 voters of different parties unequally constitutes</p> <p>24 gerrymandering?</p> <p>25 MR. EARLE: Same objection, go</p>	19	<p>1 report, differences in wasted vote rates was the</p> <p>2 indicator that I relied on to measure partisan</p> <p>3 gerrymandering.</p> <p>4 Q I guess I'm just trying to figure out why rely on</p> <p>5 that as your indicator?</p> <p>6 A Because it's available in such a wide array of</p> <p>7 states and years and made possible the analysis</p> <p>8 that I did.</p> <p>9 Q And your analysis, just kind of following up on</p> <p>10 your prior answer, is based solely on the end</p> <p>11 results of the various elections in the states you</p> <p>12 measured?</p> <p>13 MR. EARLE: I'm going to object to</p> <p>14 the form of the question, ambiguous.</p> <p>15 A Okay. Could you repeat the question?</p> <p>16 Q Sure. You mentioned that you were just looking at</p> <p>17 the results of the elections and didn't look at</p> <p>18 the intent of any of the bodies that were doing</p> <p>19 any of the districting; that's correct?</p> <p>20 A Yes, in large effect. The one additional piece of</p> <p>21 data that I did have at my disposal was, you know,</p> <p>22 under which plan an election took place. But I</p> <p>23 didn't take into account who drew the plan, and I</p> <p>24 have no room to measure this to whatever was in</p> <p>25 their minds when they draw the plan.</p>
18	<p>1 ahead.</p> <p>2 A The word "treat" in that sentence is key and</p> <p>3 perhaps subject to a little ambiguity. I think if</p> <p>4 operationally the plan, the districting plan</p> <p>5 produces differences in wasted vote rates of the</p> <p>6 sort that I elaborate in this report, then we're</p> <p>7 on the road to establishing partisan</p> <p>8 gerrymandering.</p> <p>9 Q And did you say you're on the road to establishing</p> <p>10 partisan gerrymandering?</p> <p>11 A Uh-huh.</p> <p>12 Q That's a yes?</p> <p>13 A Yes.</p> <p>14 Q Sorry. But does the just difference in wasted</p> <p>15 votes alone establish partisan gerrymandering?</p> <p>16 MR. EARLE: Same objection. I'll</p> <p>17 just note that for the record without</p> <p>18 repeating and elaborating on it, but go ahead</p> <p>19 and answer the question if you understand the</p> <p>20 question.</p> <p>21 A From my perspective, absent any data about the</p> <p>22 intent of people who were drawing the lines,</p> <p>23 that's why I got hung up on the word treat in your</p> <p>24 earlier question. But the data I observe and in</p> <p>25 particular the data I had at my disposal for this</p>	20	<p>1 Q Yeah. And so your analysis just looks at what the</p> <p>2 results of those plans were in the various</p> <p>3 elections that took place under those plans?</p> <p>4 A Yes.</p> <p>5 Q Okay. I was just going to skip ahead to --</p> <p>6 actually maybe we'll just go to No. 2, Paragraph 2</p> <p>7 where it says, "The efficiency gap, EG, is a</p> <p>8 relative, wasted vote measure, the ratio of one</p> <p>9 party's wasted vote rate to the other party's</p> <p>10 wasted vote rate."</p> <p>11 A Uh-huh.</p> <p>12 Q And I think we've talked about this before, but</p> <p>13 you got this definition of the efficiency gap from</p> <p>14 the Stephanopoulos and McGhee article; is that</p> <p>15 correct?</p> <p>16 A That's right.</p> <p>17 Q Have you written any articles that were published</p> <p>18 about the efficiency gap?</p> <p>19 A No.</p> <p>20 Q And then you say in No. 3 that, "The efficiency</p> <p>21 gap is an excess seats measure reflecting the</p> <p>22 nature of a partisan gerrymander."</p> <p>23 When you say excess seats, excess in</p> <p>24 comparison to what?</p> <p>25 A An efficiency gap of zero and an assumption that</p>

21	<p>1 there's an equal number of voters in every</p> <p>2 district. Under those two assumptions, we have a</p> <p>3 very precise relationship between statewide vote</p> <p>4 share and seat share for a given party. And it's</p> <p>5 with respect to that very precise relationship</p> <p>6 that I'm using the term excess seats. So it's</p> <p>7 with reference to a world, hypothetical world in</p> <p>8 which the efficiency gap is zero, all right.</p> <p>9 Against that standard we can assess what happens</p> <p>10 in real world elections, the extent to which the</p> <p>11 seats won given the votes won is above or below</p> <p>12 the level that the zero efficiency gap standard</p> <p>13 would imply.</p> <p>14 Q And you said that it assumes that there's equal</p> <p>15 voters in each district. Can you just explain</p> <p>16 what that means?</p> <p>17 A Right. That's a simplification that generates a</p> <p>18 very simple representation of the mapping from</p> <p>19 votes to seats when the efficiency gap is zero.</p> <p>20 So if we were able or willing to make the</p> <p>21 assumption that there were equal number of voters</p> <p>22 in every district and if the efficiency gap was a</p> <p>23 preset value, let's say zero for the sake of</p> <p>24 argument, then we have an expectation as to how</p> <p>25 many seats we should see for a given level of vote</p>	23	<p>1 MR. KEENAN: No, I have color.</p> <p>2 MR. EARLE: Oh, this is my copy.</p> <p>3 MR. KEENAN: Yeah, his is in black</p> <p>4 and white.</p> <p>5 MR. EARLE: Oh, I see. Oh, it is.</p> <p>6 MR. KEENAN: Yeah, the official one</p> <p>7 is in color. There's some of these graphs</p> <p>8 that --</p> <p>9 MR. EARLE: Okay. Page 7, got it.</p> <p>10 Q And now that we have the color version, the red, I</p> <p>11 take it the red line there is Wisconsin; is that</p> <p>12 correct?</p> <p>13 A That is the average of the efficiency gap measures</p> <p>14 for Wisconsin 2012 and Wisconsin 2014.</p> <p>15 Q And you say average, so that would be?</p> <p>16 A It's just the average of two numbers.</p> <p>17 Q Two numbers. And then the bar is there, there's a</p> <p>18 dot in the middle and then there's bars on the</p> <p>19 side. What does that line represent?</p> <p>20 A In this graph the horizontal lines are 95 percent</p> <p>21 confidence intervals around each average.</p> <p>22 Q Okay. So the right most, for example, line is the</p> <p>23 furthest -- I'm just trying to figure out if</p> <p>24 that's actually your calculation of the efficiency</p> <p>25 gap for I guess what would be the most favorable</p>
22	<p>1 -- statewide vote. Now, the equal number of</p> <p>2 voters per seat means just that, that in every</p> <p>3 district we have the same number of people voting.</p> <p>4 Q And the same number of people voting would be the</p> <p>5 total votes, not the number of people that live in</p> <p>6 the district?</p> <p>7 A That's correct.</p> <p>8 Q Okay. So it assumed that District 1, 20,000</p> <p>9 people voted and District 2, 20,000 people voted,</p> <p>10 all the way down the line?</p> <p>11 A That's right.</p> <p>12 Q Okay. I'm just going to jump ahead a little bit</p> <p>13 and we can get into these things in a little more</p> <p>14 detail.</p> <p>15 A Uh-huh.</p> <p>16 Q Looking at Figure 1 which is on Page 7.</p> <p>17 A Uh-huh.</p> <p>18 Q The exhibit is in color, so if that's a little --</p> <p>19 A Yeah, that is helpful.</p> <p>20 Q I printed it in black and white and realized it</p> <p>21 didn't make much sense, so then I printed it in</p> <p>22 color.</p> <p>23 MR. EARLE: We need to increase the</p> <p>24 budget of the AG's office and have a color</p> <p>25 printer.</p>	24	<p>1 democratic year in a plan or does that extend even</p> <p>2 further right based on some sort of confidence</p> <p>3 interval?</p> <p>4 MR. EARLE: I'm going to object to</p> <p>5 the form of the question. I think I know</p> <p>6 what you're asking, but answer the question</p> <p>7 if you understand it.</p> <p>8 A That's not the interpretation I would give --</p> <p>9 Q Okay. Why don't you explain what you would give?</p> <p>10 MR. EARLE: Let him finish his</p> <p>11 sentence.</p> <p>12 MR. KEENAN: Sure.</p> <p>13 MR. EARLE: There you go.</p> <p>14 A The right most edge or the limit at the end there</p> <p>15 of the red horizontal line is the point at which</p> <p>16 there is only a 2.5 percent chance that the</p> <p>17 average efficiency gap lies to the right of that</p> <p>18 point. And similarly there is only a 2.5 percent</p> <p>19 chance that the average efficiency gap score for</p> <p>20 Wisconsin 2012, 2014 lies to the left of the</p> <p>21 left-hand end of the red line. So the single</p> <p>22 point estimate is the dot that is unknown -- our</p> <p>23 uncertainty about that point estimate is</p> <p>24 concentrated around that red dot, and the line is</p> <p>25 giving a graphical summary of how large that</p>



25	<p>1 uncertainty is.</p> <p>2 Q And I'll just follow that up. So in Wisconsin in</p> <p>3 this red line, there's only two efficiency gap</p> <p>4 calculations, correct?</p> <p>5 A That's right.</p> <p>6 Q And so later on you give what those are for</p> <p>7 Wisconsin. And I guess I might be phrasing this</p> <p>8 poorly but, for example, if you put two dots at</p> <p>9 where your calculation for the efficiency gap for</p> <p>10 2012 and 2014 --</p> <p>11 A That's correct.</p> <p>12 Q -- would those be inside the outermost edges there</p> <p>13 or would they be at the outermost edges there?</p> <p>14 A The individual estimates for each year lie on</p> <p>15 either side of the average, right, so the average</p> <p>16 by definition will be in the middle. And since we</p> <p>17 only have two, the 2012 estimate will be on one</p> <p>18 side and the 2014 estimate will be on the other.</p> <p>19 In this case the 2012 estimate is to the left and</p> <p>20 the 2014 estimate is to the right. Just looking</p> <p>21 at my numbers, the individual point estimates for</p> <p>22 2012 and 2014, the 2012 estimate would lie on that</p> <p>23 red line, and the 2014 estimate, yes, probably</p> <p>24 does as well, probably right up towards the</p> <p>25 right-hand edge, the right-hand end of that red</p>	27	<p>1 efficiency gap might actually be to the right of</p> <p>2 whatever the number was calculated for 2012?</p> <p>3 A Okay. So the uncertainty in that average, that</p> <p>4 95 percent confidence interval that's been drawn</p> <p>5 around the average, reflects the uncertainty in</p> <p>6 the estimate for 2012 and 2014. So to the extent</p> <p>7 we're uncertain about those point estimates, that</p> <p>8 uncertainty is reflected and that's what's</p> <p>9 generating the confidence interval that you see</p> <p>10 graphed for the average.</p> <p>11 Q And this graph represents the average efficiency</p> <p>12 gap scores it says for 206 districting plans; is</p> <p>13 that correct?</p> <p>14 A Uh-huh, that's correct.</p> <p>15 Q Is that all of the districting plans you looked</p> <p>16 at?</p> <p>17 A Yes.</p> <p>18 Q And so I take it that Wisconsin obviously only has</p> <p>19 two elections under its plan, but some of these</p> <p>20 elections that are here have a full five elections</p> <p>21 under the plan?</p> <p>22 A That's correct.</p> <p>23 Q Okay. I guess we can move to 4.1, the Seats-Votes</p> <p>24 Curves. We had been talking about this a little</p> <p>25 bit before I believe, perhaps we can get into it a</p>
26	<p>1 horizontal line.</p> <p>2 Q Okay. And I guess I was trying to be a little bit</p> <p>3 simpler in that those two numbers, we have two and</p> <p>4 then we have an average. If we had bigger dots to</p> <p>5 represent the 2012 and 2014 numbers, would they</p> <p>6 lie at the very extreme of this red line or would</p> <p>7 they be somewhat inside of it?</p> <p>8 A They'd be as I just said, one would be towards the</p> <p>9 left-hand end but still on that line, and the</p> <p>10 other would be towards the end but I think still</p> <p>11 -- it would still be on the red line.</p> <p>12 MR. EARLE: Just so the record is</p> <p>13 clear, the deponent was referencing</p> <p>14 Figure 35.</p> <p>15 A I was eyeballing, literally sort of doing the</p> <p>16 transposition, picking up those two estimates</p> <p>17 there at the end of Figure 35 and plunking them</p> <p>18 down on Figure 1.</p> <p>19 MR. EARLE: And for the ease of</p> <p>20 anybody reading the transcript, Figure 35 is</p> <p>21 on Page 72.</p> <p>22 Q And you said it's a long line. I guess I'm just</p> <p>23 trying to figure out if it's at the very end of</p> <p>24 the line or if the line you have depicted on</p> <p>25 Figure 1 accounts for some uncertainty that the</p>	28	<p>1 little more here.</p> <p>2 A Uh-huh.</p> <p>3 Q I note that there's like a Footnote 1 that talks</p> <p>4 about the Cube Law. Can you just explain what the</p> <p>5 Cube Law is?</p> <p>6 A Sure. The Cube Law really isn't a law. It's a</p> <p>7 law in the sense that social scientists sometimes</p> <p>8 use that term when talking about what might be</p> <p>9 better described as an apparent empirical</p> <p>10 regularity.</p> <p>11 The Cube Law dates back to the very beginning</p> <p>12 of systematic study of electoral systems when turn</p> <p>13 of the 20th Century British statisticians started</p> <p>14 looking at the relationship between vote shares</p> <p>15 and seat shares in single-member district systems</p> <p>16 in the UK House of Commons in particular. And</p> <p>17 what was observed was a nonlinear relationship</p> <p>18 between vote shares and seat shares for a given</p> <p>19 party. And literally through fitting what might</p> <p>20 be the right curve to fit to that nonlinear</p> <p>21 relationship, it was speculated that that</p> <p>22 particular equation shown in Figure 1 would</p> <p>23 produce a good fit to the data that that group of</p> <p>24 early investigators of this topic were seeing in</p> <p>25 the UK House of Commons data.</p>

