

Supplementary Appendix: Geography, Uncertainty, and Polarization

This appendix first discuss the ideal point estimates that are used to measure the heterogeneity of preferences in each district in more depth. Then, we present several robustness checks for the results reported in the main paper. First, we examine several alternative empirical strategies for the relationship between the variance of the median voter in *state senate* districts and legislators’ ideal points in these districts. Next, we examine the relationship between the variance of the median voter in *state house* districts and legislators’ ideal points in these districts. Finally, we examine the relationship between the variance of the median voter in *U.S. House* districts and legislators’ ideal points in these districts. All three analysis yield results that are substantively similar to the results in the main body of the paper. In all three contexts, the average intradistrict divergence (AIDD) is clearly a function of ideological heterogeneity in the district. The difference between the roll-call voting behavior of Democrats and Republicans is largest in districts that are most heterogeneous, and smallest in the most homogeneous districts.

A Ideal Point Model and Data

For our measure of citizens’ ideology, we use ideal point estimates made available by Tausanovitch and Warshaw (2013) based on policy responses to several recent large sample surveys (See Table A.1). To estimate voters’ ideological positions, Tausanovitch and Warshaw (2013) assume that all survey respondents have a quadratic utility function with normal errors (Clinton, Jackman and Rivers 2004). Each item presents individual with a choice between a “Yes” position and a “No” position. They use the two-parameter IRT model introduced to political science by Clinton, Jackman and Rivers (2004), which characterizes each response $y_{ij} \in \{0, 1\}$ as a function of subject i ’s latent *ability* (x_i), the *difficulty* (α_j)

and *discrimination* (β_j) of item j , and an error term (e_{ij}), where

$$\Pr[y_{ij} = 1] = \Phi(\beta_j x_i - \alpha_j) \quad (1)$$

where Φ is the standard normal CDF. β_j is referred to as the “discrimination” parameter because it captures the degree to which the latent trait affects the probability of a yes answer. We assume a one-dimensional policy space because a two-dimensional model shows little improvement in terms of model fit. The ideal point, x , for individual i signifies the “liberalness” or “conservativeness” of that individual. We orient the ideal point estimates so that lower values are associated with politically left preferences and higher values with politically right preferences.

Table 10 shows the complete list of survey questions that we used to jointly scale respondents from the 2000-2004 National Annenberg Election Studies and the 2006-2012 Cooperative Congressional Election Studies. The questions are a mix of items from the common content and modules that we created.

Table A.1: Survey Question Text

Variable	Survey	Question Text
cbb05	NAES 2000	Favor cutting taxes or strengthening soc. sec.
cbb10	NAES 2000	Fed gov’t should reduce top bracket taxes
cbb13	NAES 2000	Fed gov’t should adopt flat tax
cbc01	NAES 2000	Amount of spending on social security
cbc05	NAES 2000	Favor social security in stock market
cbd01	NAES 2000	Favor school vouchers
cbd02	NAES 2000	Fed gov’t should give school vouchers
cbe02	NAES 2000	Favor spending on health care for uninsured
cbe04	NAES 2000	Fed gov’t should spend on Medicare
cbe05	NAES 2000	Position on prescription coverage for seniors
cbe08	NAES 2000	Favor universal health care for children
cbe14	NAES 2000	Favor right to sue HMOs
cbe21	NAES 2000	Fed gov’t should spend on Medicaid
cbf02	NAES 2000	Fed gov’t should restrict abortion
cbf03	NAES 2000	Fed gov’t should ban abortion
cbg01	NAES 2000	Favor death penalty
cbg05	NAES 2000	Favor handgun licenses
cbg06	NAES 2000	Fed gov’t should restrict gun purchases
cbh01	NAES 2000	Fed gov’t should limit contributions to parties
cbh02	NAES 2000	Favor soft money ban
cbl01	NAES 2000	Favor gays in military
cbl05	NAES 2000	Make effort to end job discrimination - gays
cbm01	NAES 2000	Make effort to end job discrimination - blacks
cbm02	NAES 2000	Make effort to end job discrimination - women
cbp02	NAES 2000	Fed gov’t should reduce income differences
cbp03	NAES 2000	Spend on aid to mothers w/ young children

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
cbs01	NAES 2000	Fed gov't should protect environment
cbt01	NAES 2000	Fed gov't should eliminate business regulations
cbt03	NAES 2000	Fed gov't should allow school prayer
ccb13	NAES 2004	Favor reducing taxes
ccb33	NAES 2004	Favor eliminating estate tax
ccb34	NAES 2004	Favor eliminating estate tax
ccb35	NAES 2004	Favor eliminating estate tax
ccc24	NAES 2004	Favor re-importing drugs
ccc25	NAES 2004	Favor re-importing drugs
ccc17	NAES 2004	Favor Medicare prescription law
ccc18	NAES 2004	Favor Medicare prescription law
ccb71	NAES 2004	Favor making union organizing easier
ccb72	NAES 2004	Favor making union organizing easier
ccd67	NAES 2004	Patriot Act is good for country
ccb82	NAES 2004	Favor more trade agreements
ccc02	NAES 2004	Favor spending more on health insurance
ccc03	NAES 2004	Favor gov't health insurance for children
ccc04	NAES 2004	Favor gov't health insurance for children
ccc05	NAES 2004	Favor gov't health insurance for workers
ccc06	NAES 2004	Favor gov't health insurance for workers
ccc32	NAES 2004	Favor social security in stock market
ccc33	NAES 2004	Favor social security in stock market
ccc39	NAES 2004	Favor school vouchers
ccc40	NAES 2004	Favor federal assistance to schools
ccc41	NAES 2004	Fed gov't should reduce income differences
ccd82	NAES 2004	Favor restricting immigration
cce01	NAES 2004	Favor banning all abortions
cce05	NAES 2004	Favor banning late-term abortions
cce06	NAES 2004	Favor banning late-term abortions
cce07	NAES 2004	Favor stem cell funding
cce08	NAES 2004	Favor stem cell funding
cce09	NAES 2004	Favor stem cell funding
cce17	NAES 2004	Favor federal marriage amendment
cce18	NAES 2004	Favor federal marriage amendment
cce19	NAES 2004	Favor federal marriage amendment
cce20	NAES 2004	Favor federal marriage amendment
cce21	NAES 2004	Favor federal marriage amendment
cce24	NAES 2004	Favor state allowing same-sex marriage
cce25	NAES 2004	Favor state allowing same-sex marriage
cce26	NAES 2004	Favor state law allowing civil unions
cce31	NAES 2004	Favor gun control
cce32	NAES 2004	Favor extension of assault weapons ban
cce33	NAES 2004	Favor assault weapons ban
cce34	NAES 2004	Favor assault weapons ban
ccb65	NAES 2004	Favor increasing minimum wage
cag07	NAES 2004	Favor limiting malpractice awards
v2072	CCES 2006	Raise minimum wage to \$7.25
v2092	CCES 2006	Should we take action on climate change?
v2103	CCES 2006	Amendment banning gay marriage
v3019	CCES 2006	When should abortions be allowed?
v3022	CCES 2006	Climate change is real
v3024	CCES 2006	Social security privatization
v3027	CCES 2006	Affirmative action for discriminatory companies
v3060	CCES 2006	Ban late-term abortion
v2102	CCES 2006	Expand funding for stem cell research
v3063	CCES 2006	Expand funding for stem cell research
v2101	CCES 2006	Path to citizenship or strict enforcement
v3069	CCES 2006	Citizenship opportunity for illegal immigrants
v3072	CCES 2006	Favor/oppose raising minimum wage
v3075	CCES 2006	Extend capital gains tax cuts
v3066	CCES 2006	Withdrawing troops from Iraq
v3078	CCES 2006	Free trade agreement with Central America
q34	CCES 2006	Support state voter ID laws
cc06_v2072	CCES 2007	Raise minimum wage to \$7.25
cc06_v2092	CCES 2007	Should we take action on climate change?

