# *Supplementary Materials* for Multiple Ideal Points: Revealed Preferences in Different Domains

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## A   Derivation of the prior on the concentration parameter $\phi$

Our goal is to select a prior for $\phi$ such that the induced prior on $\theta = \frac{\Gamma(K)\Gamma(\phi+1)}{\Gamma(K+\phi)}$, the probability that any legislator is a stayer, follows a uniform distribution on the unit interval. The density of such prior must satisfy $p(\phi) = \left|\frac{\mathrm{d}\theta}{\mathrm{d}\phi}\right|$, and has support on the $[0, \infty)$ interval. Now,

$$
\begin{aligned}
\left|\frac{\mathrm{d}\theta}{\mathrm{d}\phi}\right| &= \Gamma(K)\left|\frac{\Gamma'(\phi+1)}{\Gamma(K+1)} - \frac{\Gamma(\phi+1)\Gamma'(\phi+K)}{[\Gamma(\phi+K)]^2}\right| \\
&= \Gamma(K)\frac{\Gamma(\phi+1)}{\Gamma(\phi+K)}\left|\frac{\Gamma'(\phi+1)}{\Gamma(\phi+1)} - \frac{\Gamma'(\phi+K)}{\Gamma(\phi+K)}\right| \\
&= \Gamma(K)\frac{\Gamma(\phi+1)}{\Gamma(\phi+K)}\left\{\psi(\phi+K) - \psi(\phi+1)\right\} \\
&= \Gamma(K)\frac{\Gamma(\phi+1)}{\Gamma(\phi+K)}\left\{\sum_{k=0}^{K-2}\frac{1}{\phi+k+1}\right\}
\end{aligned}
$$

where $\psi(\cdot) = \frac{\Gamma'(\cdot)}{\Gamma(\cdot)}$ denotes the digamma function. Note that, for $K = 2$, the prior reduces to $p(\phi) = (\phi+1)^{-2}$, a (shifted) Pareto distribution. Figure 1 shows the shape of this prior distribution for two different values of $K$. Note that the prior tends to concentrate more around zero for higher values of $K$. It is also worthwhile noting that, while this is a proper, it is heavy tailed. Indeed, since $\Gamma(\phi+1)/\Gamma(\phi+K) = 1/Q_{K-1}(\phi)$, where $Q_{K-1}$ is a polynomial of degree $K-1$, this prior has only $K-2$ finite moments.

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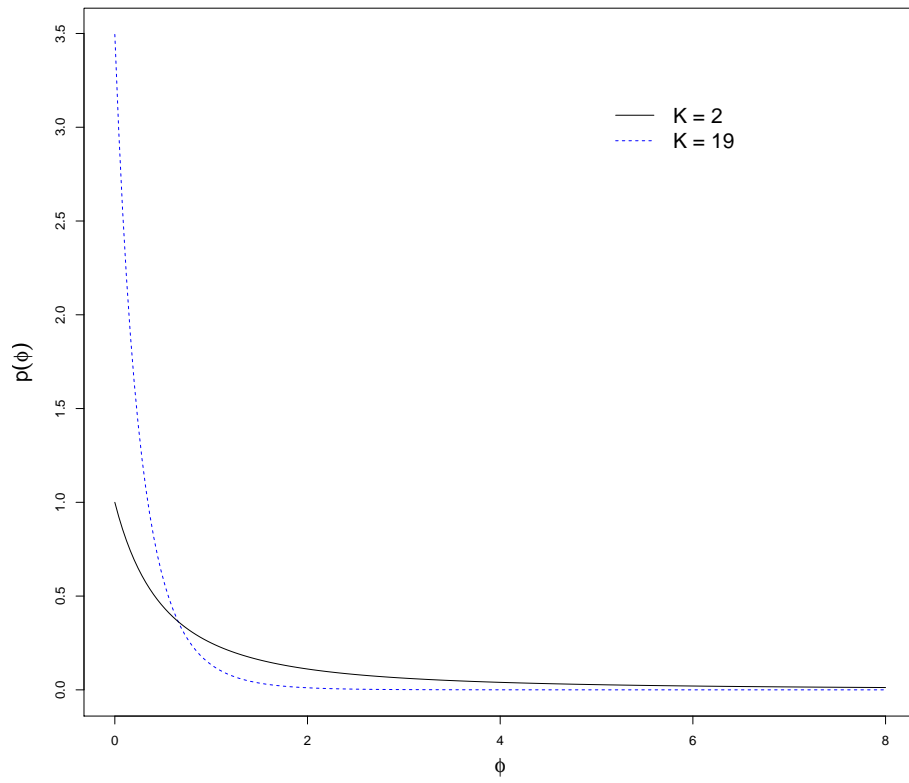
Figure 1: Prior distribution for the concentration parameter $\phi$ for various values of $K$.