29	<p>1 And if I were to describe it to you, you get</p> <p>2 an S-shaped curve of the sort that I've graphed in</p> <p>3 Figure 2 on Page 10, and that appeared to fit</p> <p>4 those early data reasonably well. And it was</p> <p>5 speculated that maybe there was something about</p> <p>6 the nature of single-member district systems that</p> <p>7 would produce S-shaped curves and indeed maybe</p> <p>8 S-shaped curves where the right power function</p> <p>9 there is cubic; hence, the Cube Rule or the Cube</p> <p>10 Law. But over time as we've investigated many,</p> <p>11 many single-member district systems over the</p> <p>12 years, we've come to realize that sometimes we see</p> <p>13 values higher than three and sometimes we see</p> <p>14 values lower than three.</p> <p>15 Proportional representation is a special</p> <p>16 case. It's not a district system at all, right,</p> <p>17 it's just allocated seats in proportion to vote</p> <p>18 shares. That gives you a 45-degree line. It's</p> <p>19 essentially taking the three you see there in the</p> <p>20 Cube Law and setting up to one. And then there</p> <p>21 are even more extreme versions. You know,</p> <p>22 districting plans that are extremely protective of</p> <p>23 incumbents, actually the value drops below one.</p> <p>24 And you get sort of an inverted S-shaped curve, a</p> <p>25 curve that is steep at the ends but largely flat</p>	31	<p>1 THE WITNESS: Oh, pardon me.</p> <p>2 Footnote 1, location of the formula, yes.</p> <p>3 Q And then just digging into that answer a little</p> <p>4 bit, you mentioned that sometimes instead of a</p> <p>5 cube you get a three, you get something higher or</p> <p>6 lower. If you go higher, does that make the shape</p> <p>7 of the curve steeper?</p> <p>8 A Exactly.</p> <p>9 Q And lower is flatter?</p> <p>10 A Flatter, exactly.</p> <p>11 Q You mentioned that this Cube Law differs from</p> <p>12 system to system, some systems have higher or</p> <p>13 lower. Is there a study about like what the</p> <p>14 proportion is in United States state legislature</p> <p>15 elections?</p> <p>16 A Yes, indeed. So just keep in mind it's not the</p> <p>17 Cube Law that varies; it's the Cube Law proposes</p> <p>18 three, that's where you empirically go about</p> <p>19 trying to estimate these curves. Jurisdiction to</p> <p>20 jurisdiction or context to context, we see</p> <p>21 variation in the number that belongs there. And</p> <p>22 there's a large literature, you know, offering</p> <p>23 ways of estimating that number in state</p> <p>24 legislative elections comparing state legislative</p> <p>25 elections to house elections to an institution</p>
30	<p>1 over vote shares between say 25 to 75 percent, or</p> <p>2 if not quite flat then close to it.</p> <p>3 And so the Cube Law lives on in the</p> <p>4 literature. It's a nice way to introduce people</p> <p>5 to the topic. And it still does express -- I</p> <p>6 think the thing to take away from it is that in</p> <p>7 single-member district systems you don't get</p> <p>8 45-degree lines, you get a quite abrupt</p> <p>9 nonlinearity. Single-member district systems hand</p> <p>10 out harsh punishment to parties whose vote share</p> <p>11 falls into the teens or the twenties or the</p> <p>12 thirties. Seat shares tend to rapidly improve as</p> <p>13 your vote share moves up towards into the forties,</p> <p>14 fifties and then tends to plateau out once</p> <p>15 statewide, jurisdiction-wide vote shares get</p> <p>16 largely beyond 70, 80 percent. And that's a</p> <p>17 regularity that holds up, and the Cube Law lives</p> <p>18 on in the sense that it was one of the first</p> <p>19 attempts to formalize that empirical regularity.</p> <p>20 MR. EARLE: Before you ask the next</p> <p>21 question, just for the record I think there</p> <p>22 was a misspeak at the beginning of that</p> <p>23 answer where you referred to Figure 1 as</p> <p>24 opposed to Footnote 1 as to the location of</p> <p>25 the formula.</p>	32	<p>1 like the electoral college winner take all by</p> <p>2 state with the exception of Maine and Nebraska.</p> <p>3 So yeah, there are estimates like that out there.</p> <p>4 Q Does your calculation of the efficiency gap rely</p> <p>5 on a seats-votes curve?</p> <p>6 A Strictly speaking, no, no, although a seats-votes</p> <p>7 curve is implied by the efficiency gap. If you</p> <p>8 assume the efficiency gap is zero, an underlying</p> <p>9 seats-votes curve is implied.</p> <p>10 Q What is the underlying seats-votes curve implied</p> <p>11 that you're mentioning?</p> <p>12 A Okay. Figure 4 of Page 18 of my report, I show in</p> <p>13 orange the seats-votes curve that's implied by an</p> <p>14 efficiency gap of zero. And it's what we would</p> <p>15 call formally a piecewise linear function that is</p> <p>16 flat, horizontal when vote shares lie between zero</p> <p>17 and .25, has a slope of two between vote shares of</p> <p>18 25 percent and 75 percent, and is again flat or</p> <p>19 horizontal from the point at which vote share is</p> <p>20 75 percent through to 100 percent.</p> <p>21 Q Okay. So if I look at the orange line here on</p> <p>22 Figure 4 and if a seats-votes result in a</p> <p>23 particular election lies on that line, there'd be</p> <p>24 a zero efficiency gap?</p> <p>25 A Subject to some assumptions here, right, that that</p>



33	<p>1 would be subject to the equal votes in each</p> <p>2 district assumption, sure.</p> <p>3 Q Okay. And then just to make sure I'm visualizing</p> <p>4 this correctly, is the vote share going to the</p> <p>5 right, that's the democratic vote share?</p> <p>6 A It could be, it need not be. We're in a two-party</p> <p>7 system here is what all of this presumes, and</p> <p>8 those curves are perfectly symmetric, about 50/50.</p> <p>9 So it's just a point of convenience what you</p> <p>10 choose. But for sake of argument and the way I've</p> <p>11 done the analysis, I took it to be democratic vote</p> <p>12 share.</p> <p>13 Q That's what I was going to ask. The way you did</p> <p>14 the analysis, was that the democratic votes -- V</p> <p>15 is democratic vote share?</p> <p>16 A That's right.</p> <p>17 Q And so if I wanted to plot out, you know, the</p> <p>18 democratic vote at 60 percent, I'd have to go</p> <p>19 to .6 on your map?</p> <p>20 A That's right.</p> <p>21 Q And just for example, if democrats had 60 percent</p> <p>22 of the vote, so I'd go to the 0.6?</p> <p>23 A Uh-huh.</p> <p>24 Q But they got 50 percent of the seats, I'd go up</p> <p>25 to .5?</p>	35	<p>1 going on here, that conditional on winning 60</p> <p>2 percent of the votes under the zero efficiency gap</p> <p>3 standard, we'd expect 70. Under your scenario</p> <p>4 they won 50; that difference is a deficit relative</p> <p>5 to what we would expect under a zero efficiency</p> <p>6 gap.</p> <p>7 Q Okay. And then like just to view a different side</p> <p>8 of the coin, if they got 40 percent of the vote</p> <p>9 but got 50 percent of the seats, what would the</p> <p>10 efficiency gap be in that circumstance?</p> <p>11 A If they won 50 percent of the seats with</p> <p>12 40 percent of the vote, in that case the</p> <p>13 efficiency gap is -- that would be a positive .2.</p> <p>14 Q And then if we were -- say we just flip this to</p> <p>15 look at it from the republican perspective, it</p> <p>16 would be just a mirror image. That would be --</p> <p>17 A Yeah, one minus everything, right.</p> <p>18 MR. EARLE: We're getting a little</p> <p>19 conversational here. One of the things about</p> <p>20 depositions is when you discuss something,</p> <p>21 you get conversational and you sometimes</p> <p>22 speak over each other a little bit. And</p> <p>23 there was a little bit of that there. So if</p> <p>24 you could try to keep the question separated</p> <p>25 from the answer, that would be great.</p>
34	<p>1 A Uh-huh.</p> <p>2 Q And I guess if I compare that to where the line is</p> <p>3 there, the line says it should be at .7 percent of</p> <p>4 the seats but they're at .5, what's the efficiency</p> <p>5 gap under that condition?</p> <p>6 A Right. It's --</p> <p>7 MR. EARLE: I'm going to object to</p> <p>8 the form of the question only because you</p> <p>9 were diagramming on your copy of the exhibit</p> <p>10 with your finger, and that's not going to</p> <p>11 appear on the transcript.</p> <p>12 Q Did you understand the question?</p> <p>13 A I did.</p> <p>14 Q Okay.</p> <p>15 A I did. Well, there's a very simple formula. So</p> <p>16 the scenario you sketched is that they won</p> <p>17 50 percent of the seats with 60 percent of the</p> <p>18 vote. And so in such a case, the efficiency gap</p> <p>19 there would be negative .2.</p> <p>20 Q Okay. And that's just the difference between</p> <p>21 where that orange line intersects with .6 and</p> <p>22 where the actual seats number is?</p> <p>23 A Yeah, that's right. And that's the sense in which</p> <p>24 earlier I referred to the efficiency gap measure</p> <p>25 or as inducing excess seats, understanding what's</p>	36	<p>1 Q I think I understand that now, so I'm just going</p> <p>2 to go backwards in the report to Page 16, and</p> <p>3 there are some equations here.</p> <p>4 A Uh-huh.</p> <p>5 Q Could you just start with the first one there, it</p> <p>6 starts with EG.</p> <p>7 A Uh-huh.</p> <p>8 Q What does that equation represent?</p> <p>9 A That's the definition of the efficiency gap as the</p> <p>10 difference of two wasted -- two numbers of wasted</p> <p>11 votes.</p> <p>12 Q So is WB, that's the wasted votes for --</p> <p>13 A For Party B, and WA are the wasted votes for</p> <p>14 Party A. And we've divided in both cases by the</p> <p>15 total number of in this case the jurisdictions,</p> <p>16 the number of jurisdictions in the -- actually I</p> <p>17 misspoke. In this particular formulation, these</p> <p>18 are proportions, these are not numbers, these are</p> <p>19 proportions.</p> <p>20 Q Okay. So maybe just explain that then.</p> <p>21 A Yeah, right. The constituent parts of WA and WB</p> <p>22 are these quantities S and V. V is a vote</p> <p>23 proportion, in particular a share of the two-party</p> <p>24 vote for Party A, I express those as proportion.</p> <p>25 Q Okay. So some of these examples we've been using,</p>

37	<p>1 if Party A got 40 percent of the vote, is WA                  2 40 percent?                  3 A No, that's their wasted vote.                  4 Q Oh, okay.                  5 A Not the statewide vote.                  6 Q Okay, I see. So the next equation down is WA                  7 equals a bunch of things that I don't understand,                  8 so maybe you could just --                  9 MR. EARLE: Just so the transcript                  10 is clear, you're now discussing the second                  11 formula --                  12 MR. KEENAN: On Page 16.                  13 MR. EARLE: -- from the top of                  14 Page 16, okay.                  15 Q What does this equation for WA mean?                  16 A Okay. So there's a summation operator there, so                  17 over all districts we do the following: The vote                  18 share one -- okay, so these shares are defined                  19 with respect to Party A. So VI is the vote share                  20 of Party A in District I, and we're assuming it's                  21 a two-party system. So if VI exceeds .5, then                  22 Party A wins the district.                  23 Q Right.                  24 A So the wasted votes for Party A are in seats where                  25 it won the proportion of votes in excess of what</p>	39	<p>1 Party A won or a seat that Party A did not win.                  2 Q Okay. So this is a calculation to determine the                  3 wasted votes in a particular district; is that                  4 correct?                  5 A But summed over all districts.                  6 Q Yeah, I'm sorry. WA is the wasted votes in a                  7 particular district --                  8 A No, no, for the whole jurisdiction.                  9 MR. EARLE: Hold on, we're getting                  10 conversational again. Why don't we start                  11 over with the next question and rephrase it.                  12 MR. KEENAN: Okay.                  13 Q So the sum means that you do this sigma, is that                  14 the correct --                  15 A Correct, yes.                  16 Q You do that calculation for each and every                  17 district; is that correct?                  18 A Subscript I indexes districts, so the summation                  19 over I takes us across districts. So now we've                  20 got a jurisdiction-wide quantity; WA is                  21 jurisdiction wide or in this case statewide as is                  22 EG, the efficiency gap itself.                  23 What's happening down at the district level                  24 are these vote shares, VI and SI which is just                  25 telling us where the VI is above .5, and not</p>
38	<p>1 it needed to win, so that's why we've got VI                  2 minus .5, all right, multiplied by SI. Now, SI                  3 takes the value one when the party wins the seat                  4 and takes the value zero when it doesn't. So when                  5 SI is one, we're talking about seats that Party A                  6 won.                  7 And then the second piece of the second                  8 equation on Page 16, one minus SI, well, if SI is                  9 one, then one minus SI is only one when SI equals                  10 zero. And so now that part of the equation is                  11 picking up wasted votes and seats that Party A did                  12 not win, and in that case the VI in that case                  13 they're all below .5. And the definition of                  14 wasted votes is any votes you cast that are cast                  15 for a party in seats that it goes on to lose are                  16 wasted votes.                  17 So we've essentially summed up all the                  18 districts now, right. Every district is won by                  19 either Party A or Party B. Wasted votes in the                  20 seats that Party A wins are the vote shares in                  21 excess of .5. And in the seats that Party A loses                  22 it's just the vote share, so it's just VI in those                  23 cases. And then we're just summing now of all                  24 districts. So every district is appearing                  25 somewhere in that equation, either a seat that</p>	40	<p>1 telling us who won the district.                  2 Q All right. And as I understand it, you did not                  3 actually perform this particular calculation in                  4 every district across every election that you                  5 looked at?                  6 A Actually I used a very similar form of this after                  7 I was able to -- my version of the efficiency gap                  8 calculation, my calculations are extremely similar                  9 to this in that I substitute -- I have a vote                  10 share for each and every district. So I did come                  11 up with a VI for every district.                  12 Q Okay. So maybe I should just ask you how you                  13 calculated the efficiency gap for a particular                  14 state in a particular year.                  15 A Okay, sure. Well, why don't we take an easy case                  16 where every district is contested and so VI is                  17 observed for every district. And we're limiting                  18 ourselves or ignoring minor party candidates;                  19 we're focused on two-party competition. In that                  20 case, the efficiency gap calculations are                  21 identical under either the form given in the top                  22 half of Page 16 as we've just been discussing and                  23 unpacking the three equations in the top half of                  24 that page, or we could use the formulation given                  25 in Equation 1 on the lower half of Page 16 where</p>

41	<p>1 we can rely quite simply on the statewide</p> <p>2 aggregate numbers S -- the seat share for Party A</p> <p>3 in this case the way I set it up, the democrats --</p> <p>4 and V, the average of the district vote shares.</p> <p>5 Q So did you, in calculating the efficiency gap for</p> <p>6 all the various states that you looked at, did you</p> <p>7 use the equation here in 6.1 or the one above it</p> <p>8 in 6.0?</p> <p>9 A Well, under the assumption of equal size</p> <p>10 districts, there's a strict correspondence between</p> <p>11 the two and so I assumed that. And so the</p> <p>12 distinction between the two forms is immaterial.</p> <p>13 Q Yeah, and that may be. I'm just trying to figure</p> <p>14 out, though, like when you actually did the</p> <p>15 calculation, did you use the 6.1 equation or the</p> <p>16 one above it?</p> <p>17 A Okay. To be perfectly clear, I used the equation</p> <p>18 labeled 1 on the bottom half of Page 16 but note</p> <p>19 that it has an input, to wit, V, which has these</p> <p>20 VI, V subscript I, quantities which are analogous</p> <p>21 to the VI quantities on the top half of the --</p> <p>22 MR. EARLE: Just so the transcript</p> <p>23 is clear, you're referencing the sentence</p> <p>24 immediately below Formula 1 in 6.1 where V</p> <p>25 equals, and then you have a formula.</p>	43	<p>1 race where there happened to be a third party</p> <p>2 candidate perhaps even only getting two percent of</p> <p>3 the vote or some small amount, what did you do</p> <p>4 with that party candidate's vote?</p> <p>5 MR. EARLE: I'm going to object to</p> <p>6 the form of the question. Go ahead and</p> <p>7 answer if you understand the question.</p> <p>8 A In such a case, everything I did is defined by</p> <p>9 computing the democrats' share of the two-party</p> <p>10 vote. So it would be D over D plus R and putting</p> <p>11 votes for any other candidates out of the</p> <p>12 analysis.</p> <p>13 Q Okay. And then looking at the bottom of Page 16</p> <p>14 it says, "I operationalize V as the average over</p> <p>15 districts of the democratic share of the two-party</p> <p>16 vote, in seats won by either a democratic or</p> <p>17 republican candidate."</p> <p>18 What did you do with a seat that wasn't won</p> <p>19 by a democratic or a republican candidate?</p> <p>20 A And again, they're out of the analysis.</p> <p>21 Q So, for example, if in Wisconsin there's 99 seats</p> <p>22 and one of them is won by some other party, then</p> <p>23 the analysis proceeds just looking at the 98 other</p> <p>24 seats?</p> <p>25 A That's correct.</p>
42	<p>1 THE WITNESS: That's right.</p> <p>2 MR. EARLE: Okay.</p> <p>3 Q And you mentioned -- it says there's an assumption</p> <p>4 of equally-sized districts.</p> <p>5 A Yes.</p> <p>6 Q Other parts of the deposition you talked about</p> <p>7 we've assumed equal number of voters. Is this</p> <p>8 equal number of voters or is it a different</p> <p>9 assumption?</p> <p>10 A No, equal number of voters.</p> <p>11 Q Okay. Because the districts could be equally</p> <p>12 sized and have different numbers of voters.</p> <p>13 A I understand.</p> <p>14 MR. EARLE: You want to take a</p> <p>15 break now?</p> <p>16 MR. KEENAN: Yeah, we can take a</p> <p>17 break.</p> <p>18 (Recess)</p> <p>19 Q We're back on the record. You were in the middle</p> <p>20 of explaining how you calculated the efficiency</p> <p>21 gap, and I think we're on Page 16 of your report.</p> <p>22 A Sure.</p> <p>23 Q Going back to something you had said, you</p> <p>24 mentioned that you were looking at the two-party</p> <p>25 vote. Just so I understand that correctly, in a</p>	44	<p>1 Q What does the average over districts of democratic</p> <p>2 share of the two-party vote mean?</p> <p>3 A It means that you compute the democratic share of</p> <p>4 the two-party vote in every district, you sum that</p> <p>5 up over districts, and you divide by the number of</p> <p>6 districts.</p> <p>7 Q So that will give you a number, a percentage?</p> <p>8 A Yeah.</p> <p>9 Q And then you say, "If districts are of equal size</p> <p>10 and ignoring seats won by independents and minor</p> <p>11 party candidates, then this average over districts</p> <p>12 will correspond to the democratic share of the</p> <p>13 statewide, two-party vote."</p> <p>14 Okay. I think I understand that, so I don't</p> <p>15 need to ask more about it.</p> <p>16 MR. EARLE: So there's no question?</p> <p>17 MR. KEENAN: No.</p> <p>18 MR. EARLE: All right.</p> <p>19 Q We already went over the seats-votes curve, so I</p> <p>20 guess we can pass over that.</p> <p>21 A Uh-huh.</p> <p>22 Q Why don't you explain the set of legislative</p> <p>23 elections that you analyzed for your report?</p> <p>24 A Sure. So the data -- well, the set of state</p> <p>25 elections I rely on span 1972 to 2014. I looked</p>