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
cc06_v2103	CCES 2007	Amendment banning gay marriage
cc06_v3019	CCES 2007	When should abortions be allowed?
cc06_v3022	CCES 2007	Protect environment over jobs/economy
cc06_v3024	CCES 2007	Social security privatization
cc06_v3027	CCES 2007	Affirmative action for discriminatory companies
cc06_v3060	CCES 2007	Ban late-term abortion
cc06_v3063	CCES 2007	Expand funding for stem cell research
cc06_v3075	CCES 2007	Extend capital gains tax cuts
cc46	CCES 2007	Withdrawing troops from Iraq
cc06_v3078	CCES 2007	Free trade agreement with Central America
cc34	CCES 2007	Expand SCHIP - health care for children
cc38	CCES 2007	Surveillance of foreigners in US
cc12x_5	CCES 2007	Build a wall between US and Mexico
cc310	CCES 2008	When should abortions be allowed?
cc311	CCES 2008	Protect environment over jobs/economy
cc312	CCES 2008	Social security privatization
cc313	CCES 2008	Affirmative action for discriminatory companies
cc316b	CCES 2008	Raise minimum wage to \$7.25
cc316c	CCES 2008	Expand funding for stem cell research
cc316e	CCES 2008	Fund health insurance for children
cc316a	CCES 2008	Withdrawing troops from Iraq
cc316f	CCES 2008	Support/oppose amendment banning gay marriage
cc316g	CCES 2008	Federal assistance for housing crisis
cc316d	CCES 2008	Eavesdrop overseas without court order
cc316h	CCES 2008	Extend NAFTA to Peru & Columbia
cc316i	CCES 2008	U.S. government bank bailout
cc417	CCES 2008	Government guaranteed health insurance
cc422	CCES 2008	Carbon tax to reduce emissions
cc419_6	CCES 2008	Require photo ID to vote
cc09_51	CCES 2009	Take action against global warming
cc09_54	CCES 2009	Amendment banning gay marriage
cc09_53	CCES 2009	When should abortions be allowed?
cc09_55	CCES 2009	Affirmative action for discriminatory companies
cc09_59a	CCES 2009	Lilly Ledbetter Fair Pay Act
cc09_59b	CCES 2009	Hate Crimes Act - include LGBT
cc09_59c	CCES 2009	American Recovery & Reinvestment Act
cc09_59d	CCES 2009	Expand SCHIP - health care for children
cc09_59e	CCES 2009	Renewable energy funding, carbon caps
cc09_59f	CCES 2009	Require health insurance
cc09_59g	CCES 2009	Appoint Sotomayor to Supreme Court
sta302.1	CCES 2010 Module	Increase funding for job training programs
sta302.2	CCES 2010 Module	Reduce government regulation
sta302.3	CCES 2010 Module	Employers should offer childcare
sta302.4	CCES 2010 Module	Increase minimum wage
sta302.5	CCES 2010 Module	Support workers right to unionize
sta302.6	CCES 2010 Module	Eliminate federal unemployment programs
sta302.7	CCES 2010 Module	Include sexual orientation in anti-discrimination laws
sta302.8	CCES 2010 Module	Include gender in anti-discrimination laws
sta303.1	CCES 2010 Module	Universal healthcare
sta303.2	CCES 2010 Module	Expand tax-free medical savings accounts
sta303.3	CCES 2010 Module	Allow importation of prescription drugs
sta303.4	CCES 2010 Module	Expand Medicare prescription drug coverage
sta303.5	CCES 2010 Module	Tax credits to offset insurance costs
sta303.6	CCES 2010 Module	Expand child healthcare programs
sta303.7	CCES 2010 Module	Providing healthcare is not responsibility of government
sta304a	CCES 2010 Module	Allow same-sex marriage
sta304c	CCES 2010 Module	Funding for stem cell research (existing)
sta304d	CCES 2010 Module	Funding for stem cell research (new embryos)
sta304e	CCES 2010 Module	Affirmative action for federal contractors
sta304f	CCES 2010 Module	Continue federal affirmative action programs
sta305.1	CCES 2010 Module	Private social security accounts
sta305.2	CCES 2010 Module	Increase payroll tax to ensure social security viability
sta305.3	CCES 2010 Module	Decrease benefits to retirees to ensure social security viability
sta305.4	CCES 2010 Module	Increase social security benefits with cost of living
sta305.5	CCES 2010 Module	Raise the retirement age to ensure social security viability

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
sta306.1	CCES 2010 Module	Require welfare recipients to work
sta306.2	CCES 2010 Module	Federal block grants for welfare
sta306.3	CCES 2010 Module	Housing assistance for welfare recipients
sta306.4	CCES 2010 Module	Abolish federal welfare programs
307a	CCES 2010 Module	Public health insurance option
307b	CCES 2010 Module	Monetary limits in malpractice lawsuits
307c	CCES 2010 Module	Require balanced federal budget
307d	CCES 2010 Module	Government funds to stimulate economy
sta312	CCES 2010 Module	Free trade agreement with Central America
sta314	CCES 2010 Module	Expand funding for stem cell research
sta315	CCES 2010 Module	Citizenship opportunity for illegal immigrants
sta317	CCES 2010 Module	Affirmative action for discriminatory companies
sta319	CCES 2010 Module	Path to citizenship or strict enforcement
sta320	CCES 2010 Module	Increase minimum wage
sta321	CCES 2010 Module	Extend capital gains tax cuts
sta322	CCES 2010 Module	Amendment banning gay marriage
sta360a	CCES 2010 Module	Eliminate the minimum wage
sta360b	CCES 2010 Module	Government guarantee standard of living
sta360c	CCES 2010 Module	No taxes for low-income families
sta360d	CCES 2010 Module	Prohibit incomes above \$1 million
sta360e	CCES 2010 Module	Eliminate food subsidies for children
sta360f	CCES 2010 Module	Tax rate the same for rich and poor
sta360g	CCES 2010 Module	No government assistance for low-income
sta360h	CCES 2010 Module	Government should provide universal jobs
sta360i	CCES 2010 Module	Rich should pay higher tax rate than poor
sta360j	CCES 2010 Module	Minimum wage should be \$15/hour
sta361a	CCES 2010 Module	Ban some high-fat foods from restaurants
sta361b	CCES 2010 Module	Government standards for prescription drugs
sta361c	CCES 2010 Module	All public buildings accessible to handicapped
sta361d	CCES 2010 Module	Government-enforced nutrition standards
sta361e	CCES 2010 Module	No limits on pollution from businesses
sta361f	CCES 2010 Module	Government-enforced advertising standards
sta361g	CCES 2010 Module	All motorcyclists required to wear helmets
sta361h	CCES 2010 Module	Ban sale of energy-inefficient appliances
sta361j	CCES 2010 Module	Privatize the Post Office
sta361k	CCES 2010 Module	Military burden shifted to private contractors
sta361l	CCES 2010 Module	Government takeover of bad companies
sta361m	CCES 2010 Module	Require power plants to reduce emissions
sta361n	CCES 2010 Module	Require residential carbon monoxide detectors
sta362a	CCES 2010 Module	Hold BP executives liable for oil spill
sta362b	CCES 2010 Module	Require public schools to teach creationism
sta362c	CCES 2010 Module	Limit ATM fees to \$1
sta362d	CCES 2010 Module	Eliminate Environmental Protection Agency
sta362e	CCES 2010 Module	Deport all illegal immigrants
sta362f	CCES 2010 Module	Grant all illegal immigrants citizenship
sta362g	CCES 2010 Module	End subsidies for green energy
sta362h	CCES 2010 Module	Government-funded high-speed railroad
sta362i	CCES 2010 Module	Felons should have right to vote
sta362j	CCES 2010 Module	Prohibit construction of 9-11 site mosque
sta362k	CCES 2010 Module	Ban late-term abortion procedures
sta370a	CCES 2010 Module	Require business-provided health insurance
sta370b	CCES 2010 Module	Require all people buy health insurance
sta370c	CCES 2010 Module	Limit damages in malpractice lawsuits
sta370d	CCES 2010 Module	Medical experts decide which tests insured
sta370e	CCES 2010 Module	Patients pay more for "ineffective" treatments
sta370f	CCES 2010 Module	Public insurance entity for low-cost insurance
sta380a	CCES 2010 Module	Government funds to insure all children
sta380b	CCES 2010 Module	Right of patients to sue HMO
sta380c	CCES 2010 Module	Make it harder to obtain abortion
sta380d	CCES 2010 Module	Allow the death penalty for some crimes
sta380e	CCES 2010 Module	Require license to purchase handgun
sta380f	CCES 2010 Module	Allow gays to serve in military
sta380g	CCES 2010 Module	Federal law to allow school prayer
sta380h	CCES 2010 Module	Flat tax law for all Americans
sta381a	CCES 2010 Module	Eliminate regulations for businesses