# B Number of Votes by Vote-Type, U.S. House of Representatives

Table 1: Frequency of PAP major topic recorded votes by House. Source: Policy Agendas Project

| House Number | Macroeconomics | Civil Rights | Health | Agriculture | Labor and Employment | Education | Environment | Energy | Transportation | Law and Crime | Housing | Banking and Finance | Defense | Science | International Affairs | Government Operations | Public Lands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 81 | 16 | 16 | 31 | 20 | 9 | 36 | 22 | 39 | 31 | 14 | 28 | 112 | 29 | 46 | 190 | 62 |
| 98 | 40 | 20 | 30 | 38 | 28 | 32 | 30 | 19 | 25 | 26 | 21 | 33 | 123 | 31 | 51 | 209 | 65 |
| 99 | 62 | 12 | 20 | 43 | 15 | 11 | 28 | 9 | 42 | 32 | 26 | 23 | 124 | 13 | 91 | 224 | 47 |
| 100 | 33 | 41 | 30 | 17 | 17 | 11 | 21 | 16 | 38 | 36 | 32 | 25 | 156 | 27 | 88 | 230 | 76 |
| 101 | 45 | 32 | 16 | 29 | 20 | 25 | 33 | 10 | 32 | 30 | 12 | 33 | 96 | 16 | 85 | 243 | 66 |
| 102 | 36 | 16 | 26 | 11 | 35 | 22 | 11 | 10 | 31 | 42 | 23 | 52 | 94 | 38 | 67 | 259 | 100 |
| 103 | 58 | 37 | 30 | 17 | 43 | 48 | 21 | 12 | 40 | 89 | 20 | 30 | 86 | 46 | 59 | 305 | 108 |
| 104 | 106 | 45 | 32 | 36 | 41 | 18 | 63 | 33 | 46 | 87 | 25 | 54 | 113 | 36 | 87 | 343 | 77 |
| 105 | 53 | 49 | 31 | 32 | 17 | 48 | 31 | 8 | 28 | 66 | 27 | 49 | 75 | 16 | 137 | 366 | 74 |
| 106 | 71 | 26 | 72 | 40 | 18 | 55 | 45 | 11 | 29 | 100 | 14 | 56 | 89 | 40 | 93 | 295 | 101 |
| 107 | 72 | 36 | 49 | 17 | 28 | 41 | 18 | 24 | 36 | 56 | 10 | 43 | 94 | 14 | 78 | 276 | 36 |
| 108 | 99 | 33 | 88 | 24 | 36 | 31 | 13 | 30 | 49 | 55 | 9 | 67 | 153 | 17 | 119 | 250 | 78 |
| 109 | 54 | 66 | 49 | 39 | 22 | 46 | 20 | 55 | 41 | 78 | 22 | 66 | 148 | 25 | 139 | 227 | 44 |
| 110 | 69 | 57 | 97 | 47 | 44 | 116 | 49 | 89 | 61 | 68 | 91 | 131 | 205 | 43 | 105 | 407 | 131 |
| 111 | 47 | 36 | 79 | 29 | 28 | 110 | 50 | 45 | 64 | 71 | 27 | 168 | 148 | 49 | 78 | 440 | 126 |
| 112 | 98 | 31 | 87 | 40 | 33 | 27 | 146 | 163 | 63 | 55 | 33 | 103 | 215 | 28 | 34 | 295 | 105 |
| 113 | 57 | 14 | 64 | 48 | 20 | 36 | 98 | 125 | 38 | 46 | 16 | 88 | 155 | 27 | 35 | 197 | 99 |
| 114 | 41 | 43 | 80 | 18 | 20 | 40 | 130 | 88 | 58 | 43 | 12 | 118 | 172 | 40 | 52 | 215 | 81 |