45	<p>1 at general election contests for State Lower House</p> <p>2 elections held under single-member district</p> <p>3 electoral systems. Or there are also a small</p> <p>4 number of districts and races in there that are</p> <p>5 multimember districts, but multimember districts</p> <p>6 with slots or positions. So we're able to</p> <p>7 identify which candidates were running for which</p> <p>8 slot and in effect treat them as if they were the</p> <p>9 functional equivalent of single-member districts.</p> <p>10 Q Okay. So you only looked at elections that were</p> <p>11 the State Lower House; that's correct?</p> <p>12 A That's correct.</p> <p>13 Q So the Wisconsin State Senate, for example, that</p> <p>14 wasn't considered?</p> <p>15 A Not in this analysis.</p> <p>16 Q And then if there was any elections that had</p> <p>17 multimember, any multimember districts?</p> <p>18 A There are some multimember districts in the</p> <p>19 analysis, but as I said earlier in answer to the</p> <p>20 previous question, only of a particular type.</p> <p>21 MR. EARLE: Pause a little bit</p> <p>22 before answering the question so I can insert</p> <p>23 an objection if necessary. And I will, post</p> <p>24 hoc, make an objection to the form of that</p> <p>25 last question.</p>	47	<p>1 used in your study?</p> <p>2 A He is the current steward of this large canonical,</p> <p>3 in political science at least, canonical</p> <p>4 collection of data on state legislative election</p> <p>5 returns. And he supplied me with the data for up</p> <p>6 through 2014 which was the current append to the</p> <p>7 longer historical data collection that runs 1967</p> <p>8 to 2012.</p> <p>9 Q Was Mr. Klarner the only source of your election</p> <p>10 data or did you go to some other sources as well?</p> <p>11 A On the state legislative election returns, the</p> <p>12 collection that he is currently the steward of and</p> <p>13 the append for 2014 he gave me, that's where that</p> <p>14 data came from. There are of course other data</p> <p>15 used in the analysis that came from other sources.</p> <p>16 But in terms of the state legislative election</p> <p>17 outcomes, that data collection is the only source</p> <p>18 for those data.</p> <p>19 Q Okay. So I see here 786 elections across 41</p> <p>20 states.</p> <p>21 A Could you tell me --</p> <p>22 Q Page 20 at the very bottom.</p> <p>23 MR. EARLE: It's the last sentence</p> <p>24 on Page 20.</p> <p>25 A Correct.</p>
46	<p>1 Q So just so I understand, if there was like a State</p> <p>2 Lower House that had most of its seats were</p> <p>3 single-member but there was a few that were</p> <p>4 multimember but not of this slotted type, then</p> <p>5 that election was not considered?</p> <p>6 A There are a couple of cases in the data where I</p> <p>7 did keep elections of that type. There aren't</p> <p>8 many, but I put the multimember districts to one</p> <p>9 side that were not of that slotted position type.</p> <p>10 Q But you could still run an efficiency gap on the</p> <p>11 remaining --</p> <p>12 A That's right, yeah.</p> <p>13 Q If you look at Figure 5 on Page 21, I just want to</p> <p>14 make sure that I'm understanding correctly that if</p> <p>15 there's an orange dot for the state in a</p> <p>16 particular year, that's an election that you did</p> <p>17 consider in your analysis?</p> <p>18 A That's correct.</p> <p>19 Q And if there's not a dot, then that election was</p> <p>20 not considered?</p> <p>21 A Or there was not an election in that year, that's</p> <p>22 right.</p> <p>23 Q Fair enough. Who is Karl Klarner?</p> <p>24 A He's a political scientist.</p> <p>25 Q And what role did he have in the data that you</p>	48	<p>1 Q And then are all those 786 elections reflected on</p> <p>2 Figure 5?</p> <p>3 A Yes.</p> <p>4 Q Moving to 7.2, the uncontested races, you</p> <p>5 mentioned this a little bit before but why don't</p> <p>6 you explain how you accounted for uncontested</p> <p>7 races in your analysis?</p> <p>8 A Okay. So in the what is an uncontested race, it's</p> <p>9 where we do not have a democrat facing off against</p> <p>10 a republican, and so we don't have votes from both</p> <p>11 a democrat and republican. In such a case, in</p> <p>12 order to come up with a vote share for that</p> <p>13 district, I relied on a modeling procedure that</p> <p>14 used presidential vote tabulated by state</p> <p>15 legislative district from the most temporally</p> <p>16 proximate presidential election. And I also took</p> <p>17 into account if the candidate who did -- the only</p> <p>18 candidate who did show up and was returned</p> <p>19 unopposed was an incumbent or not and of which</p> <p>20 party. So was it a republican incumbent, was it a</p> <p>21 democratic incumbent or was there no incumbent.</p> <p>22 Now, what I did was to run regression</p> <p>23 analysis of the relationship between vote shares</p> <p>24 and the state legislative elections against</p> <p>25 presidential vote in districts where we did have a</p>

49	<p>1 contested race, so we get to observe both of these</p> <p>2 things in those cases. Then on the basis of what</p> <p>3 that analysis tells us about the relationship</p> <p>4 between those two variables taking into account</p> <p>5 incumbency, we're able then to make a prediction</p> <p>6 as to the vote share in an uncontested race</p> <p>7 because even in the uncontested races, races that</p> <p>8 aren't contested in the state legislative</p> <p>9 election, nonetheless we do have presidential vote</p> <p>10 share available in that district. And so the</p> <p>11 regression procedure is able to produce a</p> <p>12 prediction for those cases.</p> <p>13 Q Okay. Let's just get into some specifics there.</p> <p>14 So you said the presidential vote in the most</p> <p>15 recent or proximate presidential election.</p> <p>16 A Typically the preceding one.</p> <p>17 Q Preceding one. For example 2014, would you have</p> <p>18 looked at the 2012 presidential election?</p> <p>19 A Exactly, yes.</p> <p>20 MR. EARLE: Slipping into</p> <p>21 conversation again, but --</p> <p>22 THE WITNESS: Sure.</p> <p>23 MR. EARLE: -- that's fine.</p> <p>24 Q And then for the 2012 election where there was a</p> <p>25 presidential election that year, would you have</p>	51	<p>1 if the unopposed candidate is not actually an</p> <p>2 incumbent?</p> <p>3 A The same type of calculation but leveraging off a</p> <p>4 different set of data.</p> <p>5 Q Is the vote total that you're trying to find, is</p> <p>6 it just a percentage or is it an actual like</p> <p>7 number of votes?</p> <p>8 A It's actually -- I'm trying to model a percentage,</p> <p>9 not a count.</p> <p>10 Q So in the report on Page 26 through 29, it</p> <p>11 mentions two different imputation models?</p> <p>12 A Right.</p> <p>13 Q What are the two different imputation models?</p> <p>14 A For prior to the 2000s, we don't have presidential</p> <p>15 vote share tabulated at the level of state</p> <p>16 legislative districts or at least that's not</p> <p>17 widely available. So there I relied on a</p> <p>18 different procedure, one that attempted to build</p> <p>19 an over time sequence. So inside a districting</p> <p>20 plan if we take a given district, suppose it was</p> <p>21 contested in one year and then it was uncontested</p> <p>22 in the following year but contested in the year</p> <p>23 after, in the election after that, then we had a</p> <p>24 basis for interpolating what the missing vote</p> <p>25 share would have been. Again taking into account</p>
50	<p>1 just used the 2012 presidential election?</p> <p>2 A Yes.</p> <p>3 Q Okay. And then the regression analysis, was that</p> <p>4 done -- I guess against which unit is that done?</p> <p>5 Was that done for each state in each election or</p> <p>6 is it a nationwide thing?</p> <p>7 A No. That regression analysis is run in each</p> <p>8 election -- each state, each election.</p> <p>9 Q So there's a separate calculation for Wisconsin</p> <p>10 2012 from Michigan 2012?</p> <p>11 A Yeah. And moreover, there's a separate</p> <p>12 calculation for Wisconsin 2012 republican</p> <p>13 incumbents versus Wisconsin 2012 democratic</p> <p>14 incumbents versus Wisconsin 2012 open seats.</p> <p>15 Q So when you say an incumbent, does that refer to</p> <p>16 the candidate that's running unopposed whether</p> <p>17 they're an incumbent or not?</p> <p>18 A That's right.</p> <p>19 Q Okay. So you're trying to or what you're trying</p> <p>20 to do is model the share of votes that incumbent</p> <p>21 running would have received if there was an actual</p> <p>22 opponent?</p> <p>23 A If in fact they had attracted a challenger, that's</p> <p>24 right.</p> <p>25 Q Okay. And you're running a separate calculation</p>	52	<p>1 incumbency and also statewide factors, you could</p> <p>2 say it was a particularly good year or not so good</p> <p>3 year for the party in that state in that year. So</p> <p>4 that was the procedure I relied on in that case.</p> <p>5 I engaged in some comparisons of how that</p> <p>6 method performed against the method I was able to</p> <p>7 use and I prefer to use for the period 2000</p> <p>8 forward where presidential vote shares were</p> <p>9 available and was reasonably satisfied that I was</p> <p>10 getting similar results. And although while I</p> <p>11 would much prefer to rely on presidential vote</p> <p>12 when I've got it as a basis for imputation, I was</p> <p>13 reasonably satisfied with the performance of that</p> <p>14 ultimate procedure based on the time periods where</p> <p>15 I had both methods so I could perform both</p> <p>16 methods. So I did a check of the performance of</p> <p>17 the two methods.</p> <p>18 Q Under the imputation model that didn't have</p> <p>19 presidential vote share available, how were you</p> <p>20 able to determine the share of votes when a</p> <p>21 district was always uncontested?</p> <p>22 A Right. That poses a real challenge. And at that</p> <p>23 point you're only able to rely on the identity of</p> <p>24 the incumbent and your estimate of the statewide</p> <p>25 vote share. And so in those cases, the estimates</p>



53	<p>1 of vote shares in such a district are relatively</p> <p>2 imprecise.</p> <p>3 Q Okay. So if I understand, 8.1, Imputation model</p> <p>4 deals with the 2000 through the post 2000s that we</p> <p>5 have presidential vote share data?</p> <p>6 A Well, you're actually also able to do a lot of the</p> <p>7 nineties as well because the 2000 presidential</p> <p>8 election takes place with the same districting</p> <p>9 plan in place for a lot of the elections of the</p> <p>10 nineties in a lot of jurisdictions.</p> <p>11 Q Okay. So you actually used the 2000 presidential</p> <p>12 election and went backwards so to speak to impute</p> <p>13 election results into the nineties?</p> <p>14 A Yeah.</p> <p>15 Q Okay.</p> <p>16 A Only in cases where the same plan's in place</p> <p>17 obviously.</p> <p>18 Q Understood. I guess now we'll get in to your</p> <p>19 actual calculations of the efficiency gap by the</p> <p>20 state in each election.</p> <p>21 A Sure.</p> <p>22 MR. EARLE: Which page do we move</p> <p>23 to?</p> <p>24 MR. KEENAN: 32.</p> <p>25 Q Did you use some sort of computer program to run</p>	55	<p>1 getting the data down to one record per district</p> <p>2 per election per state. Then at the level of each</p> <p>3 election, we then compute those quantities that go</p> <p>4 into the computation of the efficiency gap. So</p> <p>5 referring to my report, and I think we were</p> <p>6 discussing those equations earlier.</p> <p>7 MS. GREENWOOD: Page 16.</p> <p>8 THE WITNESS: Thank you.</p> <p>9 A So for instance, Equation 1 on Page 16 then is</p> <p>10 computed for every election in this data set. And</p> <p>11 so in this instance, this analysis, 786 separate</p> <p>12 calculations of Equation 1. And again a program</p> <p>13 like R, this is rather straightforward, looping</p> <p>14 over the states and the years and keeping states</p> <p>15 grouped, you know, according to tagging them with</p> <p>16 a redistricting plan. That's precisely the sort</p> <p>17 of task that a computing environment like R is</p> <p>18 extremely well suited for, along with producing</p> <p>19 the graphs that appear throughout the report.</p> <p>20 Q Yeah. And there are a lot of graphs, and I was</p> <p>21 just wondering if there was a -- do you have a</p> <p>22 master list anywhere, or perhaps it could be</p> <p>23 generated, that lists the efficiency gap as</p> <p>24 calculated by you for each state and each election</p> <p>25 that you analyzed?</p>
54	<p>1 the -- or programs to run the calculations?</p> <p>2 A Yes.</p> <p>3 Q And can you just explain what you did to get the</p> <p>4 efficiency gaps in terms of, you know, running</p> <p>5 through computer programs?</p> <p>6 MR. EARLE: I'm going to object to</p> <p>7 the form of that question.</p> <p>8 MR. KEENAN: Sure.</p> <p>9 MR. EARLE: Do you understand the</p> <p>10 question?</p> <p>11 THE WITNESS: No.</p> <p>12 A I need you to be a bit more specific for me.</p> <p>13 Q I understand that obviously you have a lot of data</p> <p>14 and I know that there's like -- I've seen some</p> <p>15 document production of a program called R?</p> <p>16 A Uh-huh.</p> <p>17 Q Could you explain how you used R in calculating</p> <p>18 the efficiency gap? On a general level; I don't</p> <p>19 need you to get into the --</p> <p>20 A Okay. R is a widely used statistical data</p> <p>21 processing program used widely in the social and</p> <p>22 -- in science and in industry. I wrote programs</p> <p>23 in R that took the original data from the, as we</p> <p>24 were discussing earlier, the Karl Klarner</p> <p>25 collection. There's a lot of preprocessing</p>	56	<p>1 MR. EARLE: Okay, that's a request.</p> <p>2 MR. KEENAN: Well, I was just</p> <p>3 wondering if -- it doesn't exist in the</p> <p>4 documents.</p> <p>5 MR. EARLE: Well, let's break it</p> <p>6 down into two things. You have a request and</p> <p>7 you have a question.</p> <p>8 MR. KEENAN: Yeah.</p> <p>9 MR. EARLE: Do the question first</p> <p>10 and then we'll respond to the request.</p> <p>11 MR. KEENAN: Sure.</p> <p>12 Q Have you generated such a report, a spreadsheet or</p> <p>13 something that contains that information?</p> <p>14 A Yes.</p> <p>15 Q And was it provided to your attorneys do you know?</p> <p>16 A Yes.</p> <p>17 Q Okay. So it should be in the data set that has</p> <p>18 been provided to me?</p> <p>19 MS. GREENWOOD: We can talk about</p> <p>20 that. I don't think it's in the data set</p> <p>21 provided to you.</p> <p>22 MR. KEENAN: Okay.</p> <p>23 MS. GREENWOOD: Because of what was</p> <p>24 -- we can take about that.</p> <p>25 MR. KEENAN: Okay. I think I would</p>