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
sta381b	CCES 2010 Module	Protect environment/natural resources
sta401a	CCES 2010 Module	Government help insure all children
sta401b	CCES 2010 Module	Government help employers pay for insurance
sta401c	CCES 2010 Module	Eliminate the estate tax
sta401d	CCES 2010 Module	Social Security privatization
sta401e	CCES 2010 Module	Easier for labor unions to organize
sta401f	CCES 2010 Module	Federal funding for stem cell research
sta401g	CCES 2010 Module	Extend federal ban on assault weapons
sta402	CCES 2010 Module	Same-sex marriage in your state
sta403a	CCES 2010 Module	Increase the minimum wage
sta403b	CCES 2010 Module	Government reduce income inequality
sta403c	CCES 2010 Module	Government reduction of federal taxes
sta403d	CCES 2010 Module	Government vouchers for private school
sta403e	CCES 2010 Module	Amendment banning gay marriage
sta405a	CCES 2010 Module	Increase federal funding to public school
sta405b	CCES 2010 Module	Government-funded universal health care
sta406a	CCES 2010 Module	Should the government restrict immigration?
sta406b	CCES 2010 Module	Should the government restrict gun sales?
sta411c	CCES 2010 Module	Health insurance for low-income children
sta411d	CCES 2010 Module	Assist homeowners facing foreclosure
sta411e	CCES 2010 Module	Extend NAFTA to Peru & Columbia
sta411f	CCES 2010 Module	U.S. government bank bailout
sta412	CCES 2010 Module	Carbon tax to reduce emissions
sta413	CCES 2010 Module	Guaranteed universal health insurance
sta430a	CCES 2010 Module	Housing vouchers for homeless
sta430b	CCES 2010 Module	Maintain welfare-to-work requirements
sta430c	CCES 2010 Module	Provide food stamps to legal immigrants
sta430d	CCES 2010 Module	Continue Medicaid for welfare-to-work
sta430e	CCES 2010 Module	Federal poverty aid through religious orgs.
sta430f	CCES 2010 Module	Additional funding for state Medicaid
sta430g	CCES 2010 Module	Tax credits for businesses with childcare
sta430h	CCES 2010 Module	Federal aid for states with more immigrants
sta430i	CCES 2010 Module	Prohibit state laws denying immigrations services
sta430j	CCES 2010 Module	Increase quota for skilled immigrants
sta430k	CCES 2010 Module	Collect fingerprint data from visa applicants
sta450	CCES 2010 Module	Federal income tax level
sta451	CCES 2010 Module	Support same-sex marriage
sta460a	CCES 2010 Module	Path to citizenship for immigrants
sta460b	CCES 2010 Module	Increase border security with Mexico
sta460c	CCES 2010 Module	Drivers licenses for undocumented immigrants
cc324	CCES 2010	When should abortions be allowed?
cc325	CCES 2010	Protect environment over jobs/economy
cc326	CCES 2010	Amendment banning gay marriage
cc327	CCES 2010	Affirmative action for discriminatory companies
cc332a	CCES 2010	American Recovery & Reinvestment Act
cc332b	CCES 2010	Expand SCHIP - health care for children
cc332c	CCES 2010	Renewable energy funding, carbon caps
cc332d	CCES 2010	Require health insurance
cc332e	CCES 2010	Appoint Kagan to Supreme Court
cc332f	CCES 2010	Financial Reform Bill
cc332g	CCES 2010	End Don't Ask, Don't Tell
cc332h	CCES 2010	Overseas surveillance of foreigners
cc332i	CCES 2010	Federal funding for stem cell research
cc332j	CCES 2010	U.S. government bank bailout
cc321	CCES 2010	Belief in climate change
cc341a	CCES 2011	American Recovery & Reinvestment Act
cc341b	CCES 2011	Expand SCHIP - health care for children
cc341c	CCES 2011	Renewable energy funding, carbon caps
cc341d	CCES 2011	Require health insurance
cc341e	CCES 2011	End Don't Ask, Don't Tell
cc341f	CCES 2011	Overseas surveillance of foreigners
cc341g	CCES 2011	Federal funding for stem cell research
cc341h	CCES 2011	U.S. government bank bailout
cc354	CCES 2011	Affirmative action for discriminatory companies
cc353	CCES 2011	Amendment banning gay marriage

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
cc352	CCES 2011	When should abortions be allowed?
cc351_1	CCES 2011	Citizenship opportunity for illegal immigrants
cc351_2	CCES 2011	Increase patrols of U.S.-Mexico border
cc351_3	CCES 2011	Allow police to question suspected immigrants
hsu301	CCES 2011 Module	Guaranteed universal health insurance
hsu302	CCES 2011 Module	Protect right of workers to unionize
hsu303	CCES 2011 Module	Government reduce income inequality
hsu304	CCES 2011 Module	Reduce regulation of private sector
hsu305	CCES 2011 Module	Raise minimum wage to \$10
hsu306	CCES 2011 Module	Allow corporations unlimited campaign contributions
hsu310	CCES 2011 Module	Allow same-sex marriage
hsu311	CCES 2011 Module	Allow LGBT to legally form civil unions
hsu312	CCES 2011 Module	Ban or limit contraceptive use
hsu313	CCES 2011 Module	Ban sex between persons of same gender
hsu314	CCES 2011 Module	Require 24-hour waiting period for abortion
hsu320	CCES 2011 Module	Raise taxes a few hundred dollars
hsu321	CCES 2011 Module	Raise taxes on rich (\$250,000+/year)
hsu322	CCES 2011 Module	Reduce tax break for homeowners
hsu323	CCES 2011 Module	Make retirees pay for Medicare
hsu324	CCES 2011 Module	Increase capital gains taxes
hsu325	CCES 2011 Module	Increase taxes on corporations
hsu326	CCES 2011 Module	Reduce Medicaid benefits for low-income
hsu327	CCES 2011 Module	Eliminate student loan subsidies
hsu328	CCES 2011 Module	Reduce federal worker pensions
hsu329	CCES 2011 Module	Make deep cuts in defense spending
hsu330	CCES 2011 Module	Increase retirement age to 68
hsu360	CCES 2011 Module	Fine businesses that hire illegal immigrants
hsu361	CCES 2011 Module	Allow states to deport illegal immigrants
hsu362	CCES 2011 Module	Allow police to ask for immigration documents
hsu363	CCES 2011 Module	Deport all illegal immigrants
hsu364	CCES 2011 Module	Remove fence on border with Mexico
hsu365	CCES 2011 Module	Same treatment of Mexican & Canadian immigrants
hsu367	CCES 2011 Module	Allow states to admit immigrants
hsu370	CCES 2011 Module	Federal government should protect environment
hsu371	CCES 2011 Module	Require power plants to reduce emissions
hsu372	CCES 2011 Module	Eliminate the Environmental Protection Agency
hsu373	CCES 2011 Module	Require 10% electricity renewable statewide
hsu374	CCES 2011 Module	Require 25% electricity renewable statewide
hsu375	CCES 2011 Module	Government should protect endangered species
hsu376	CCES 2011 Module	States should set pollution limits
hsu377	CCES 2011 Module	States should keep waterways clean
hsu378	CCES 2011 Module	Support coal plant within 25 miles of home
hsu379	CCES 2011 Module	Support wind power plant within 25 miles of home
hsu380	CCES 2011 Module	Support oil/gas drilling within 25 miles of home
hsu381	CCES 2011 Module	Power plants near home should be regulated
cc350	CCES 2011	Should we take action on climate change?
ucm301	CCES 2012 Module	Guaranteed universal health insurance
ucm302	CCES 2012 Module	Protect worker right to unionize
ucm303	CCES 2012 Module	Government reduce income inequality
ucm304	CCES 2012 Module	Reduce regulation of private sector
ucm305	CCES 2012 Module	Raise the minimum wage to \$10
ucm306	CCES 2012 Module	Allow corporations unlimited campaign contributions
ucm307	CCES 2012 Module	Allow drilling in Alaskan Wildlife Refuge
ucm321	CCES 2012 Module	City should provide health benefits to same-sex partners
ucm322	CCES 2012 Module	Reduce greenhouse gas emissions in city
ucm323	CCES 2012 Module	Subsidize mass transit for low-income in city
ucm324	CCES 2012 Module	Subsidies for residential solar energy in city
ucm325	CCES 2012 Module	Ban smoking in local bars/restaurants in city
ucm326	CCES 2012 Module	Require local residents to recycle in city
ucm327	CCES 2012 Module	Reduce pension for government employees in city
ucm328	CCES 2012 Module	Tax breaks to incentivize businesses to move in city
ucm329	CCES 2012 Module	Limit how much landlords can raise rent in city
ucm330	CCES 2012 Module	Offer subsidized housing to homeless in city
ucm331	CCES 2012 Module	Eliminate tenure for school teachers in city
ucm332	CCES 2012 Module	Close city parks to save money

Survey Text A.1 Continued from previous page

Variable	Survey	Question Text
ucm333	CCES 2012 Module	Close city libraries to save money
ucm370	CCES 2012 Module	Require parental permission for teen abortion
ucm371	CCES 2012 Module	Require 24-hour waiting period for abortion
ucm372	CCES 2012 Module	Require photo ID to vote
ucm373	CCES 2012 Module	Legalize casino gambling in states
ucm374	CCES 2012 Module	State law capping property taxes
ucm375	CCES 2012 Module	Take away union right to bargain
ucm376	CCES 2012 Module	Allow LGBT to legally form civil unions
ucm377	CCES 2012 Module	Allow same-sex marriage
ucm378	CCES 2012 Module	In-state tuition for illegal immigrant graduates
ucm379	CCES 2012 Module	If your state opted out of Medicaid expansion
ucm380	CCES 2012 Module	Allow death penalty for convicted murderers
ucm381	CCES 2012 Module	Require waiting period for gun purchases
ucm382	CCES 2012 Module	Raise the minimum wage to \$8
ucm401	CCES 2012 Module	Set limits on CO2 emissions
ucm402	CCES 2012 Module	Require 10% electricity renewable statewide
ucm403	CCES 2012 Module	Require 25% electricity renewable statewide
ucm404	CCES 2012 Module	State gasoline tax less than \$0.25/gallon
ucm405	CCES 2012 Module	Renewable energy tax on electricity bill
ucm406	CCES 2012 Module	Require more efficient use of electricity
ucm407	CCES 2012 Module	Set limits on CO2 emissions
ucm408	CCES 2012 Module	State should prepare for climate change
cc321	CCES 2012	Should we take action on climate change?
cc324	CCES 2012	When should abortions be allowed?
cc325	CCES 2012	Protect environment over jobs/economy
cc327	CCES 2012	Affirmative action for discriminatory companies
cc326	CCES 2012	Amendment banning gay marriage
cc332a	CCES 2012	House Budget plan - cut Medicare/Medicaid
cc332b	CCES 2012	Simpson-Bowles plan - 15% cuts
cc332c	CCES 2012	Middle Class Tax Cut Act
cc332d	CCES 2012	Tax Hike Prevent Act
cc332e	CCES 2012	Religious exemption for birth control coverage
cc332f	CCES 2012	Free trade agreement with Korea
cc332g	CCES 2012	Repeal Affordable Care Act
cc332h	CCES 2012	Approve Keystone XL pipeline
cc332i	CCES 2012	Support ACA - required health insurance
cc332j	CCES 2012	Allow Gays in the Military
cc322.1	CCES 2012	Citizenship opportunity for illegal immigrants
cc322.2	CCES 2012	Increase patrols of U.S.-Mexico border
cc322.3	CCES 2012	Allow police to question suspected immigrants
cc322.4	CCES 2012	Fine businesses that hire illegal immigrants

B Robustness Checks for State Senate Results

In this section, we present several robustness checks for the results in the main paper using state senate districts. First, we show that our results are robust to the usage of an alternative measure of the heterogeneity of district preferences. Next, we show that the results are robust to the usage of random effects for states rather than census divisions.

A limitation of the measure of heterogeneity that we present in the main results is that it potentially commingles uncertainty over the median voter and sampling error in our survey. As a result, we developed an alternative measure that holds constant sampling error across districts. Specifically, we bootstrapped 20 different samples from each district and fixed the number of respondents at 40 in each district. This allows us to hold variation in sampling error fixed across districts. In each simulation, we estimated the median ideal point in each district. Then, across all the simulations, we estimated the standard deviation of the median. This measure captures the variation in median voters in each district that result from the heterogeneity of the distribution of preferences. However, we were only able to calculate this measure of district heterogeneity for districts which had more than 40 respondents in our data, which forced us to drop about 50% of state senate districts, and substantially reduces our statistical power.