57	<p>1 like to have something like that, just like a</p> <p>2 spreadsheet or something.</p> <p>3 MR. EARLE: Okay. So you want a</p> <p>4 copy -- to the extent that it exists, you</p> <p>5 want a copy of the spreadsheet that includes</p> <p>6 the analysis from 1972 for the entire, all</p> <p>7 786 --</p> <p>8 MS. GREENWOOD: The efficiency gap.</p> <p>9 MR. EARLE: All 786 efficiency gap?</p> <p>10 MR. KEENAN: Yeah. I mean, there</p> <p>11 are data points on various graphs and things,</p> <p>12 but you don't actually know what the specific</p> <p>13 number is and like which state is this one</p> <p>14 and things like that.</p> <p>15 MR. EARLE: We'll get back to you</p> <p>16 on that.</p> <p>17 MS. GREENWOOD: Yeah.</p> <p>18 MR. KEENAN: All right.</p> <p>19 Q Looking at Figure 11 on Page 33, what does the</p> <p>20 orange line represent?</p> <p>21 A That is the seats-votes curve corresponding to an</p> <p>22 efficiency gap of zero.</p> <p>23 Q Okay. And then if we see a -- it looks like</p> <p>24 they're represented by boxes?</p> <p>25 A Uh-huh.</p>	59	<p>1 gap and the vertical bars extending outward from</p> <p>2 each box indicating length of a 95 percent</p> <p>3 confidence interval around each</p> <p>4 election-by-election estimate. And the data of</p> <p>5 course are grouped by state and ordered by time.</p> <p>6 Q Is there a reason Vermont is listed at the top</p> <p>7 left?</p> <p>8 MR. EARLE: Were you finished with</p> <p>9 your question?</p> <p>10 MR. KEENAN: Yes.</p> <p>11 MR. EARLE: Okay.</p> <p>12 A That's a peculiarity of R. If you look, it's a</p> <p>13 reverse alphabetical order going from bottom left</p> <p>14 through to the top right.</p> <p>15 Q Okay.</p> <p>16 A That's all that is.</p> <p>17 Q It confused me so --</p> <p>18 A Yeah.</p> <p>19 Q I was just going to go through the -- on the next</p> <p>20 page on 35 there's numbers with some points here.</p> <p>21 A Uh-huh.</p> <p>22 MR. EARLE: When you say numbers,</p> <p>23 you mean numbered paragraphs?</p> <p>24 MR. KEENAN: Yeah, numbered</p> <p>25 paragraphs.</p>
58	<p>1 Q What does each little box represent?</p> <p>2 A A plotted square is the particular vote share and</p> <p>3 seat share, all right -- so a vote share on the</p> <p>4 horizontal axis, seat share on the vertical axis</p> <p>5 -- from each of the 786 elections in the analysis.</p> <p>6 Q And then elections that are I guess I want to say</p> <p>7 above and to the left of the orange line, would</p> <p>8 those be positive or negative efficiency gaps?</p> <p>9 A Right. The vertical distance of a plotted square,</p> <p>10 if you project up or down to the orange line,</p> <p>11 gives you the efficiency gap. And so a data point</p> <p>12 that lies vertically above the orange line</p> <p>13 indicates a positive efficiency gap and a data</p> <p>14 point that lies below in a vertical distance, and</p> <p>15 vertical distance vertically below the orange</p> <p>16 line, indicates a negative estimate of the</p> <p>17 efficiency gap -- would correspond to a negative</p> <p>18 estimate of the efficiency gap.</p> <p>19 Q Just turning to the next page, Figure 12, looking</p> <p>20 at that, can you explain what Figure 12</p> <p>21 represents?</p> <p>22 A Figure 12 represents the individual</p> <p>23 election-by-election efficiency gap estimates</p> <p>24 ordered by time left to right, and with the box</p> <p>25 indicating the point estimate of each efficiency</p>	60	<p>1 MR. EARLE: Okay.</p> <p>2 Q So in Paragraph 4, is it true that New York had</p> <p>3 the lowest median efficiency gap estimates in your</p> <p>4 study?</p> <p>5 A Yes.</p> <p>6 Q And what is -- maybe just explain what a median</p> <p>7 estimate gap is.</p> <p>8 A The plural in estimates there may be misleading.</p> <p>9 The lowest median -- if you took the median of all</p> <p>10 of New York's efficiency gap estimates, right, and</p> <p>11 then you did that for each state, New York has the</p> <p>12 lowest of those medians across the states. That's</p> <p>13 what I'm trying to say in the opening of</p> <p>14 Paragraph 4 on Page 35.</p> <p>15 Q Okay, that makes sense. And for a low efficiency</p> <p>16 gap, that means favorable to republicans and</p> <p>17 unfavorable to democrats?</p> <p>18 A That's right.</p> <p>19 Q And No. 5 says Arkansas has the highest median</p> <p>20 efficiency gap score?</p> <p>21 A That's right.</p> <p>22 Q So that would be the highest median that's</p> <p>23 favorable to democrats?</p> <p>24 A That's right.</p> <p>25 Q And I believe you found Michigan was the third</p>

61	<p>1 lowest median efficiency gap score by state. Is</p> <p>2 there a list in here of each state's median?</p> <p>3 A Not that I'm aware of.</p> <p>4 Q Okay. No. 8 on the next page deals with Wisconsin</p> <p>5 specifically. It says Wisconsin's EG estimates</p> <p>6 range from negative .14 to .02. So is .02 the</p> <p>7 most favorable efficiency gap to democrats that</p> <p>8 you observed in Wisconsin?</p> <p>9 A Yes.</p> <p>10 Q Okay. And when you say efficiency gap estimates,</p> <p>11 what do you mean by that?</p> <p>12 A Okay. I used the language of estimate; the word</p> <p>13 "estimate" appears because of the modeling that</p> <p>14 went into handling uncontested seats. And that's</p> <p>15 just the way I think any social scientist would</p> <p>16 refer to a calculation that came out of a</p> <p>17 procedure like that. In three cases we could drop</p> <p>18 the word estimate, in three cases where every seat</p> <p>19 was contested, but there are only three out of</p> <p>20 786. So for the rest of the time, I prefer the</p> <p>21 word estimate.</p> <p>22 Q And are those three elections that are not</p> <p>23 estimates, is that because they had no uncontested</p> <p>24 seats at all?</p> <p>25 A That's right. And hence nothing had to be done,</p>	63	<p>1 unbroken run of negative EG estimates from 1998 to</p> <p>2 2014; is that correct?</p> <p>3 A That's correct.</p> <p>4 Q Looking at Figure 13 on Page 37, there's a series</p> <p>5 of plotted squares -- is that the correct term?</p> <p>6 A That will work.</p> <p>7 Q -- that are connected by a line. I was just, my</p> <p>8 question was whether that line -- does that line</p> <p>9 move temporally from, for example, 1972 to 1974 or</p> <p>10 is it just the nearest dot?</p> <p>11 A No. It's difficult to see in this case but what I</p> <p>12 -- I was indeed trying to demonstrate the temporal</p> <p>13 sequence, and I used a solid box to indicate the</p> <p>14 end of the sequence so that's 2014. And you can</p> <p>15 kind of make out backward through time the way</p> <p>16 that sequence of efficiency gap estimates in</p> <p>17 Georgia in this case, in Figure 13 we're looking</p> <p>18 at Georgia, the evolution that the sequence of</p> <p>19 efficiency gap estimates can literally be read off</p> <p>20 that graph, you know, regard from being below the</p> <p>21 orange line in recent elections to earlier in time</p> <p>22 to be considerably above the orange line in an</p> <p>23 earlier phase in Georgia.</p> <p>24 Q Okay. So I noticed that there's a similar type of</p> <p>25 graph, looks like every page, 37 through 42; do</p>
62	<p>1 yeah, for the uncontested seats.</p> <p>2 Q Is the level of confidence in a particular</p> <p>3 efficiency gap estimate -- sorry, I'll start over</p> <p>4 again. Does the level of confidence in a</p> <p>5 particular efficiency gap estimate change from</p> <p>6 election to election and state to state?</p> <p>7 A Yes.</p> <p>8 Q And what factors affect that?</p> <p>9 A The proportion of seats that are uncontested.</p> <p>10 Q Okay. And I would take it that a lower proportion</p> <p>11 of uncontested seats would give you more</p> <p>12 confidence in your calculation?</p> <p>13 A And the limiting case is of course zero</p> <p>14 uncontested seats in which case the confidence</p> <p>15 interval around an estimate collapses onto a point</p> <p>16 estimate itself. And in such a case, we could</p> <p>17 dispense with the word estimate.</p> <p>18 Q And you looked at Wisconsin's election results for</p> <p>19 every year from 1972 to 2014?</p> <p>20 A That's correct.</p> <p>21 Q And among that whole time, the most favorable</p> <p>22 efficiency gap to democrats was .02; is that</p> <p>23 correct?</p> <p>24 A That's correct.</p> <p>25 Q And you found that Wisconsin has recorded an</p>	64	<p>1 you see that?</p> <p>2 A Indeed, yeah.</p> <p>3 Q For each of these, did you use the same procedure</p> <p>4 of having a solid box for the most recent election</p> <p>5 and then connecting the line to the --</p> <p>6 A Yeah, that's correct.</p> <p>7 Q Okay. So for each of these if I start at the</p> <p>8 solid box, then I go from there and work my way</p> <p>9 backwards through time?</p> <p>10 A Well, it can be difficult when the lines overlap,</p> <p>11 but absent that problem, that would be correct,</p> <p>12 yeah.</p> <p>13 Q And again looking at each of these plotted</p> <p>14 squares, the ones that are below on the vertical</p> <p>15 axis from the orange line are negative efficiency</p> <p>16 gaps?</p> <p>17 A That's correct.</p> <p>18 Q And the ones that are above are positive</p> <p>19 efficiency gaps?</p> <p>20 A That's correct.</p> <p>21 Q And then going to 42 is Figure 18, Wisconsin, so</p> <p>22 this shows graphical plot of all the efficiency</p> <p>23 gaps you calculated in Wisconsin from 1972 to</p> <p>24 2014?</p> <p>25 A Well, one can figure out what the efficiency gap</p>

65	<p>1 estimates are in the sense I was talking about</p> <p>2 earlier in that they're the vertical distance of</p> <p>3 each plotted square from the orange line with the</p> <p>4 last two, 2014, being the solid point there in the</p> <p>5 lower left quadrant of the graph. And you can see</p> <p>6 the line taking us back in time to the immediately</p> <p>7 preceding election in 2012.</p> <p>8 Q Going on to Page 44 now, Section 9.2.</p> <p>9 A Uh-huh.</p> <p>10 Q It's titled Over-time change in the efficiency</p> <p>11 gap.</p> <p>12 A Uh-huh.</p> <p>13 Q What did you find with respect to any changes in</p> <p>14 the efficiency gap over time from the beginning of</p> <p>15 the 1972 period that you looked at till today?</p> <p>16 A At a high level of generality, the general trend</p> <p>17 in the distribution of efficiency gap estimates</p> <p>18 across states is for a roughly -- we see plans</p> <p>19 more favorable to democrats, at least as measured</p> <p>20 by the efficiency gap, in the earlier decades of</p> <p>21 this analysis. But in the late nineties and</p> <p>22 particularly 2000s onwards, that shifts and on</p> <p>23 average, efficiency gap estimates from the mid</p> <p>24 nineties onwards on average are indicative of</p> <p>25 plans that are favoring republicans. So negative</p>	67	<p>1 efficiency gap?</p> <p>2 A That's right. Positive values of the efficiency</p> <p>3 gap are indicative of plans favorable to</p> <p>4 democrats. And so as you go vertically up the</p> <p>5 graph, you're in positive territory up in the</p> <p>6 very, all right, above zero there in the top half</p> <p>7 of the graph. And for the contrary, for negative</p> <p>8 territory on the vertical axis, the bottom half of</p> <p>9 the graph, negative estimates of the efficiency</p> <p>10 gap indicative of plans that are not advantageous</p> <p>11 to democrats.</p> <p>12 Q So the lower most dot would be the plan that's</p> <p>13 most favorable to republicans as measured by the</p> <p>14 efficiency gap?</p> <p>15 A That's right.</p> <p>16 Q And there's three blue lines on the graph; could</p> <p>17 you explain what those are?</p> <p>18 A Yeah. That's estimating -- the middle blue line</p> <p>19 is an estimate of the median across states, all</p> <p>20 right. So in any given year, looking at that</p> <p>21 spread of points in the vertical dimension</p> <p>22 estimating where the median is but performing a</p> <p>23 little bit of what we call smoothing so to produce</p> <p>24 a trend over time in both. So the middle line is</p> <p>25 the smoothed over time estimate of the median</p>
66	<p>1 efficiency gap estimates are tending to be the</p> <p>2 norm although there's considerable -- I think it's</p> <p>3 important to note that at any given time point,</p> <p>4 there's considerable spread in the distribution.</p> <p>5 So that's sort of a weak trend in the overall</p> <p>6 distribution.</p> <p>7 Q Yeah, let's look at Figure 20 which I believe</p> <p>8 you're referring to.</p> <p>9 A Uh-huh.</p> <p>10 Q Could you explain what the -- to look at it, the</p> <p>11 bottom, I guess the horizontal axis has time,</p> <p>12 1970, 1980, 1990, 2000, 2010, vertical is the</p> <p>13 efficiency gap, and there's a series of black</p> <p>14 dots.</p> <p>15 A Uh-huh.</p> <p>16 Q What does each black dot represent?</p> <p>17 A Each black dot is an efficiency gap estimate from</p> <p>18 a specific election. So they're grouped by the</p> <p>19 year of the election. Typically most of these</p> <p>20 states, the elections have been held in</p> <p>21 even-numbered years.</p> <p>22 Q Okay. And then so if you look at any one</p> <p>23 particular year, the highest dot would be the plan</p> <p>24 that's the most -- or the election that's the most</p> <p>25 favorable to democrats as measured by the</p>	68	<p>1 efficiency gap.</p> <p>2 The upper blue line is a smooth estimate of</p> <p>3 the 75th percentile, the point at which only</p> <p>4 one-quarter of elections are producing efficiency</p> <p>5 gap estimates more extreme than that. And the</p> <p>6 lower blue line is the smooth estimate of the 25th</p> <p>7 percentile of the distribution of efficiency gap</p> <p>8 estimates, the point at which only 25 percent of</p> <p>9 elections are producing efficiency gap estimates</p> <p>10 more advantageous to republicans than where the</p> <p>11 blue line is, the lower blue line.</p> <p>12 Q So looking at just like one election --</p> <p>13 A Uh-huh.</p> <p>14 Q -- you plotted each, or plotted might not be the</p> <p>15 best word, but plotted each efficiency gap that</p> <p>16 you calculated on that line, and then the median</p> <p>17 is the one that's in the middle when you line them</p> <p>18 up lowest to highest?</p> <p>19 A Yeah. The median is the middle of the efficiency</p> <p>20 gap estimates arrayed from lower to high, and the</p> <p>21 only qualification is that we've smoothed --</p> <p>22 there's a little bit of smoothing going on.</p> <p>23 Otherwise the estimate of that median would be</p> <p>24 quite jagged if we did it with respect to every</p> <p>25 two years. So we employed a little statistical</p>

69	<p>1 technique called smoothing to just make that less</p> <p>2 jagged and easier to visualize than it would be</p> <p>3 otherwise.</p> <p>4 MR. EARLE: And just for the record</p> <p>5 to make it clear, the deponent was using his</p> <p>6 hands to symbolize a sawtooth pattern as he</p> <p>7 was describing the word "jagged."</p> <p>8 Q So if I'm reading this correctly, since about it</p> <p>9 looks like as you said the mid nineties, the</p> <p>10 median plan has been an efficiency gap that's</p> <p>11 favorable to republicans?</p> <p>12 A That's right. Well, strictly speaking, the median</p> <p>13 efficiency gap estimate, right, so plans span</p> <p>14 multiple elections. But substantially the</p> <p>15 characterization that plans is correct, but</p> <p>16 technically the graph is displaying</p> <p>17 election-by-election estimates of the efficiency</p> <p>18 gap.</p> <p>19 Q Yeah. So the median efficiency gap that you</p> <p>20 calculated for that particular election year?</p> <p>21 A Election year, correct.</p> <p>22 MR. EARLE: That's fine. The</p> <p>23 question wasn't complete, he was referencing</p> <p>24 the prior question. But that's okay, the</p> <p>25 transcript will reflect that.</p>	71	<p>1 below .5 meaning it's more likely than not that</p> <p>2 efficiency gap estimates from that election year</p> <p>3 are negative. That happens in the mid nineties,</p> <p>4 and it's largely that way say for that line 50/50</p> <p>5 result in 2010 as indicated on Figure 21.</p> <p>6 Q So is this, looking at like 2006 because it's</p> <p>7 almost precisely on that .25 percent line --</p> <p>8 A Uh-huh.</p> <p>9 Q -- does that mean that 25 percent of plans were</p> <p>10 efficiency gap positive and 75 percent of plans</p> <p>11 were efficiency gap negative that year?</p> <p>12 A Of elections held under plans in that year,</p> <p>13 25 percent of the efficiency gap estimates</p> <p>14 produced in that election year indicated</p> <p>15 democratic advantage, 75 percent indicated</p> <p>16 republican advantage.</p> <p>17 Q Okay. And going back to Figure 20, is each state</p> <p>18 weighted equally --</p> <p>19 A Yes.</p> <p>20 Q -- in these graphs?</p> <p>21 A Yes.</p> <p>22 Q And then I did note that on Figure 20 it said at</p> <p>23 the very end on the little caption it says,</p> <p>24 "weighted by the precision of each EG measure."</p> <p>25 What does that mean?</p>
70	<p>1 Q Turning to Figure 21 on the next page, could you</p> <p>2 explain what Figure 21 represents?</p> <p>3 A Right. So for each efficiency gap estimate, each</p> <p>4 one comes equipped with some uncertainty. And</p> <p>5 what I've attempted to do in Figure 21 is to take</p> <p>6 into account that uncertainty and produce,</p> <p>7 averaging over all efficiency gap estimates</p> <p>8 produced in a given year and taking into account</p> <p>9 the uncertainty that accompanies each one,</p> <p>10 nonetheless, what's the probability that a given</p> <p>11 efficiency gap number from a given election year</p> <p>12 is positive or negative, all right.</p> <p>13 So here I've plotted the probability that an</p> <p>14 efficiency gap estimate from 1972 is positive, and</p> <p>15 remember positive means would favor democrats, and</p> <p>16 in 1972 we see that that's just above 50 percent.</p> <p>17 We see that cluster -- we see a bunch of estimates</p> <p>18 above 50 percent through to the mid nineties, and</p> <p>19 this largely tracks, you know, it's another</p> <p>20 summary of the distribution of the data presented</p> <p>21 in Figure 20, all right.</p> <p>22 And so as the data in Figure 20 we saw the</p> <p>23 median fall below zero in the mid nineties.</p> <p>24 Likewise, this estimate of the probability that an</p> <p>25 efficiency gap estimate is positive, it falls</p>	72	<p>1 A Okay. So when the median is computed, an estimate</p> <p>2 of the efficiency gap that is imprecise</p> <p>3 contributes less weight to the computation of the</p> <p>4 estimate of where the median is than one that's</p> <p>5 estimated precisely, more precisely. So it is not</p> <p>6 the case that each state is weighted equally.</p> <p>7 They're precision weighted estimates of the median</p> <p>8 of the 25th percentile and of the 75th percentile.</p> <p>9 Q Turning to Figure 22, what does this graph</p> <p>10 represent?</p> <p>11 A This is in a sense folding the efficiency gap</p> <p>12 estimates now. So now we're looking at the</p> <p>13 absolute value in magnitude, not -- so we're just</p> <p>14 literally asking irrespective of the partisan</p> <p>15 advantage that may or may not indicate, just are</p> <p>16 the raw values in absolute value terms of a</p> <p>17 changing over time. And here the answer seems to</p> <p>18 be that's reasonably stable over time.</p> <p>19 Q So when you say absolute value, what does that</p> <p>20 mean?</p> <p>21 A It literally means a number that is negative, you</p> <p>22 would call a positive sign. The positive numbers</p> <p>23 stay the same. We're just literally looking at</p> <p>24 magnitudes now, not -- we're wiping out the sign,</p> <p>25 we're ignoring the sign of a given efficiency gap</p>