Nonetheless, Table B.2 (using random effects for each census division) shows that the results using this alternative measure of the heterogeneity of preferences in district i yields substantively similar results to those in the main paper. State senators take more extreme positions in districts where there is more uncertainty over the location of the median voter.

Second, because the functional forms used in our OLS models are somewhat restrictive, we also use matching estimators to check the robustness of our main results. Following McCarty, Poole and Rosenthal (2009) and Shor and McCarty (2011) we use matching techniques to estimate the *average district divergence* for districts with different levels of $var m_i$. Specifically, we use matching to estimate the AIDD for districts with “high” and “low” levels of uncertainty. We define districts with “high” levels of heterogeneity as those that are above

Table B.2: Uncertainty - Legislator Score Models (Multilevel)

	<i>Dependent variable:</i>	
	Legislator Score	
	R	D
	(1)	(2)
Uncertainty	0.44*** (0.10)	-0.43*** (0.11)
Citizen Ideology	0.81*** (0.06)	0.84*** (0.04)
Constant	0.52*** (0.07)	-0.61*** (0.09)
Observations	1,501	1,322
Log Likelihood	-607.02	-508.40
Akaike Inf. Crit.	1,224.04	1,026.81
Bayesian Inf. Crit.	1,250.61	1,052.74
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

	N.Obs	N.Rep	AIDD	SE
Overall	3396	1784	1.27	0.02
High Uncertainty	1410	865	1.43	0.03
Low Uncertainty	1413	636	1.22	0.05

Table B.3: Matching Estimates of the AIDD (Average Treatment Effect) in the Upper Chamber

the national median, and those with “low” levels of uncertainty as those that are below the national median. The matching approach tells a similar story to the OLS models, as seen in Table B.3. Average intradistrict divergence is substantially greater (about 16%) among matched state senate districts that are more heterogeneous than in those that contain more homogeneous electorates.

Table B.4: Heterogeneity - Legislator Score Models (Multilevel)

	<i>Dependent variable:</i>	
	Legislator Score	
	R	D
	(1)	(2)
Heterogeneity	0.20** (0.10)	-0.17** (0.09)
Citizen Ideology	0.57*** (0.06)	0.77*** (0.03)
Constant	0.40*** (0.14)	-0.49*** (0.12)
Observations	1,501	1,322
Log Likelihood	-432.75	-340.20
Akaike Inf. Crit.	875.50	690.41
Bayesian Inf. Crit.	902.07	716.34
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Third, we show that the results in the main paper are robust to using a multi-level model with random effects for each state, rather than each census division. The point estimates shown in Table B.4 are all smaller than the results in the main paper. Nonetheless, the aver-

age intradistrict divergence (AIDD) is still clearly a function of ideological heterogeneity in the district. Controlling for mean district ideology, the difference between the roll-call voting behavior of Democrats and Republicans is largest in districts that are most heterogeneous, and smallest in the most homogeneous districts.

C State House Results

In this section, we replicate the analysis in the main paper using state house chambers. We have relatively small samples of survey respondents in each state house district. As a result, our estimates of the heterogeneity of each district are measured with a great deal of uncertainty, which attenuates the estimated relationship between heterogeneity and roll call behavior. Nonetheless, the results are substantively similar to the results in the main body of the paper for state senates.

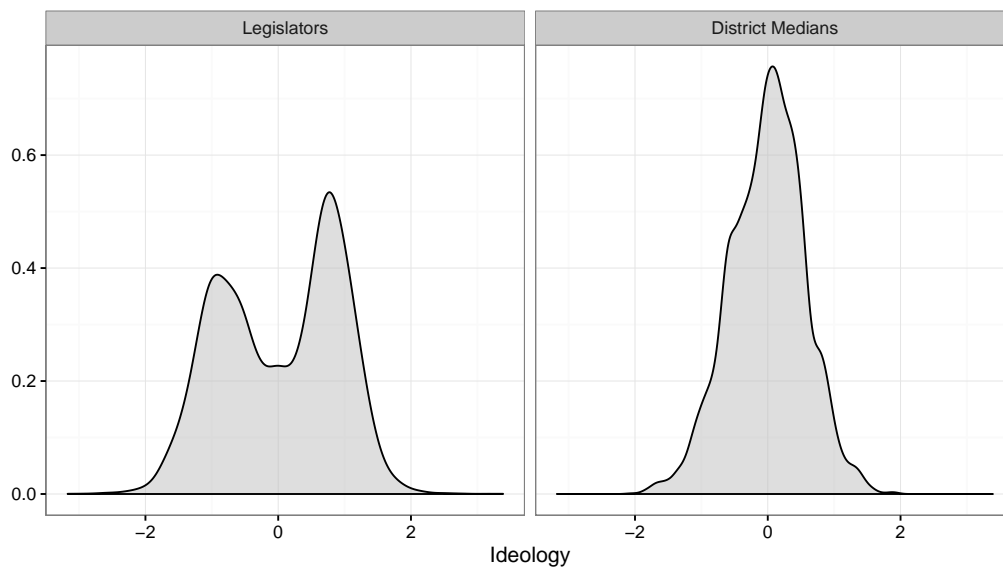
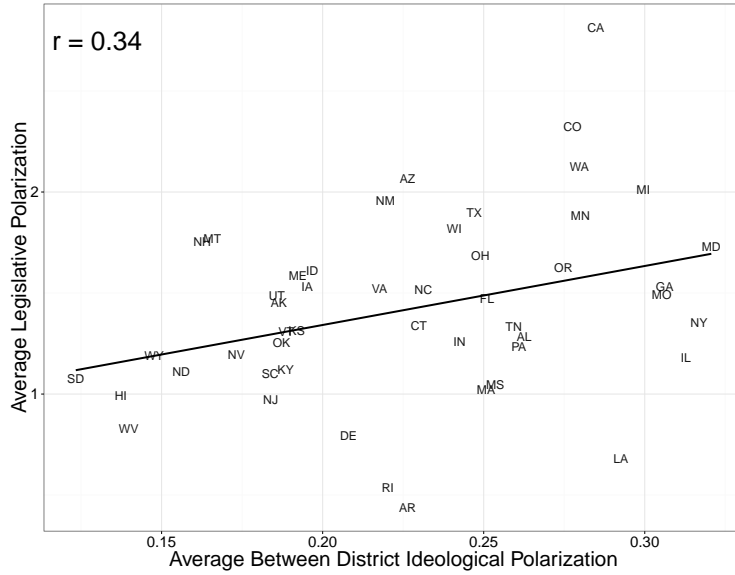
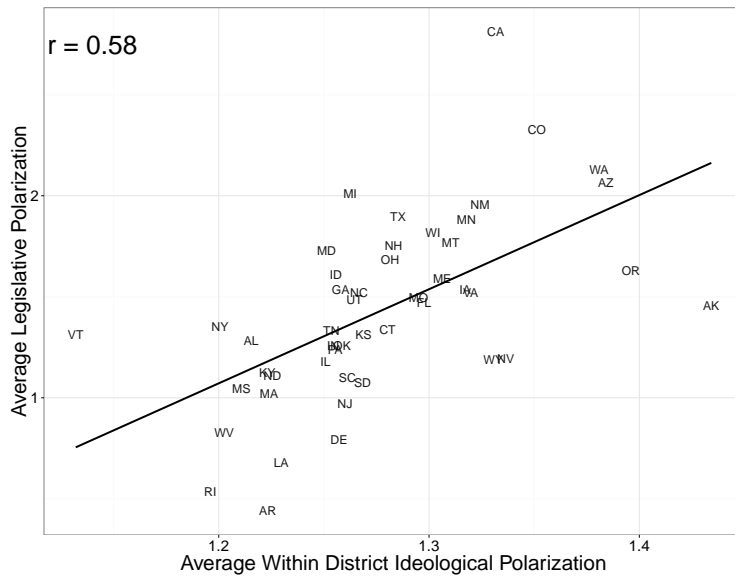