73	<p>1 estimate.</p> <p>2 Q Okay. So a negative 10 and a positive 10 now</p> <p>3 become --</p> <p>4 A Are treated the same, yeah, for the purposes of</p> <p>5 Figure 22.</p> <p>6 Q Okay.</p> <p>7 MR. EARLE: Yeah, we had a little</p> <p>8 overlap there. And maybe, Brian, you want to</p> <p>9 clear that up.</p> <p>10 MR. KEENAN: Sure.</p> <p>11 Q For the purposes of Figure 22, a negative 10 and a</p> <p>12 positive 10 would both be plotted out at the .10</p> <p>13 level?</p> <p>14 A That's correct.</p> <p>15 Q Going to 9.3 which is titled Within-plan variation</p> <p>16 in the efficiency gap.</p> <p>17 MR. EARLE: So you're on Page 48?</p> <p>18 MR. KEENAN: Yes, 48.</p> <p>19 Q So you did note that within a particular plan the</p> <p>20 efficiency gap will change over the course of that</p> <p>21 plan; is that correct?</p> <p>22 A That is correct.</p> <p>23 Q And it's your opinion that some of this change is</p> <p>24 caused by districts displaying demographic drift</p> <p>25 which is gradually changing the political</p>	75	<p>1 between-plan variation." What does that mean?</p> <p>2 A Okay. So suppose you took all the efficiency gap</p> <p>3 estimates, 786 of them, and you want to assess the</p> <p>4 extent to which the efficiency gap is more or less</p> <p>5 stable over the life of a plan and hence would</p> <p>6 bolster up confidence that we're measuring a</p> <p>7 characteristic of the plan and not these</p> <p>8 election-to-election vagaries that you just led me</p> <p>9 through.</p> <p>10 What we observe is that 76 percent of the</p> <p>11 variation is due to if we clustered the efficiency</p> <p>12 gap estimates by what plan they belong to, if we</p> <p>13 group them by that, the variation across those</p> <p>14 groups now is 76 percent of the total variation we</p> <p>15 saw which means that 100 minus 76, 24 percent of</p> <p>16 the variation we see in efficiency gap estimates</p> <p>17 is within-plan variation. And so that means by a</p> <p>18 ratio of about three to one, all right, it's what</p> <p>19 plan I'm in is three times as important in telling</p> <p>20 me what level of efficiency gap I'm going to see</p> <p>21 than other factors such as these</p> <p>22 election-to-election vagaries.</p> <p>23 So this bolsters my confidence that the</p> <p>24 efficiency gap is measuring something about the</p> <p>25 plan and isn't varying so much election to</p>
74	<p>1 complexion of those districts; is that correct?</p> <p>2 A That's one reason.</p> <p>3 Q And then another one would be incumbent losing or</p> <p>4 not running again for some reason; that's true?</p> <p>5 A That's true.</p> <p>6 Q And then you also found that a variation in</p> <p>7 turn-out most prominently from an on-year to an</p> <p>8 off-year election will cause the distribution of</p> <p>9 vote shares to vary from election to election; is</p> <p>10 that correct?</p> <p>11 A That's correct.</p> <p>12 Q And an on-year election, that's a presidential</p> <p>13 election, correct?</p> <p>14 A That's what I mean by that, yes.</p> <p>15 Q And then an off-year is an election that takes</p> <p>16 place in a year when there's not a presidential</p> <p>17 election?</p> <p>18 A Right.</p> <p>19 Q So, for example, in Wisconsin in 2012, that would</p> <p>20 be an on-year election?</p> <p>21 A That's correct.</p> <p>22 Q And then 2014 is an off-year election?</p> <p>23 A That's correct.</p> <p>24 Q Going down to the third paragraph it says, "About</p> <p>25 76 percent of the variation in the EG estimates is</p>	76	<p>1 election that who knows what it's telling us about</p> <p>2 the plan. The strong clustering by plan in the</p> <p>3 efficiency gap scores is what that between-plan</p> <p>4 variation reference is getting at.</p> <p>5 Q Did you do any analysis of analyzing, comparing</p> <p>6 the differences between just specific states</p> <p>7 between plans and whether a factor was just the</p> <p>8 underlying nature of the state?</p> <p>9 MR. EARLE: I'm going to object to</p> <p>10 the form of that question but go ahead, you</p> <p>11 can answer.</p> <p>12 A I didn't quite catch the last part of it.</p> <p>13 Q Sure. Did you do any analysis of examining the</p> <p>14 difference in efficiency gap just looking at the</p> <p>15 variations in states over time through different</p> <p>16 plans and whether there was any correlation</p> <p>17 between the efficiency gap in just the particular</p> <p>18 state that was being measured?</p> <p>19 MR. EARLE: I'm going to object to</p> <p>20 the form of the question as ambiguous. Are</p> <p>21 you referring to the variables that you went</p> <p>22 through before being the factors? I mean, I</p> <p>23 don't understand the question, I guess.</p> <p>24 MR. KEENAN: No, he's talking about</p> <p>25 that he saw that variations in plans,</p>



77	<p>1 76 percent, you know, there's clustering by</p> <p>2 plan.</p> <p>3 Q Did you do any analysis of clustering by states</p> <p>4 around efficiency gap numbers through time?</p> <p>5 A Well, clustering by state, holding time, bundling</p> <p>6 all efficiency gap estimates by time, if that's</p> <p>7 what you mean, the answer is no, I haven't</p> <p>8 performed that specific analysis.</p> <p>9 MR. EARLE: You completed your</p> <p>10 answer?</p> <p>11 THE WITNESS: Yes.</p> <p>12 MR. EARLE: Okay.</p> <p>13 Q Going to Page 49, there's a second paragraph</p> <p>14 there, it says, "A plan with moderate variability</p> <p>15 in the EG. The median, within-plan standard</p> <p>16 deviation of the EG is about .03." What does that</p> <p>17 mean?</p> <p>18 A Okay. So recall that we begin with an efficiency</p> <p>19 gap estimate for each election. Elections are</p> <p>20 then bundled into plans. And so for a given plan,</p> <p>21 we may have up to as many as five say estimates of</p> <p>22 the efficiency gap, all right. So now we're up at</p> <p>23 the level of plans.</p> <p>24 For each plan, we can compute a measure of</p> <p>25 how variable the efficiency gap is over the life</p>	79	<p>1 efficiency gap number associated with it, right.</p> <p>2 And then the standard deviation measures variation</p> <p>3 in efficiency gap estimates over the life of the</p> <p>4 plan. And averaged over all plans, that</p> <p>5 variation, the median standard deviation is .03.</p> <p>6 Now, how to interpret that. If, and it's an</p> <p>7 if, efficiency gap estimates followed say a normal</p> <p>8 distribution, then we could expect that it would</p> <p>9 be extremely unlikely to see an efficiency gap for</p> <p>10 a given election more than two standard deviations</p> <p>11 away from the average efficiency gap estimate for</p> <p>12 the plan. So that would be in this case plus or</p> <p>13 minus .06. That would be an extremely</p> <p>14 conservative bound on how much variation you see</p> <p>15 in efficiency gap estimates over the life of a</p> <p>16 plan around the average efficiency gap estimate we</p> <p>17 see over the plan.</p> <p>18 Q Okay. So just in my head, like if the average</p> <p>19 efficiency gap is .05, one standard deviation away</p> <p>20 is .08?</p> <p>21 A Uh-huh.</p> <p>22 Q And then two would be .11?</p> <p>23 A Yeah.</p> <p>24 Q It would be unlikely to get -- statistically</p> <p>25 unlikely to get higher than .11?</p>
78	<p>1 of the plan. And the particular measure of</p> <p>2 variability I used is the standard deviation, the</p> <p>3 square root of the variance. And now I have one</p> <p>4 of those numbers for each plan, and I simply</p> <p>5 computed the median of those standard deviations</p> <p>6 across the 200 odd plans in this analysis.</p> <p>7 Q Okay. And in thinking about just what that means</p> <p>8 for a particular plan specific efficiency gap</p> <p>9 calculation, what does that .03 mean? Does that</p> <p>10 mean that like the median plan would deviate</p> <p>11 between .03 and .06 or like .3 from the middle of</p> <p>12 the plan, the median efficiency gap calculated</p> <p>13 under that plan? I mean, I just ask you to help</p> <p>14 me understand.</p> <p>15 A Sure, sure.</p> <p>16 MR. EARLE: So the question is</p> <p>17 you're asking him to help you understand --</p> <p>18 MR. KEENAN: Yeah, what this means.</p> <p>19 MR. EARLE: -- the ambiguous</p> <p>20 question, which I was struggling with the</p> <p>21 same thing. But I just want to clear that</p> <p>22 up. Go ahead.</p> <p>23 A See if I can clarify here a little. One way to</p> <p>24 think of it, let's suppose a plan has -- we don't</p> <p>25 have to suppose. A plan will have an average</p>	80	<p>1 A Yeah.</p> <p>2 Q Okay. But then it could go the other way as</p> <p>3 well; .05 could go down to .02, correct, for one</p> <p>4 standard deviation?</p> <p>5 A Well, two --</p> <p>6 MR. EARLE: You're getting</p> <p>7 conversational again.</p> <p>8 Q So if the average is .05, if the standard</p> <p>9 deviation goes the other way, one standard</p> <p>10 deviation is down to .02?</p> <p>11 A Uh-huh.</p> <p>12 Q Okay. And then two standard deviations away would</p> <p>13 be going to the other side of zero to --</p> <p>14 A Yeah, negative .01.</p> <p>15 Q Okay. Makes sense.</p> <p>16 MR. EARLE: You said it makes</p> <p>17 sense?</p> <p>18 MR. KEENAN: It makes sense to me</p> <p>19 now.</p> <p>20 Q How did you go about measuring the durability of</p> <p>21 an efficiency gap over the course of a plan?</p> <p>22 A I did a number of things. One of the first things</p> <p>23 I did was to compute just pair-wise election to</p> <p>24 election under a plan how often or the probability</p> <p>25 that a temporally adjacent pair of efficiency gap</p>



81	<p>1 estimates have the same sign. But the other thing</p> <p>2 I did was to also compute the probability that</p> <p>3 given the efficiency gap estimate we see at the</p> <p>4 start of a plan, the probability that the sequence</p> <p>5 of efficiency gap estimates we see from that point</p> <p>6 forward, right, the subsequent fall elections,</p> <p>7 have the same sign as the efficiency gap estimate</p> <p>8 that the plan opened with.</p> <p>9 Q And then what did you find with respect to the</p> <p>10 chance that the plan would keep the same sign over</p> <p>11 the course of the plan?</p> <p>12 A Well, so I'm referring to on Page 55 of my report.</p> <p>13 If we restrict our attention to efficiency gap</p> <p>14 measures available for three -- plans where we've</p> <p>15 got efficiency gap measures for three or more</p> <p>16 elections, the probability of seeing three or more</p> <p>17 efficiency gap estimates with the same sign, there</p> <p>18 are 141 such plans; 35 percent of those 141 plans</p> <p>19 had at least a 95 percent probability of each of</p> <p>20 the efficiency gap measures having the same sign.</p> <p>21 So I understand that's a little, may be a little</p> <p>22 difficult to parse, but --</p> <p>23 MR. EARLE: You said parse?</p> <p>24 THE WITNESS: Yes, P-A-R-S-E.</p> <p>25 A So there's 141 -- I'll say it one more time.</p>	83	<p>1 efficiency gap estimates, there's a probability</p> <p>2 that that sequence of efficiency gap estimates</p> <p>3 lies above or below zero, reflecting the</p> <p>4 uncertainty that each individual efficiency gap</p> <p>5 estimate is accompanied with.</p> <p>6 Q Okay. So I think that leads then to you found</p> <p>7 17 plans that were utterly unambiguous as to their</p> <p>8 sign?</p> <p>9 A That's right.</p> <p>10 Q What does that mean?</p> <p>11 A The individual efficiency gap estimates are so far</p> <p>12 from zero in a positive or negative direction and</p> <p>13 the uncertainty that accompanies each of those</p> <p>14 efficiency gap estimates is sufficiently small</p> <p>15 that the probability that we're seeing a sign flip</p> <p>16 is zero, out to as many decimal places as is</p> <p>17 reasonable.</p> <p>18 Q No part of any confidence interval ends up on the</p> <p>19 other side of a line?</p> <p>20 A It's even stronger than that. Remember those</p> <p>21 confidence intervals go up to 95 percent. Now</p> <p>22 we're up to 99.99999 percent. And that's an</p> <p>23 extremely stringent standard, and that's why it's</p> <p>24 a relatively small set of plans that it's not</p> <p>25 beyond -- you know, we're not just beyond the</p>
82	<p>1 There's 141 plans, all right, give us three or</p> <p>2 more elections with sequences of efficiency gaps</p> <p>3 of like three or more. What's the probability</p> <p>4 that they've all got the same sign? Well, 35</p> <p>5 percent of those 141 plans, that probability is</p> <p>6 about 95 percent. If you say 75 percent chance of</p> <p>7 having the same sign, then we go up to roughly</p> <p>8 about half, 46 percent of the plans have at least</p> <p>9 a 75 percent chance of retaining the same sign</p> <p>10 over the life of the plan.</p> <p>11 Q And then how do you -- how are you calculating</p> <p>12 this 95 percent probability and the 75 percent</p> <p>13 probability? I don't really understand that.</p> <p>14 A Remember that each estimate of the efficiency gap</p> <p>15 comes with a confidence interval, and so it's</p> <p>16 taking into account the fact that each efficiency</p> <p>17 gap is being estimated with some uncertainty. And</p> <p>18 so, you know, there's a chance given that</p> <p>19 uncertainty that in any given year, for instance,</p> <p>20 that confidence interval may drift above zero.</p> <p>21 And so we want to take that into account when we</p> <p>22 talk about the stability of the efficiency gap.</p> <p>23 So that's why this is being couched in</p> <p>24 probabilistic terms.</p> <p>25 For any given plan with its sequence of</p>	84	<p>1 typical standards used in the social sciences, say</p> <p>2 95 percent; we're essentially within rounding</p> <p>3 error of 100 percent.</p> <p>4 Q And those 17 plans are listed in Table 1 on</p> <p>5 Page 55; is that correct?</p> <p>6 A That's right.</p> <p>7 Q And as I read it, 16 of those 17 plans were</p> <p>8 unambiguously negative efficiency gaps which means</p> <p>9 they were favorable to the republicans and</p> <p>10 unfavorable to the democrats?</p> <p>11 A That's correct.</p> <p>12 Q And then one of them which looks to be Florida --</p> <p>13 A Uh-huh.</p> <p>14 Q -- in 1972 to 1980 was favorable to the democrats</p> <p>15 and unfavorable to the republicans?</p> <p>16 A That's right.</p> <p>17 Q Did you do any analysis on these states as to like</p> <p>18 which party was in control of the districting for</p> <p>19 these unambiguous plans?</p> <p>20 A No, I did not.</p> <p>21 Q And Wisconsin here, 2002 to 2010, that shows up as</p> <p>22 an unambiguously negative plan, correct?</p> <p>23 A That's correct.</p> <p>24 Q Okay. And I see the average efficiency gap of</p> <p>25 Wisconsin from 2002 to 2010 was negative .076</p>