Figure C.1: Distributions of Legislator and District Median Ideal Points

We begin with plotting the overall distribution of legislator ideal points and lower chamber district medians. In Figure C.1, we see that, just as with the upper chamber, the lower chamber district medians are bell-shaped around a moderate middle.



(a) Between-district ideological polarization



(b) Within-district ideological polarization

Figure C.2: Legislative polarization and ideological polarization

Second, we examine cross-state variation in the polarization of legislatures that we measure as the distance in ideal point estimates between state legislative Democratic and Republican medians (averaged across chambers). A commonly held view of polarization is that it reflects the way in which voters are allocated across districts. If this were the case, we would expect to see our measure of legislative polarization correlate strongly with the variation of district medians within each state. In the top panel of Figure C.2, we consider this hypothesis by plotting the degree of legislative polarization against across-district ideological polarization in the mass public for each state (measured as the standard deviation of the district-level ideology estimates). Similarly to our results in the main body of the paper, we find a correspondence between across-district polarization and the polarization of the legislature.

In the bottom panel of Figure C.2 we test a different proposition—that polarization *within* state house districts correlates with legislative polarization. The horizontal axis captures the average within-district standard deviation of our ideological scale. Again we find a systematic relationship. Not only is legislative polarization correlated with across-district ideological polarization, but the states with the highest levels of within-district polarization, like California, Colorado, and Washington, are also clearly those with the highest levels of legislative polarization. In the states like West Virginia and Louisiana—where public opinion is not very polarized within districts—the parties in the legislature are much more alike.

Figure C.3 plots our measure of the standard deviation of public ideology for each state house district on the horizontal axis, and our estimate of mean ideology of the district on the horizontal axis. And as with the state senate results, the left and right sides of the inverted u-shape of the lowess plot shows that the liberal urban enclaves and the conservative exurban and suburban districts are ideologically relatively homogeneous.

Next, we examine the relationship between district ideology and legislators’ roll call behavior in sets of state house districts with different levels of heterogeneity. Figure C.4 shows how legislator ideology changes with district opinion. The three panels represent

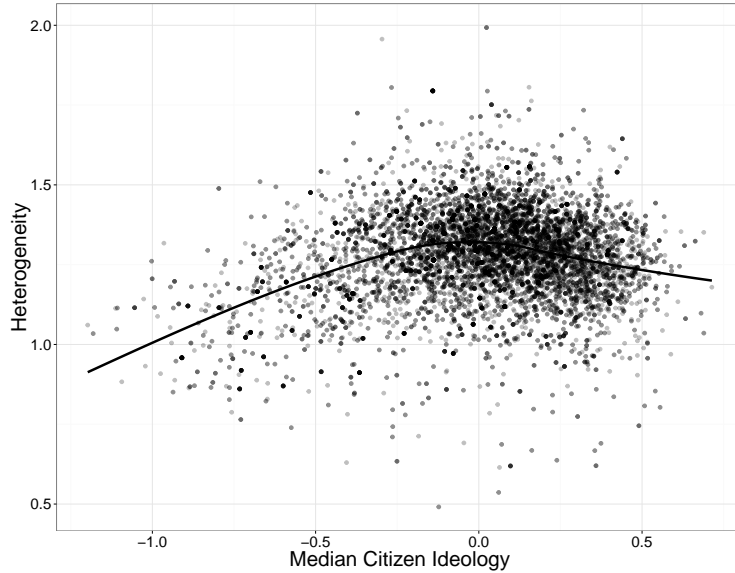


Figure C.3: Average District Ideology and Within-District Polarization

terciles of district heterogeneity, with the leftmost (or “First”) the least heterogeneous, and the rightmost (“Third”) the most heterogeneous. Each point represents a unique legislator serving some time between 2003 and 2013, with Republicans represented with triangles and Democrats with circles. Both parties are responsive to district opinion, with more conservative districts being represented by more conservative legislators. Nevertheless, a distinct separation between the parties is quite evident. Moreover, this divergence is largest for the most heterogeneous districts.

We can also examine the subset of state house districts that have been represented by both parties at some point in this decade. We measure within-district party divergence as the difference in the average ideal point score of Democrats and Republicans who have served in the same district across the decade. The left hand side of Figure C.5 plots this divergence as the function of district opinion heterogeneity. The results are quite obvious; district heterogeneity and legislator partisan divergence are quite strongly related. Similarly, the right hand panel compares the differences between the two parties for districts with multiple representatives for a given year, due either to multi-member districts or mid-year replacement. Again, there is a strong relationship.

Figure C.4: Scatterplot of Legislator Ideology and District Opinion, by Heterogeneity Tercile. Republicans are represented with triangles and Democrats with circles.

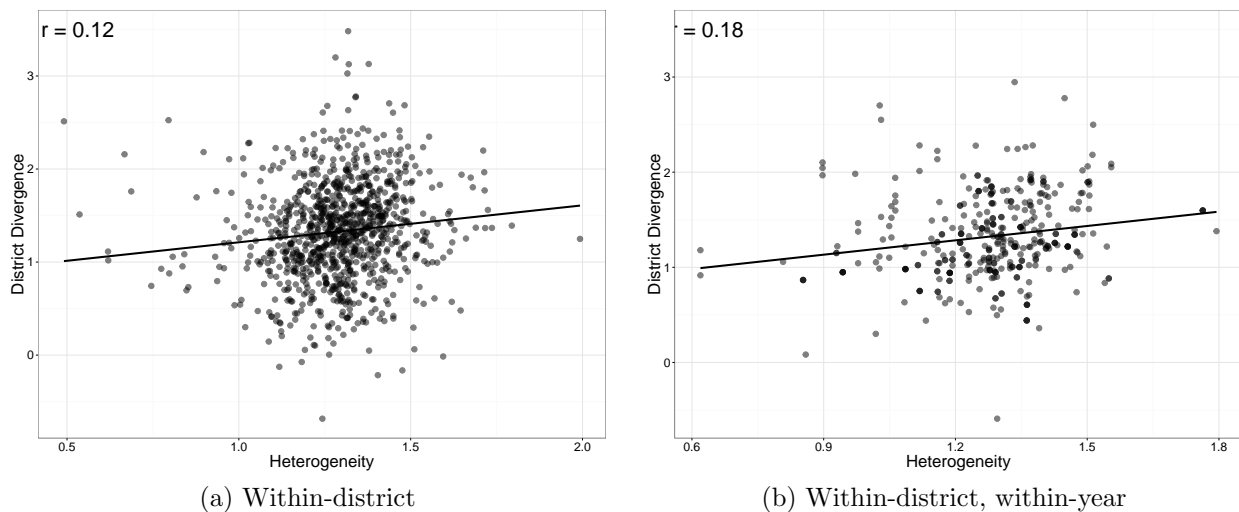
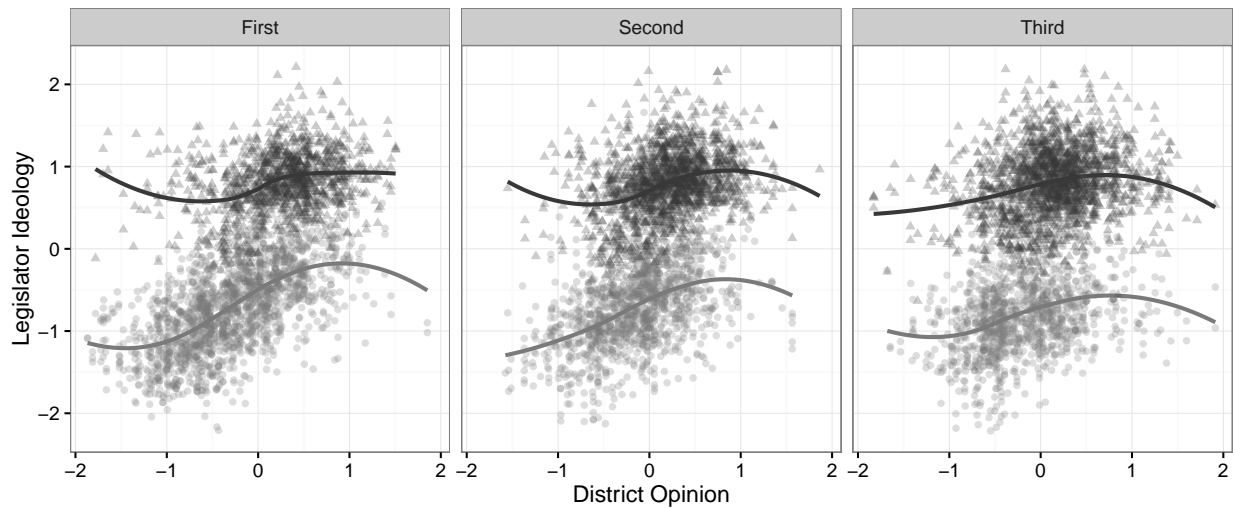


Figure C.5: Scatterplot of District Heterogeneity and Partisan Divergence. Left panel compares the difference between the average ideology of Republicans and Democrats representing a single district anytime from 2003 to 2013. Right panel compares the differences between the two parties for districts with multiple representatives for a given year, due either to multi-member districts or mid-year replacement.

Next, we use two empirical strategies to examine more formally whether the AIDD is greater when there is more heterogeneous districts. First, we use OLS models similar to the ones in the main paper. The unit of analysis is the unique state house member that served at some point between 2003 and 2012. We use Shor and McCarty (2011)'s estimate of the ideal point of each legislator as the dependent variable.

Table C.1 shows the results of these simple OLS models. The results indicate that Democratic state house members take substantially more extreme positions in more ideologically heterogeneous districts. There is some evidence that Republican members also take more extreme positions in ideologically heterogeneous districts, but the results are not statistically significant, perhaps due to the relatively high level of measurement error in our estimates of the heterogeneity of voters preferences at the level of state house districts. Similarly to our main results, the average intradistrict divergence (AIDD) is clearly a function of ideological heterogeneity in the district. Controlling for mean district ideology, the difference between the roll-call voting behavior of Democrats and Republicans is largest in districts that are most heterogeneous, and smallest in the most homogeneous districts.

Second, we repeat the matching exercise described earlier for state house districts, with similar results. Table C.2 shows that AIDD is substantially greater among matched state house districts that are more heterogeneous than in those that contain more homogeneous electorates.

Table C.1: Heterogeneity - Lower Chamber Score Models (Multilevel)

	<i>Dependent variable:</i>	
	Legislator Score	
	R	D
	(1)	(2)
Heterogeneity	0.03 (0.04)	-0.15*** (0.04)
Citizen Ideology	0.62*** (0.03)	0.84*** (0.02)
Constant	0.65*** (0.08)	-0.47*** (0.09)
Observations	4,575	4,328
Log Likelihood	-1,934.11	-1,801.24
Akaike Inf. Crit.	3,878.23	3,612.48
Bayesian Inf. Crit.	3,910.37	3,644.34
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

	N.Obs	N.Rep	AIDD	SE
Overall	8906	4576	1.29	0.02
High Heterogeneity	4451	2659	1.38	0.02
Low Heterogeneity	4452	1916	1.20	0.03

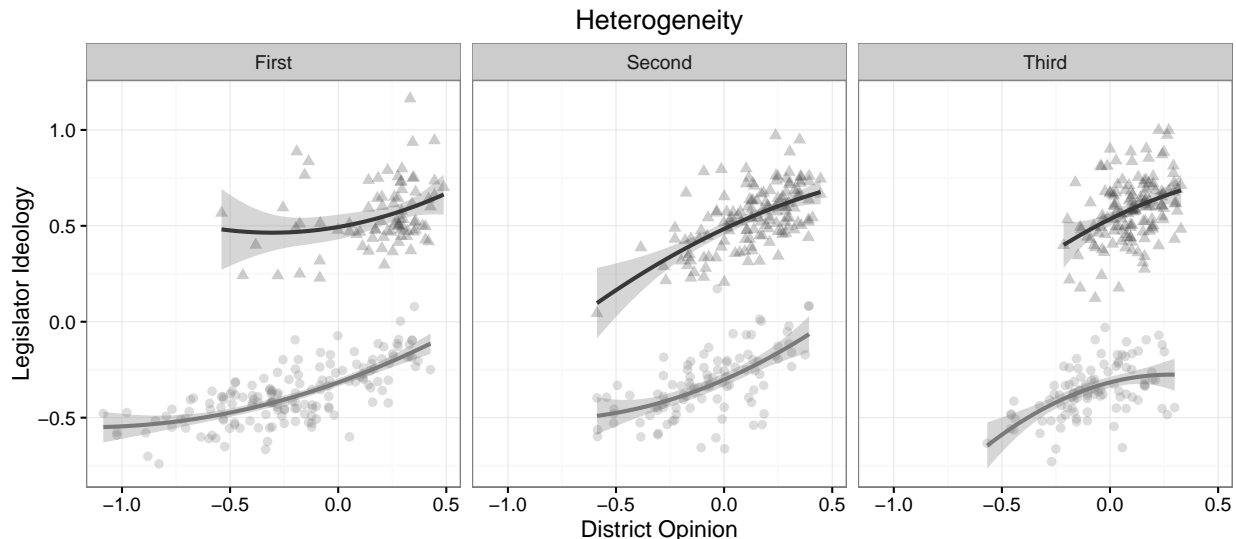
Table C.2: Matching Estimates of the AIDD (Average Treatment Effect) in the Lower Chamber

D U.S. Congress Results

In this section, we replicate the analysis in the main paper for the U.S. Congress. We have substantially less statistical power in this context. Nonetheless, the results are substantively similar to the results in the main body of the paper for state senates.