85	<p>1 percent?</p> <p>2 A Well, negative .076.</p> <p>3 Q Okay. And negative -- I'll ask it again.</p> <p>4 A Or we could say negative .7 --</p> <p>5 Q Negative 7.6 percent?</p> <p>6 A If we wish, yes.</p> <p>7 Q And then the efficiency gap minimum which I guess</p> <p>8 would be the plan, the calculation that was most</p> <p>9 favorable to republicans and least favorable to</p> <p>10 democrats was negative .118; is that correct?</p> <p>11 A That's correct.</p> <p>12 Q And then the efficiency gap max which would be the</p> <p>13 plan that was --</p> <p>14 MR. EARLE: Hold on a second, I</p> <p>15 think he's looking at -- in response to the</p> <p>16 last question.</p> <p>17 A Yep.</p> <p>18 Q And then the efficiency gap max is the plan that</p> <p>19 is most favorable to democrats and least favorable</p> <p>20 to republicans, and that's negative .039?</p> <p>21 A That's correct.</p> <p>22 Q Okay.</p> <p>23 MR. KEENAN: I think now is a good</p> <p>24 time for a break.</p> <p>25 MS. GREENWOOD: Yeah, sure.</p>	87	<p>1 proposition the plan is advantaging one side or</p> <p>2 the other than if the efficiency gap estimates</p> <p>3 were to alternate sign or to be of mixed sign over</p> <p>4 the life of the plan. So consistency of sign of</p> <p>5 the efficiency gap estimate I took to be a signal,</p> <p>6 a reliable signal of the partisan advantage of the</p> <p>7 plan.</p> <p>8 Q In this Page 56 it says EG with a little star</p> <p>9 after it. What does that refer to?</p> <p>10 A That's the threshold or the putative, the proposed</p> <p>11 threshold, yeah.</p> <p>12 Q Going down you say that, "Plans with at least one</p> <p>13 election with an efficiency gap greater than .07</p> <p>14 are reasonably common."</p> <p>15 So you found that there was a 20 percent</p> <p>16 chance that a plan will have at least one election</p> <p>17 that has an efficiency gap that's greater</p> <p>18 than .07?</p> <p>19 MR. EARLE: You're referring to the</p> <p>20 second to last paragraph of Section 10 on</p> <p>21 Page 56, correct?</p> <p>22 MR. KEENAN: Yes.</p> <p>23 MS. GREENWOOD: Maybe you should</p> <p>24 just explain when you have EG between --</p> <p>25 THE WITNESS: Sure.</p>
86	<p>1 (Discussion off the record)</p> <p>2 (Recess)</p> <p>3 Q Professor Jackman, you understand you're still</p> <p>4 under oath?</p> <p>5 A Yes.</p> <p>6 Q All right. Let's turn to Page 56 of your report</p> <p>7 which is Section 10. Why don't you describe how</p> <p>8 you determined a threshold for determining if the</p> <p>9 EG is a large and enduring characteristic of a</p> <p>10 plan.</p> <p>11 A Sure. In this part of the report, what I sought</p> <p>12 about finding was a particular threshold value of</p> <p>13 the efficiency gap such that if you saw a value of</p> <p>14 the efficiency gap that large or larger, there's a</p> <p>15 low probability that you would see an efficiency</p> <p>16 gap with the opposite sign elsewhere over the life</p> <p>17 of the plan.</p> <p>18 Q Okay. And why did you base your test on seeing an</p> <p>19 election with the opposite sign over the course of</p> <p>20 the plan?</p> <p>21 A Well, remember that the sign of the efficiency gap</p> <p>22 is indicative of passing advantage one way or the</p> <p>23 other. So if a plan were to produce a sequence of</p> <p>24 efficiency gap values all of the same sign, that's</p> <p>25 evidence that's more consistent with the</p>	88	<p>1 A On the page, on Page 56 in that second to last</p> <p>2 paragraph, EG appears with two vertical bars</p> <p>3 around it. That's a mathematical notation for</p> <p>4 absolute value. So irrespective of sign, just in</p> <p>5 terms of raw magnitude, seven percent positive or</p> <p>6 negative is reasonably common is the way to read</p> <p>7 that. And that again is taking into account the</p> <p>8 uncertainty that accompanies the efficiency gap</p> <p>9 estimates.</p> <p>10 Q Okay. Looking at Figure 27, could you explain</p> <p>11 what's represented here?</p> <p>12 A Sure. Okay. So there are two quantities plotted</p> <p>13 on Figure 27, and the color version of the report</p> <p>14 makes the two quantities clear. In blue is the</p> <p>15 proportion of plans that have an efficiency gap</p> <p>16 estimate in excess of where we are on the</p> <p>17 horizontal axis. So let's just take, for</p> <p>18 instance, to the immediate left of zero we have</p> <p>19 negative not much, negative a little bit. And</p> <p>20 there are lots of plans, right, that produce an</p> <p>21 efficiency gap in excess of that threshold; about</p> <p>22 75 percent of plans will do that.</p> <p>23 But you'll note that as we move away from</p> <p>24 zero on the horizontal axis of the graph, as we</p> <p>25 move out to more extreme values of the efficiency</p>

89	<p>1 gap in either direction, positive or negative, the 2 probability -- the blue dots are going down 3 meaning that the probability of or the proportion 4 of plans that are recording a value of the 5 efficiency gap in excess of that threshold is 6 getting smaller and smaller, right. It's a more 7 extreme event, all right, to record an efficiency 8 gap -- let's go right out, say, on the left-hand 9 side of the chart out to say a negative .10. At 10 that point we see the blue square there is down 11 now below .2; roughly about 18 percent of plans 12 recording an efficiency gap estimate in excess to 13 the left, in this case of negative .10, and the 14 corresponding number out on the right of the chart 15 is a positive .10, you know, about 14 percent of 16 plans record a value in excess of that. So 17 straight away we see that extreme values of the 18 efficiency gap are relatively rare, all right. 19 And then there's a second quantity plotted, 20 and that's the quantity in red. And then that 21 asks conditional on having -- so now we're looking 22 at a plan and we're looking at the sequence of 23 efficiency gap estimates that are racked up over 24 the life of a plan. And so now let's just take 25 the case at negative .10. Conditional on one</p>	91	<p>1 vertical axis. 2 Q Sure. We looked at the negative .10 in the blue 3 and it looks like there's I think you said 4 18 percent of plans would have an efficiency gap 5 in excess of that. 6 A Uh-huh. 7 Q If we also look at the .1 positive for the 8 democrats -- 9 A Yep. 10 Q -- and there's another, I don't know what that is, 11 15 percent? 12 A Yeah, let's call it, sure. 13 Q So would that mean that in total when you're 14 looking at the absolute values, that 33 percent of 15 plans have a value greater than .1? 16 A Thirty-three percent of plans will, over the whole 17 analysis, have recorded at least one efficiency 18 gap estimate greater than .10 in magnitude. 19 Q And then I take it the same -- when we look at the 20 red ones as well then, they are also -- the sign 21 matters where if you look at .1 on the red and you 22 look at .1 on the -- negative .1 and positive .1, 23 in order to determine the absolute value of plans 24 that had one election exceeding that threshold, 25 you'd have to add those two percentages together?</p>
90	<p>1 plan, at least one plan exceeding negative .10, of 2 the set of plans that trip that threshold, what's 3 the probability that in the same plan we'll get an 4 estimate of the efficiency gap that's actually 5 positive, right, it is on the other side of zero, 6 all right. And you can see the general pattern is 7 that that goes down as well as the threshold 8 becomes more stern. 9 So in the case of negative .10 where I've 10 referred us on Figure 27, conditional on seeing 11 one efficiency gap estimate at negative .10 or 12 even more extreme, the probability that we'd also 13 see an estimate, a positive, right, sort of a 14 different signal, right, advantage going the other 15 way, positive advantage going the other way, that 16 probability is about 15 percent and so on. So you 17 can see that that probability continues to track 18 down as we get further out into the tails of the 19 distribution of efficiency gap estimates. 20 Q Focusing on the blue ones, are these values in -- 21 are they absolute values or does the sign matter? 22 A Sign matters in this graph with respect to the 23 horizontal axis. But since what's been plotted on 24 the vertical axis here is a proportion, that's 25 always going to lie between zero and one on the</p>	92	<p>1 A I just think we have to be very careful with 2 exactly what the red dot -- it says conditional on 3 a plan tripping that threshold, what's the 4 probability of a sign flip. And so provided we 5 keep that interpretation very foremost in our 6 minds, that's right. Conditional in exceeding 7 positive .1, there's about a 37 percent chance it 8 would flip back over to the negative side. 9 Conditional on going below negative .1, there's 10 about a 15 percent chance it would flip and see 11 something on the positive side? 12 Q And if I look at the efficiency gap thresholds, 13 the positive efficiency gap thresholds for the red 14 plotted squares, I'm just noticing that the shape 15 looks a little different from -- 16 A Yeah. 17 Q -- when you look at the negative efficiency gap. 18 Can you explain what the difference in the shape 19 means? 20 A Yeah, that was a very interesting feature of the 21 analysis. The interpretation of that is that, 22 okay, remember what a positive efficiency gap 23 means, that's advantage for democrats. What this 24 says is that a plan that trips that threshold 25 indicative of -- you know, let's go right out,</p>

93	<p>1 let's go out to .10, that's substantial advantage</p> <p>2 for democrats it would appear. The probability</p> <p>3 that we will, over the life of the plan we will</p> <p>4 also see an efficiency gap estimate indicating</p> <p>5 republican advantage is reasonably large, it's</p> <p>6 about 40 percent.</p> <p>7 So there's an asymmetry here that the signal</p> <p>8 as it were or a single efficiency gap estimate</p> <p>9 tripping this threshold of .10 or of democratic</p> <p>10 advantage is not especially reliable or not as</p> <p>11 reliable as the signal on the other side. Plans</p> <p>12 that when we're getting indications of democratic</p> <p>13 advantage, at least over the data available to us,</p> <p>14 it appears that that's not a durable feature -- as</p> <p>15 durable a feature of the underlying plan as is the</p> <p>16 signal, the opposite signal, and that is saying</p> <p>17 negative .10, indicative of advantage for</p> <p>18 republicans. That tends to be a more durable</p> <p>19 feature of a plan.</p> <p>20 So the take away there is that democratic</p> <p>21 advantage or apparent democratic advantage from</p> <p>22 any given reading of the efficiency gap isn't as</p> <p>23 durable, as reliable as the opposite signal. So</p> <p>24 these negative efficiency gap estimates tend to</p> <p>25 recur, are more likely to recur, to stay negative,</p>	95	<p>1 advantage in them, we tend to get a more similar</p> <p>2 sequence of efficiency gap estimates out of those</p> <p>3 plans than out of plans that at various points in</p> <p>4 time seem to be indicative of democratic</p> <p>5 advantage. And that is there in the entire data</p> <p>6 set, Figure 27, but is even more pronounced in the</p> <p>7 analysis that focuses on recent decades as done in</p> <p>8 Figure 28.</p> <p>9 Q So the trend that was seen in Figure 27 shows up</p> <p>10 stronger when you look at just the data from 1991</p> <p>11 to the present?</p> <p>12 A That's correct.</p> <p>13 Q Okay.</p> <p>14 A Well, the asymmetry in Figure 27 is more</p> <p>15 pronounced in Figure 28.</p> <p>16 Q Okay. And if we look at like some specific</p> <p>17 numbers on Figure 28, just using the positive .1,</p> <p>18 looks like there's, you know, about a 56 percent</p> <p>19 or something chance that there will be one</p> <p>20 election over the course of the plan that would</p> <p>21 have a negative sign; is that correct?</p> <p>22 A Yeah, that's the correct interpretation.</p> <p>23 Q Okay. But then if we look at the republicans at</p> <p>24 negative .1, there's maybe only a 14 percent</p> <p>25 chance or something that there's an election with</p>
94	<p>1 than a positive estimate of the efficiency gap.</p> <p>2 That's far more likely to flip back and cross the</p> <p>3 road to the other sign.</p> <p>4 Q There's a somewhat similar figure on Figure 28,</p> <p>5 Page 59. Maybe you could just explain what the</p> <p>6 Figure 28 on Page 59 represents.</p> <p>7 A Yeah. Now, what I did there, let me just read</p> <p>8 carefully. Yeah, so Figure 28 is a replay of</p> <p>9 Figure 27 if you will, subset to redistricting</p> <p>10 plans from the 1990s forward. So putting the data</p> <p>11 from 1970 and 1980 aside, just focusing on more</p> <p>12 recent decades, and a couple of things happen.</p> <p>13 The red dots if you will even drift a little</p> <p>14 higher above the blue dots on the right of the</p> <p>15 graph. And the red dots on the left of the graph</p> <p>16 come down relative to where they were in</p> <p>17 Figure 27.</p> <p>18 So let me explain that. The reliability of</p> <p>19 seeing a single efficiency gap estimate indicative</p> <p>20 of democratic advantage is less informative as to</p> <p>21 what you're going to see over the life of the plan</p> <p>22 than the corresponding signal on the other side</p> <p>23 with respect to -- so you saw the same magnitude</p> <p>24 of signal with respect to republican advantage. A</p> <p>25 single plans that appear to have republican</p>	96	<p>1 a positive sign?</p> <p>2 A That's correct.</p> <p>3 Q Moving on to Page 60 and Section 10.1, it's titled</p> <p>4 Conditioning on the first election in a</p> <p>5 districting plan.</p> <p>6 A Right.</p> <p>7 Q Can you just explain what conditioning on the</p> <p>8 first election in a districting plan means?</p> <p>9 A Right. So here I tried to put myself in the shoes</p> <p>10 of litigants frankly and people trying to</p> <p>11 adjudicate these matters. And that is it's fine</p> <p>12 for me as an analyst to come through and look at</p> <p>13 these historical data and get to observe all five</p> <p>14 elections, up to five elections that we may</p> <p>15 observe over the life of a plan. But people that</p> <p>16 want to take issue with a redistricting plan, the</p> <p>17 idea we have to wait to see with the five</p> <p>18 elections -- you know, typically if you're going</p> <p>19 to intervene, you've got to intervene early before</p> <p>20 we've seen much data at all from the plan, the</p> <p>21 election results the plan is throwing off.</p> <p>22 So what I set about to do was to ask how</p> <p>23 informative is the signal we get from the first</p> <p>24 efficiency gap reading under a plan. So in</p> <p>25 particular, what can you take away from the fact</p>

97	<p>1 that there's a new plan in place, we see the first 2 election under that plan, and it generates a 3 positive efficiency gap reading or negative one. 4 So how much can you rely on that particular number 5 as a characterization of what you would see over 6 the life of the plan. How much does the first 7 election or the efficiency gap estimate produced 8 under the first election tell you about the plan. 9 And in particular, what's the critical threshold 10 of -- how big does that first efficiency gap 11 estimate have to be before you can feel confident 12 that you're seeing something about a plan that is 13 not a one-off or a fluke, that you've seen 14 something that gives you enough confidence to 15 believe this plan is manifesting advantage one way 16 or the other. That's the goal of this part of the 17 analysis. 18 Q Okay. And then is your analysis of conditioning 19 on the first election in a districting plan 20 contained in Figure 29? 21 A That is one of the graphs that summarizes the 22 results of this analysis. 23 Q And Figure 29 contains the results from all the 24 elections that you looked at? 25 A Yes, that's 1972 to the present.</p>	99	<p>1 that is a first election under the plan with an 2 efficiency gap at least as extreme as where we are 3 on the horizontal axis, then how many of that set 4 of plans, what's the proportion of them that go on 5 over the life of the plan to produce an efficiency 6 gap estimate of the opposite sign. 7 And so at negative .10, eight percent of 8 plans begin life with an efficiency gap reading 9 that large or more extreme. Of that eight 10 percent, about -- what is that, that looks about 11 just reading off the graph, I don't have the exact 12 number, I'm reading off the graph -- but about 12 13 or 13 percent of them go on over the life of the 14 plan to produce an efficiency gap reading that 15 conveys a different message, all right, would 16 convey in this case democratic advantage. So the 17 plan opens up with the first reading is negative, 18 that's republican advantage. Of the set of plans 19 with sending an extreme signal like that or as 20 extreme as that one, 12 or 13 percent of them flip 21 sign. 22 We go out and we do the same exercise on the 23 right-hand side of the graph. At .10 we're 24 talking about eight percent of plans open up with 25 apparent democratic advantage that large or</p>
98	<p>1 Q And why don't we just go ahead again and explain 2 what the graph means, both the blue dots and the 3 red dots. 4 A Okay. So the blue dots and the red dots have the 5 same interpretation, an analogous interpretation 6 to the previous discussion. But this time now 7 that the event is the efficiency gap reading we 8 get out of the first election under the plan. 9 So let's take an example. Let's say we're at 10 negative .10 on the horizontal axis and we see the 11 blue dot tells us -- the height of the blue dot, 12 right, we read over against the vertical axis, 13 tells us that about eight percent of districting 14 plans have a first election efficiency gap reading 15 at that level or more extreme to the left in a 16 negative direction. All right. So that's the 17 blue dot. 18 If we went out to the corresponding blue dot 19 on the positive side, we would get, you know, it's 20 almost the same number actually. The proportion 21 of plans that have as their first efficiency gap 22 reading .10 or more or larger, more positive, is 23 about eight percent. 24 Now, the red dots, all right. Now, 25 conditional on having seen the blue dot event,</p>	100	<p>1 larger, but of that eight percent, 40 percent of 2 those go on to produce an efficiency gap estimate 3 over the life of a plan that sends the opposite 4 message; that is, would send a message consistent 5 with a republican advantage. 6 So again, the take away there is a similar 7 one to what we saw in the earlier graphs, and that 8 is this asymmetry here, how reliable a signal that 9 first efficiency gap reading is. It's far more 10 reliable as to what you're going to see over the 11 life of the plan if it's indicating in the first 12 election republican advantage than the reliability 13 we get from an initial reading that points us in 14 the direction of saying we've got a democratic 15 advantage. Democratic advantage doesn't seem to 16 be as durable as republican advantage. 17 Q In looking at the plans that were analyzed here, 18 did you include plans from the 2010s where you 19 have two elections? Are they a data point here or 20 not? 21 MR. EARLE: I'm going to object to 22 the form of the question only because you're 23 asking if there were two elections in 2010? 24 MR. KEENAN: No. 25 Q Like, for example, Wisconsin has a 2012 election</p>



101	<p>1 and a 2014 election. You could condition a test</p> <p>2 on that 2012 election, but there's only one</p> <p>3 subsequent election for which it could possibly</p> <p>4 flip signs. And I was just wondering if those</p> <p>5 2012, 2014 elections are represented in this</p> <p>6 Figure 29 data or not?</p> <p>7 A I would want to consult my R code or my lab notes</p> <p>8 on that one before I answered one way. I take the</p> <p>9 point, right, given only two elections, and I know</p> <p>10 at other points I've restricted analyses of the</p> <p>11 plans for three or more elections. So I would</p> <p>12 need to consult my notes on that.</p> <p>13 Q Would you be able to do that? I mean, we don't</p> <p>14 need to do it right now. But your computer is</p> <p>15 here, would you be able to do that during the</p> <p>16 course of the deposition, like on a break?</p> <p>17 MS. GREENWOOD: Yeah.</p> <p>18 MR. EARLE: Yeah, he can go in the</p> <p>19 R code and look at that.</p> <p>20 MR. KEENAN: Okay.</p> <p>21 Q We don't need to do it right now, we can do it at</p> <p>22 a time that works.</p> <p>23 A Okay.</p> <p>24 MR. EARLE: Do you want to mark the</p> <p>25 question so when we come back, we can</p>	103	<p>1 if they're at particular value points?</p> <p>2 A They're in steps of .005.</p> <p>3 Q Okay. So to get to .01, we're at the second dot?</p> <p>4 A That's correct.</p> <p>5 Q Okay. All right, makes sense. And that would be</p> <p>6 the -- is that the same for the ones we looked at</p> <p>7 before, Figure 27?</p> <p>8 A Yeah, that's right, that's right.</p> <p>9 Q Okay. Now, looking at Figure 30, what does</p> <p>10 Figure 30 represent?</p> <p>11 A Figure 30 is a rerun of Figure 29 but subset to</p> <p>12 data 1991 onwards again, this idea of separating</p> <p>13 out what's been going on in recent decades from</p> <p>14 the entire historical analysis.</p> <p>15 Q And what changes did you see when comparing the</p> <p>16 post 1990 data to the entire data set?</p> <p>17 A Sure. Well, for one thing, there are fewer plans</p> <p>18 that open with as large advantage to democrats.</p> <p>19 So if you were to look at the right-hand side of</p> <p>20 Figure 29 and compare it with the right-hand side</p> <p>21 of Figure 30, you'd see that the blue, the</p> <p>22 distribution of blue squares is pushed down the</p> <p>23 graph in Figure 30, right.</p> <p>24 So now let's take that number we were playing</p> <p>25 with earlier, the .10. The proportion of plans in</p>
102	<p>1 respond?</p> <p>2 Q And then looking at, for example, the negative .1</p> <p>3 percent efficiency gap and then the positive .1</p> <p>4 percent -- or not percent, .1 efficiency gap, we</p> <p>5 had about eight percent for each of those numbers.</p> <p>6 Does that mean that in total about 16 percent of</p> <p>7 plans had an efficiency gap as an absolute matter</p> <p>8 that were greater than .1?</p> <p>9 A That's right.</p> <p>10 Q And the same would hold true for if we're trying</p> <p>11 to find absolute values for any one of these</p> <p>12 efficiency gap thresholds, we'd have to add the</p> <p>13 percent in on both the positive and the negative</p> <p>14 side?</p> <p>15 A That's right.</p> <p>16 Q Looking at these dots, just for example, like are</p> <p>17 the dots on hold numbers or are they on a certain</p> <p>18 percentage --</p> <p>19 A Oh, yeah, they're on a grid, yeah. So literally</p> <p>20 the R code shifts that threshold in discrete steps</p> <p>21 out from zero.</p> <p>22 Q And I was just sort of curious. For example, like</p> <p>23 the first one to the left of one, is that at a --</p> <p>24 are those at particular places like .25 or .5 or</p> <p>25 is it -- or maybe I could just ask you if you know</p>	104	<p>1 recent decades that begin life with an efficiency</p> <p>2 gap that advantageous to democrats or even more</p> <p>3 advantageous is down to about five percent,</p> <p>4 whereas it was up around eight, nine percent in</p> <p>5 earlier decades.</p> <p>6 The other thing you see is that on the</p> <p>7 left-hand side of the graph, the distribution of</p> <p>8 red dots has come down a little bit, and that's</p> <p>9 consistent with that initial reading of a</p> <p>10 particular efficiency gap reading that you get</p> <p>11 from the first election under a plan that appears</p> <p>12 to be more durable, a more reliable signal as to</p> <p>13 what you'll see over the life of the plan, a more</p> <p>14 reliable signal in recent decades than in the</p> <p>15 entire data set as a whole. We're less likely to</p> <p>16 see plans that initially manifest that level, a</p> <p>17 given level of republican advantage go on to</p> <p>18 produce a contrary signal over the life of the</p> <p>19 plan in recent decades than in the entire data</p> <p>20 set.</p> <p>21 Q And everything we've held before about like the</p> <p>22 placement of the dots, that holds for this graph?</p> <p>23 A Oh, the grid spacing you referred to earlier?</p> <p>24 Q Yes.</p> <p>25 A Yes, that's the same. I used the same grid</p>



105	<p>1 stepping in all the graphs that have this layout.</p> <p>2 Q Okay. Now, you've proposed I believe a threshold</p> <p>3 of seven percent; is that correct?</p> <p>4 A Uh-huh.</p> <p>5 Q For an efficiency gap in the first election?</p> <p>6 A Uh-huh.</p> <p>7 Q How did you come to that number?</p> <p>8 A Through the calculations and indeed the graphs we</p> <p>9 were just discussing, I set about asking what</p> <p>10 would be a threshold such that we're either going</p> <p>11 to leave plans unquestioned, right, so plans don't</p> <p>12 trigger the threshold at all, or the probability</p> <p>13 of them flipping sign is sufficiently low that</p> <p>14 we've seen that that first election signal is</p> <p>15 sufficient to trigger investigation at a</p> <p>16 reasonably high level.</p> <p>17 Now, by reasonably high, I chose a</p> <p>18 conventional 95 percent standard; that's fairly</p> <p>19 typical in the social sciences. And indeed, you</p> <p>20 know, went a little bit beyond that. If anything,</p> <p>21 it's closer to 99 percent. It's roughly 10</p> <p>22 percent of plans exceed the threshold, and of</p> <p>23 those only 10 percent flip sign. So, you know, in</p> <p>24 a sense your error rate there is, you know,</p> <p>25 10 percent of 10 percent. It is down to one</p>	107	<p>1 right dot -- that's about 18 percent.</p> <p>2 Q Okay. And then of that --</p> <p>3 MR. EARLE: Wait, are you done?</p> <p>4 Were you done with the answer?</p> <p>5 THE WITNESS: Uh-huh.</p> <p>6 MR. EARLE: Okay.</p> <p>7 Q And then the red dot there would represent the</p> <p>8 proportion of those plans that would change sign</p> <p>9 over the length of a plan; is that correct?</p> <p>10 A Of those, how many then go on to flip, yeah.</p> <p>11 Q And where is the red dot when we look at</p> <p>12 negative .07?</p> <p>13 A Yeah, .22.</p> <p>14 Q So 22 percent of that 18 percent would change</p> <p>15 sign?</p> <p>16 A Uh-huh.</p> <p>17 Q And then if we look at positive .07, the blue dot,</p> <p>18 where's the blue dot for that?</p> <p>19 A Yeah, that's about 18 percent as well maybe, yep.</p> <p>20 Q Okay. And then the red dot is up at -- where is</p> <p>21 that, about four?</p> <p>22 A Forty, yep.</p> <p>23 Q So using the .07 percent efficiency gap standard,</p> <p>24 we find that 18 percent plus 18 percent, so</p> <p>25 36 percent of plans would exceed that in their</p>
106	<p>1 percent.</p> <p>2 So I thought -- what I was aiming for was a</p> <p>3 fairly conservative standard before on the basis</p> <p>4 of just one election we could say hey, there's</p> <p>5 something to look at here. This is a plan that on</p> <p>6 the basis of the first election has sent a</p> <p>7 sufficiently strong signal that we ought to take a</p> <p>8 closer look.</p> <p>9 Q But the key fact you're trying to project would be</p> <p>10 whether the efficiency gap would flip sign</p> <p>11 throughout the course of the plan?</p> <p>12 A That's right. And I relied on the historical</p> <p>13 analysis that we were just talking about to come</p> <p>14 up with a threshold.</p> <p>15 Q Did you think that there should be a different</p> <p>16 threshold for positive versus negative efficiency</p> <p>17 gaps given the difference we saw in the durability</p> <p>18 between the two?</p> <p>19 A No, I didn't. I thought if it was to be a</p> <p>20 threshold, it ought to be symmetric with respect</p> <p>21 to democratic or republican advantage.</p> <p>22 Q And just looking at, for example, Figure 29, so if</p> <p>23 we look at the blue dots, what's the proportion of</p> <p>24 plans that have an EG in excess of negative .07?</p> <p>25 A That's about -- let me make sure I'm reading the</p>	108	<p>1 first election?</p> <p>2 A Yep. I'm going to -- okay, so I'm going to</p> <p>3 qualify my answer here because the blue dots are</p> <p>4 the single best estimates. There is some</p> <p>5 uncertainty around each of them, and the folding</p> <p>6 exercise that you're proposing, it's not going to</p> <p>7 be strictly additive in the way as you've been</p> <p>8 proposing in the questions. That would come out,</p> <p>9 and indeed the confidence interval around that</p> <p>10 won't be simply putting the two together. So the</p> <p>11 better way to do that would be to compute it with</p> <p>12 respect to the absolute value directly rather than</p> <p>13 popping it off, reading it off this graph</p> <p>14 directly.</p> <p>15 Q Do you have that absolute value calculated here?</p> <p>16 A Well, that analysis is the analysis reported in</p> <p>17 Figure 32. That takes, that performs that</p> <p>18 calculation about the confidence that I was</p> <p>19 referring to earlier. So the more appropriate way</p> <p>20 to get at the level of confidence we have in a</p> <p>21 given threshold is summarized by the calculations</p> <p>22 that appear in Figure 32 than in this exercise</p> <p>23 that we're performing with respect to Figure 29 or</p> <p>24 alternatively Figure 30.</p> <p>25 Q So maybe we could just explain why, why is it</p>

109	<p>1 better to use the Figure 32 method than the --</p> <p>2 A Okay. Because it's taking into account, okay, if</p> <p>3 we went down the road we were on with respect to</p> <p>4 Figure 29, we would say that 18 percent of plans,</p> <p>5 all right, exceed .07 or greater in the first</p> <p>6 election, and then of those, 22 percent change</p> <p>7 sign. So we'd have 22 percent of 18 which is, I</p> <p>8 can't quite do that but we'll call it 20 percent</p> <p>9 of 18 if you --</p> <p>10 MR. STRAUSS: Looks like about</p> <p>11 three percent.</p> <p>12 THE WITNESS: Right.</p> <p>13 A But again, it's the way the uncertainty</p> <p>14 propagates. You want to, you know, once you're</p> <p>15 bound on that and you're confidence bound on that,</p> <p>16 and to do that you just don't literally multiply</p> <p>17 -- you know, you can multiply those two</p> <p>18 percentages together and get down to roughly three</p> <p>19 percent. But to put a bound on that, you've</p> <p>20 actually got to engage in some brute force</p> <p>21 computation. And the summary of that brute force</p> <p>22 computation is what I produced in Figure 30 and</p> <p>23 Figure 32. So we land somewhere close to, you</p> <p>24 know, 100 minus three, .97 in Figure 32. And the</p> <p>25 bound on that -- by that I mean if we went out</p>	111	<p>1 A That means that at that threshold, 96 percent of</p> <p>2 plans are either not tripping that threshold or if</p> <p>3 they are, they're continuing to produce efficiency</p> <p>4 gaps on that side of zero. So it's basically</p> <p>5 saying what proportion of plans would be correct</p> <p>6 decisions if that was your actionable standard.</p> <p>7 And so you'd be wrong, you're going to be wrong at</p> <p>8 least according to historical analysis, you know,</p> <p>9 let's call it like three plus or minus, not much,</p> <p>10 percent of the time, out at that standard. And as</p> <p>11 you make the standard more stringent, you can see</p> <p>12 there are fewer plans you're going to look at,</p> <p>13 right. And so the error rate obviously falls away</p> <p>14 to zero meaning our confidence rate goes up</p> <p>15 towards 100.</p> <p>16 Q I think I understand. So any plan that never gets</p> <p>17 above or that doesn't start above the .7 threshold</p> <p>18 -- .07 threshold, that's undisturbed?</p> <p>19 A Yeah, right, right, yes.</p> <p>20 Q And then you're also adding in plans that are</p> <p>21 above that threshold but would never change sign</p> <p>22 over the course of the term?</p> <p>23 A Yeah, yeah. And you can go the other way, right.</p> <p>24 So suppose we took a really permissive stand and</p> <p>25 said hey, if a plan trips -- suppose you took a</p>
110	<p>1 to .7, a negative .07 on the horizontal axis on</p> <p>2 Figure 32 and project it out, we'd arrive at</p> <p>3 roughly that 100 minus three something, close</p> <p>4 to .97 there.</p> <p>5 But the key is that that confidence interval</p> <p>6 is, this one is sort of an honest computation if</p> <p>7 you will, one that I believe more than just sort</p> <p>8 of, you know, reading off numbers from this graph,</p> <p>9 multiplying them together and we're not really --</p> <p>10 on Figure 29 reading off numbers, multiplying them</p> <p>11 together and sort of finger to the wind in trying</p> <p>12 to come up with estimates of the corresponding</p> <p>13 error rates. Those are computed directly if you</p> <p>14 will in Figure 32.</p> <p>15 Q Sure. Let's go into Figure 32.</p> <p>16 A Sure.</p> <p>17 Q Which dot represents the negative .07? Would it</p> <p>18 be the first one after that line at 6 or the</p> <p>19 second one?</p> <p>20 A I believe I used the same gridding, yeah.</p> <p>21 Q So it's the second one?</p> <p>22 A I believe so.</p> <p>23 Q And so that's at about 96 percent or .96?</p> <p>24 A Thereabouts, yeah.</p> <p>25 Q So what does that mean, that .96?</p>	112	<p>1 really small negative reading, you know, you'd be</p> <p>2 making errors 20 percent of the time, right. Or</p> <p>3 on the other side, a small positive reading, you'd</p> <p>4 be wrong, you know, 78 percent -- you'd be correct</p> <p>5 78 percent of the time; you'd be making errors</p> <p>6 22 percent of the time.</p> <p>7 So as you push the threshold out, two things</p> <p>8 are happening. One, fewer things are tripping it,</p> <p>9 but you're also -- because it's a more stringent</p> <p>10 threshold, you're more confident that plans are</p> <p>11 going to stick. Conditional in the first plan</p> <p>12 getting over that hurdle, it's increasingly</p> <p>13 likely that subsequent elections under the plan</p> <p>14 will be there as well. But I was just hesitant to</p> <p>15 read -- I mean, I've done the calculation I think</p> <p>16 you were going for directly in Figure 32, you</p> <p>17 know.</p> <p>18 Q Sure. But if we wanted to --</p> <p>19 MR. EARLE: You were referencing</p> <p>20 Figure 29 as you were --</p> <p>21 THE WITNESS: Figure 29, right.</p> <p>22 Q If we wanted to calculate just the total overall</p> <p>23 percentage of plans that would trigger the initial</p> <p>24 threshold, could we look at Figure 29 and look at</p> <p>25 whichever threshold you want to pick.</p>