Figure D.1 shows how legislator ideology changes with district opinion. The three panels represent terciles of district heterogeneity, with the leftmost (or “First”) the least heterogeneous, and the rightmost (“Third”) the most heterogeneous. Each point represents a unique legislator serving some time between 2003 and 2012, with Republicans represented with triangles and Democrats with circles. Both parties are responsive to district opinion, with more conservative congressional districts being represented by more conservative legislators. Nevertheless, a distinct separation between the parties is quite evident. Even more central to our point, that divergence is somewhat larger for the most heterogeneous districts.

Figure D.1: Scatterplot of Representative Ideology and District Opinion, by Heterogeneity Tercile. Republicans are represented with triangles and Democrats with circles.



Next, we use two empirical strategies to examine more formally whether the AIDD is greater when there is more heterogeneous districts. First, we use OLS models similar to the ones in the main paper. The unit of analysis is the unique representative that served at some point between 2003 and 2012. We use DW-Nominate scores for each legislator as the dependent variable.

Table D.1 shows the results of these simple OLS models. The results indicate that both Democratic and Republican representatives take substantially more extreme positions in more ideologically heterogeneous districts. Similarly to our main results, the difference between the roll-call voting behavior of Democrats and Republicans is largest in congressional districts that are most heterogeneous, and smallest in the most homogeneous districts. Similarly to the results for state senate districts, the effect for Republicans appears somewhat higher than that for Democrats.

Second, because the functional forms used in our OLS models are somewhat restrictive, we also use matching estimators to check the robustness of our main results. Following McCarty, Poole and Rosenthal (2009) and Shor and McCarty (2011) we use matching techniques to

Table D.1: Heterogeneity - Congress Models (OLS)

	<i>Dependent variable:</i>			
	Legislator Score			
	(R)	(R)	(D)	(D)
Intercept	-0.23 (0.16)	0.16 (0.17)	-0.06 (0.10)	0.45*** (0.11)
Heterogeneity	0.55*** (0.12)	0.52*** (0.13)	-0.19** (0.08)	-0.25*** (0.07)
Mean Ideology	0.42*** (0.04)		0.37*** (0.02)	
2008 Dem. Presidential Vote		-0.64*** (0.09)		-0.79*** (0.05)
Observations	360	358	357	353
R ²	0.21	0.14	0.41	0.45
Adjusted R ²	0.21	0.14	0.41	0.45
Residual Std. Error	0.15 (df = 357)	0.15 (df = 355)	0.12 (df = 354)	0.11 (df = 350)

Note:

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

	N.Obs	N.Rep	AIDD	SE
Overall	733	370	0.79	0.02
High Heterogeneity	358	214	0.84	0.02
Low Heterogeneity	359	146	0.75	0.02

Table D.2: Matching Estimates of the AIDD (Average Treatment Effect)

estimate the AIDD for districts with different levels of $V(m_i)$. Specifically, we use matching to estimate the AIDD for districts with “high” and “low” levels of heterogeneity. We define districts with “high” levels of heterogeneity as those that are above the national median, and those with “low” levels of heterogeneity as those that are below the national median.

The matching results in Table D.2 are substantively similar to the OLS models. Average intradistrict divergence is greater among matched districts that are more heterogeneous than in those that contain more homogeneous electorates. Table D.2 shows that the AIDD in heterogeneous districts is roughly 12% greater than in more homogeneous districts.

Overall, we find that members of the U.S. House from both parties are more extreme when they represent heterogeneous districts. Republican representatives in heterogeneous

districts are substantially more conservative than Republicans in homogeneous districts. Likewise, Democrats in heterogeneous districts are substantially more liberal than Democrats in homogeneous districts.

E Primary Elections as a Confounding Explanation

The theory put forward in this paper is one of a large set of complimentary and conflicting explanations for the polarization of legislative voting in the United States. While we don't imagine we can provide proof for this theory to the exclusion of all others, we believe that the evidence presented here supports our theory and narrows the range of possibilities.

However, one alternative class of explanation that deserves some additional discussion is the set of theories that concern two-stage elections. In most states legislative elections have a two-stage structure where the first stage entails the nomination of a candidate by members of their respective party. Candidates who win these nominating competitions go on to the general election. It is plausible that candidates position themselves in order to balance their chances of winning the nominating contest and their chances of winning the general election.

This is important for our purposes because nominating electorates are typically more polarized than the general electorate, since they usually contain only members of the each respective party, focusing here on only the two major parties. It may be the case that heterogeneity is merely capturing situations in which the primary electorates are more polarized.

However, our theory has a distinct prediction from an explanation based on balancing two electorates. If our theory is correct, then greater dispersion in the electorate should affect candidates of both parties, regardless of whether that dispersion comes from the candidate's own party. The operating mechanism in our theory is uncertainty over the median voter. If primary elections are the cause of dispersion this should mainly take the form of candidates moving toward their own primary electorate.

We proxy the ideology of the respective primary electorates by using the 20th percentile

and the 80th percentile of the distribution to represent the views of Democrats and Republicans, respectively, keeping in mind that the positive direction is conservative. If Democrats are particularly liberal in a district, then clearly we would expect that to be reflected in the 20th percentile of the distribution if there are and Democrats to speak of in the district. Likewise, the 80th percentile should be reflective of the preferences of the Republican primary electorate.

Table E.3 shows the results when we model the positions of Democratic and Republican electorates using the 20th and 80th quantiles rather than a general measure of heterogeneity. The first point to notice is that the effect sizes are smaller than the effect of heterogeneity and the model fit is substantially worse than our main models. This suggests that the model that better fits our theory also better fits the data. Furthermore, when we use these proxies they have the effect predicted by our theory, not the effect predicted by a simple theory of primary elections. Republicans tend to be more conservative in districts with a more conservative 80th percentile, but Democrats also tend to be more liberal. Likewise, a more liberal 20th percentile has almost as large an effect on Republican officeholders as it does on Democrats. In both cases more extreme electorate produce more extreme candidates of both parties, not just the party associated with their respective party.

Table E.3: Percentiles - Legislator Score Models (Multilevel)

	<i>Dependent variable:</i>	
	Legislator Score	
	R	D
	(1)	(2)
80th Percentile	0.10*** (0.03)	-0.18*** (0.03)
20th Percentile	-0.08*** (0.04)	0.10*** (0.04)
Citizen Ideology	0.70*** (0.09)	0.98*** (0.07)
Constant	0.40*** (0.09)	-0.32*** (0.09)
Observations	1,760	1,520
Log Likelihood	-689.35	-658.01
Akaike Inf. Crit.	1,389.69	1,328.02
Bayesian Inf. Crit.	1,423.53	1,359.98
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

References

- Clinton, Joshua, Simon Jackman and Douglas Rivers. 2004. "The Statistical Analysis of Roll Call Data." American Political Science Review 98(2):355–370.
- McCarty, Nolan, Keith T. Poole and Howard Rosenthal. 2009. "Does Gerrymandering Cause Polarization?" American Journal of Political Science 53(3):666–680.
- Shor, Boris and Nolan McCarty. 2011. "The Ideological Mapping of American Legislatures." American Political Science Review 105(3):530–551.
- Tausanovitch, Chris and Christopher Warshaw. 2013. "Measuring Constituent Policy Preferences in Congress, State Legislatures, and Cities." Journal of Politics 75(2):330–342.