113	<p>1 A Sure.</p> <p>2 Q Look at the blue dot and then add the proportion</p> <p>3 of plans on both the positive and the negative</p> <p>4 side that are in excess of that efficiency gap?</p> <p>5 MR. EARLE: So your question's</p> <p>6 about Figure 29?</p> <p>7 MR. KEENAN: Yeah.</p> <p>8 A Figure 29 --</p> <p>9 Q Yeah, just trying to figure out like instead of</p> <p>10 the number of plans where we're confident that</p> <p>11 we're right, the number of plans that just would</p> <p>12 get swept into this threshold?</p> <p>13 A Right.</p> <p>14 MR. EARLE: What's the question?</p> <p>15 Q How would we determine that from looking at</p> <p>16 Figure 29?</p> <p>17 MR. STRAUSS: I think the question</p> <p>18 is how would you determine by looking at</p> <p>19 Figure 29 what percentage of plans would have</p> <p>20 numbers more than an absolute value of .07;</p> <p>21 is that the question?</p> <p>22 MR. KEENAN: Yes.</p> <p>23 A Yeah, and the answer is -- the answer is if you're</p> <p>24 looking at the first election, the answer is over</p> <p>25 the entire historical period, 18 percent of plans</p>	115	<p>1 on the left, not many. That's a far fewer</p> <p>2 proportion than --</p> <p>3 Q On the left it looks like --</p> <p>4 MR. EARLE: Finish your answer.</p> <p>5 A On Figure 30 at negative .07, right, we're at</p> <p>6 about 22 percent. At positive .07 we're at about,</p> <p>7 what's that, about 12 percent.</p> <p>8 Q So that's 34 percent total of plans are in excess</p> <p>9 of the .07 efficiency gap?</p> <p>10 MR. EARLE: Are you asking him to</p> <p>11 confirm that?</p> <p>12 MR. KEENAN: Yes.</p> <p>13 MR. EARLE: He's asking if what he</p> <p>14 just said is correct. Can we have the court</p> <p>15 reporter read it back?</p> <p>16 (Question read)</p> <p>17 A Yes.</p> <p>18 Q All right. Let's move on to the -- okay, just</p> <p>19 maybe to clear up, Figure 33, that looks to be an</p> <p>20 analogous graph to Figure 32 but just using the</p> <p>21 data from the 1990 plans to the current?</p> <p>22 A That's right.</p> <p>23 Q So everything we talked about in Figure 32 we can</p> <p>24 transfer over to Figure 33?</p> <p>25 A That's right, with the caveat that the data in</p>
114	<p>1 have a first efficiency gap reading in excess of</p> <p>2 that.</p> <p>3 Q On the negative side?</p> <p>4 A Yes, sir.</p> <p>5 Q But then on the positive side, we'd have to look</p> <p>6 at that one as well?</p> <p>7 A Yeah.</p> <p>8 Q And then for each, if we want to change that</p> <p>9 threshold from .07 to .1, we could run that same</p> <p>10 exercise just looking at the dots on this --</p> <p>11 A That's right, that's right. That's what the graph</p> <p>12 is reporting, the proportion of plans with a first</p> <p>13 efficiency gap reading at or beyond the specified</p> <p>14 threshold on the horizontal axis.</p> <p>15 Q And if we go to Figure 30, this represents the</p> <p>16 same data we were looking at in Figure 29 but just</p> <p>17 for the 1991 through the present?</p> <p>18 A Yeah, yeah.</p> <p>19 Q So if we wanted to do the same thing and find out</p> <p>20 how many plans triggered -- what proportion of</p> <p>21 plans triggered the threshold, we would have to</p> <p>22 look at the blue dots --</p> <p>23 A That's right.</p> <p>24 Q -- on each side of the zero, correct?</p> <p>25 A Uh-huh. Yeah, so quite a few plans trigger that</p>	116	<p>1 Figure 33 covers latter decades.</p> <p>2 Q Let's go to like number -- well actually, it's</p> <p>3 12:30. I don't know if you guys want to take a</p> <p>4 break or --</p> <p>5 (Discussion off the record)</p> <p>6 (Recess)</p> <p>7 Q So we're back on the record. And we had an</p> <p>8 earlier question that, Professor Jackman, you said</p> <p>9 you didn't know and you wanted to consult your</p> <p>10 R code on the answer. And I was asking you about</p> <p>11 in Figure 29 whether this calculation that</p> <p>12 conditions certain things on the first election in</p> <p>13 a cycle, whether the elections from 2012 and 2014</p> <p>14 were included in this data set. You've had a</p> <p>15 chance to look at your R code and what is your</p> <p>16 answer to that question?</p> <p>17 A The answer is yes, elections from 2012 and 2014</p> <p>18 are included in this analysis, this part of the</p> <p>19 analysis.</p> <p>20 Q All right. So we can go back to Page 69 which</p> <p>21 deals with the Wisconsin plan.</p> <p>22 A Uh-huh.</p> <p>23 Q What did you conclude with respect to Wisconsin's</p> <p>24 plan that was enacted for the 2012 election?</p> <p>25 A The Wisconsin plan 2012, and we've had two</p>

117	<p>1 elections under that plan, 2012 and 2014, has</p> <p>2 produced efficiency gap estimates of negative .13</p> <p>3 in 2012 and negative .10 in 2014. Those are large</p> <p>4 and negative -- large, negative estimates of the</p> <p>5 efficiency gap.</p> <p>6 Q In determining the efficiency gap for Wisconsin in</p> <p>7 2012, what did you calculate the democratic share</p> <p>8 of the vote to be?</p> <p>9 A After imputations for uncontestedness, 51.4.</p> <p>10 Q And 2014, did you calculate it to be 48.0 percent?</p> <p>11 A That's correct.</p> <p>12 Q And if we wanted to visualize that, if we go back</p> <p>13 to Figure 4 on Page 18 --</p> <p>14 A Yeah.</p> <p>15 Q So if we go to -- we'd have to estimate sort of,</p> <p>16 but where 51.4 percent is, that shows that the --</p> <p>17 we would have to see where the orange line,</p> <p>18 Page 18 --</p> <p>19 A Yeah, I'm trying to --</p> <p>20 MR. EARLE: Yeah, but wait for a</p> <p>21 complete question, though. I think he's</p> <p>22 trying to frame the question, hasn't gotten</p> <p>23 it out yet.</p> <p>24 Q So I was just trying to figure out how we could --</p> <p>25 so the orange line would say that with</p>	119	<p>1 efficiency gap, yes.</p> <p>2 Q And to determine the efficiency gap -- I guess,</p> <p>3 sorry, just scrap all that. What percentage of</p> <p>4 seats did the democrats win in the 2012 election?</p> <p>5 A They won 39 of 99 seats or 39.4 percent of the</p> <p>6 seats.</p> <p>7 Q So then is the efficiency gap equivalent to</p> <p>8 subtracting 39.4 percent from 52.8 percent?</p> <p>9 A The efficiency gap is equivalent to subtracting --</p> <p>10 to be perfectly explicit and if you don't mind,</p> <p>11 I'll work in proportions. So it's .394 minus .5</p> <p>12 minus two times .514 minus .5. And so if you do</p> <p>13 that you should get negative .13.</p> <p>14 Q And you round to the tenth?</p> <p>15 A Yeah. When I'm reporting negative .13 and</p> <p>16 negative .10 in the report and in testimony, I'm</p> <p>17 rounding to digits of precision.</p> <p>18 Q Looking at Figure 35, what's represented on</p> <p>19 Figure 35?</p> <p>20 A Figure 35 presents a sequence of efficiency gap</p> <p>21 estimates for Wisconsin arrayed left to right from</p> <p>22 1972 to 2014. Each plotted point is the estimate</p> <p>23 of the efficiency gap, and the vertical bars</p> <p>24 indicate the size of the 95 percent confidence</p> <p>25 interval accompanying each estimate.</p>
118	<p>1 51.4 percent of the votes, the democrats should</p> <p>2 receive I'm not sure exactly but perhaps, you</p> <p>3 know, 53, 55 percent of the vote. Do you know</p> <p>4 exactly what they should receive with 51.4 percent</p> <p>5 of the votes?</p> <p>6 MR. EARLE: I'm going to object to</p> <p>7 the form of the question. Go ahead and</p> <p>8 answer it if you can.</p> <p>9 A I can answer the question under the scenario the</p> <p>10 maintained hypothesis of a zero efficiency gap.</p> <p>11 So under a zero efficiency gap, should democrats</p> <p>12 win 51.4 percent of the vote, we can infer that</p> <p>13 they should win -- and it's pretty simple but I'll</p> <p>14 look up the exact formula. So they've exceeded</p> <p>15 50 percent of the vote by .14 or .014 so</p> <p>16 that's .028, should be that they should bring</p> <p>17 52.8 percent of the seats.</p> <p>18 Q With 51.4 percent, did they exceed by 1.4 percent?</p> <p>19 I thought you used a .014.</p> <p>20 A I was converting that 1.4 percent to a proportion.</p> <p>21 Q Okay, that makes sense. I should assume that you</p> <p>22 know how to do this better than I do, so that my</p> <p>23 mistake. And so 51.4 percent of the votes</p> <p>24 translates to 52.8 percent of the seats?</p> <p>25 A Under the maintained hypothesis of the zero</p>	120	<p>1 Q And if we look at that, looks to me that the last</p> <p>2 positive efficiency gap that Wisconsin saw was in</p> <p>3 199 -- is that 1994?</p> <p>4 A That last positive point estimate was 1994.</p> <p>5 Q That's a good point, the positive point estimate</p> <p>6 was 1994. 1996 the point estimate is a negative</p> <p>7 efficiency gap; is that correct?</p> <p>8 A The point estimate is negative.</p> <p>9 Q But the confidence interval spans to the positive</p> <p>10 side?</p> <p>11 A That's right. That is indistinguishable from zero</p> <p>12 at conventional levels of statistical</p> <p>13 significance.</p> <p>14 Q Then from 1998 onwards, would you say that</p> <p>15 Wisconsin has experienced an unambiguously</p> <p>16 negative efficiency gap?</p> <p>17 A Yes.</p> <p>18 Q And none of the confidence intervals go to the</p> <p>19 positive side?</p> <p>20 A And indeed terminate considerable distance in</p> <p>21 negative territory.</p> <p>22 Q Okay. You calculated an average efficiency gap</p> <p>23 for the elections conducted under the 2000s plan</p> <p>24 for Wisconsin; is that correct?</p> <p>25 A Yes.</p>

121	<p>1 Q And Table 1 indicates that's a negative .076?</p> <p>2 A Could you point me to the page, please?</p> <p>3 Q Sure, Page 55.</p> <p>4 A That's correct.</p> <p>5 Q Maybe we could just use this graph to explain how</p> <p>6 that average is calculated.</p> <p>7 A Oh, okay. So that is an average of the point</p> <p>8 estimates that begin 2002 and run through '04,</p> <p>9 '06, '08 and '10. And taking into account the</p> <p>10 uncertainty associated with each point estimate,</p> <p>11 then computing an average and the uncertainty in</p> <p>12 turn inducing a confidence interval around the</p> <p>13 average.</p> <p>14 Q Okay. And then Figure 36, what does this</p> <p>15 represent?</p> <p>16 A Figure 36 presents the efficiency gap estimates</p> <p>17 observed in states in the most recent round of</p> <p>18 redistricting. So for the states here it's</p> <p>19 typically just a pair of elections; just two</p> <p>20 elections have been held under the redistricting</p> <p>21 plan. And the solid square indicates an</p> <p>22 efficiency gap estimate, and the confidence</p> <p>23 interval is indicated by the gray bar extending</p> <p>24 horizontally. And you can see that there are, you</p> <p>25 know, two estimates per state. And I've ordered</p>	123	<p>1 to the way we discussed the way you calculated the</p> <p>2 averages for Wisconsin during the 2000s period?</p> <p>3 A Yes.</p> <p>4 MR. KEENAN: I'm just going to take</p> <p>5 a quick break, make sure I've asked</p> <p>6 everything I need to ask.</p> <p>7 MR. EARLE: Sure.</p> <p>8 (Recess)</p> <p>9 MR. KEENAN: Well, we'll go back on</p> <p>10 the record just to say that I don't have any</p> <p>11 more questions. So thanks for your time this</p> <p>12 morning and afternoon.</p> <p>13 MR. EARLE: We'll read and sign.</p> <p>14 MR. STRAUSS: And that concludes</p> <p>15 the deposition. Thank you very much.</p> <p>16 (Adjourning at 12:59 p.m.)</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
122	<p>1 the states by the average level of efficiency gap</p> <p>2 for each state from low at the bottom of the page</p> <p>3 to high, positive, at the top of the page.</p> <p>4 Q So Florida had the lowest efficiency gap when</p> <p>5 considering the average of the two elections?</p> <p>6 A That's right.</p> <p>7 Q Okay. And did you calculate the average here in a</p> <p>8 similar manner to the way you calculated the</p> <p>9 average we discussed with respect to Wisconsin</p> <p>10 in --</p> <p>11 A Yes.</p> <p>12 MR. EARLE: You answered the</p> <p>13 question before he finished. He was going to</p> <p>14 indicate which figure.</p> <p>15 THE WITNESS: I'm sorry.</p> <p>16 Q -- Figure 35 during the 2000s period?</p> <p>17 A Well, there is no average indicated on Figure 35.</p> <p>18 Q Yeah, but we had discussed it in connection with</p> <p>19 that.</p> <p>20 A That's right.</p> <p>21 Q So you --</p> <p>22 MR. EARLE: We want to wait for the</p> <p>23 whole question to come out.</p> <p>24 MR. KEENAN: Yeah.</p> <p>25 Q You calculated the averages in Figure 36 similar</p>	124	<p>1 STATE OF WISCONSIN )</p> <p>2 ) ss.</p> <p>3 COUNTY OF DANE )</p> <p>4 I, MARY L. MIXON, a Court Reporter and Notary</p> <p>5 Public in and for the State of Wisconsin, do hereby</p> <p>6 certify that the foregoing deposition was taken before</p> <p>7 me at the Wisconsin Department of Justice, 17 West Main</p> <p>8 Street, in the City of Madison, County of Dane, and</p> <p>9 State of Wisconsin, on the 20th day of November 2015,</p> <p>10 that it was taken at the request of the Defendants, upon</p> <p>11 verbal interrogatories; that it was taken in shorthand</p> <p>12 by me, a competent court reporter and disinterested</p> <p>13 person, approved by all parties in interest and</p> <p>14 thereafter converted to typewriting using computer-aided</p> <p>15 transcription; that said transcript is a true record of</p> <p>16 the deponent's testimony; that the appearances were as</p> <p>17 shown on Page 2 of the transcript; that the deposition</p> <p>18 was taken pursuant to notice; that said SIMON D.</p> <p>19 JACKMAN, Ph.D. before examination was sworn by me to</p> <p>20 testify the truth, the whole truth, and nothing but the</p> <p>21 truth relative to said cause.</p> <p>22 Dated November 25, 2015.</p> <p>23</p> <p>24 Notary Public, State of Wisconsin</p> <p>25</p>



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