

# HB\_Analysis

OVD

2023-05-24

```
library(readr)
library(tidyverse)

## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr     1.1.2     v purrr     1.0.1
## vforcats    1.0.0     v stringr    1.5.0
## v ggplot2    3.4.2     v tibble     3.2.1
## v lubridate  1.9.2     v tidyverse   1.3.0
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()   masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
setwd("/Users/ovd/Documents/GitHub/esg_pensions")

data1 = read_csv("dflogitr.csv")

## Rows: 43440 Columns: 13
## -- Column specification -----
## Delimiter: ","
## chr (5): firearms, fossil_fuels, may_employ_children, racial_diversity, gender...
## dbl (8): survey_id, obs_id, label, choice_set, pension, choice_indicator, ch...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
data1 = as.data.frame(data1)

cbc.tab = data1 %>%
  select(pension, firearms, fossil_fuels, may_employ_children, racial_diversity, gender_equal_pay)

table(cbc.tab$pension)

##
## 20000 25000 30000 35000 40000 45000 50000 55000 60000
## 4804 4855 4849 4783 4820 4798 4840 4848 4843
table(cbc.tab$firearms)

##
## Does not invest in firearms           Invests in firearms
##                           21714                      21726
table(cbc.tab$fossil_fuels)

##
```

```

## Does not invest in fossil fuels           Invests in fossil fuels
##                                         21737          21703
table(cbc.tab$may_employ_children)

##
## Invests in firms that ensure no children are employed
##                                         21708
## Invests in firms that may employ children
##                                         21732
table(cbc.tab$racial_diversity)

##
## Advocates for racial diversity in management
##                                         21749
## Does not advocate for racial diversity in management
##                                         21691
table(cbc.tab$gender_equal_pay)

##
## Advocates for equal pay for men and women
##                                         21741
## Does not advocate for equal pay for men and women
##                                         21699

#'*Following choicetools vignette*

cbc.tab = cbc.tab %>%
  mutate(pension = case_when(pension == 20000 ~ 1,
                             pension == 25000 ~2,
                             pension == 30000 ~3,
                             pension == 35000 ~4,
                             pension == 40000 ~5,
                             pension == 45000 ~6,
                             pension == 50000 ~7,
                             pension == 55000 ~8,
                             pension == 60000 ~9),
        firearms = case_when(firearms == "Invests in firearms" ~ 1,
                             firearms == "Does not invest in firearms" ~ 2),
        fossil_fuels = case_when(fossil_fuels == "Invests in fossil fuels" ~ 1,
                                 fossil_fuels == "Does not invest in fossil fuels" ~ 2),
        may_employ_children = case_when(may_employ_children == "Invests in firms that may employ children"
                                         ~ 1,
                                         may_employ_children == "Invests in firms that ensure no children"
                                         ~ 2),
        racial_diversity = case_when(racial_diversity == "Does not advocate for racial diversity in management"
                                     ~ 1,
                                     racial_diversity == "Advocates for racial diversity in management"
                                     ~ 2),
        gender_equal_pay = case_when(gender_equal_pay == "Does not advocate for equal pay for men and women"
                                     ~ 1,
                                     gender_equal_pay == "Advocates for equal pay for men and women" ~ 2))

cbc.win = data1$choice_indicator

cbc.tasks = 12

cbc.concepts = 2

N = nrow(data1)/24

```

```

cbc.attrs <- c(pension=9, firearms=2, fossil_fuels=2, may_employ_children=2, racial_diversity=2, gender=2)

attr.list=cbc.attrs

cbc.levels      <- c("$20,000", "$25,000", "$30,000", "$35,000", "$40,000", "$45,000", "$50,000", "$55,000",
                      "Invests in firearms", "Does not invests in firearms", # firearms
                      "Invests in fossil fuels", "Does not invest in fossil fuels", # fossil fuels
                      "Invests in firms that may employ children", "Invests in firms that ensure no child labor", # firms
                      "Does not advocate for racial diversity in management", "Advocates for racial diversity in management", # diversity
                      "Does not advocate for equal pay for men and women", "Advocates for equal pay for men and women", # gender)

library(choicetools)

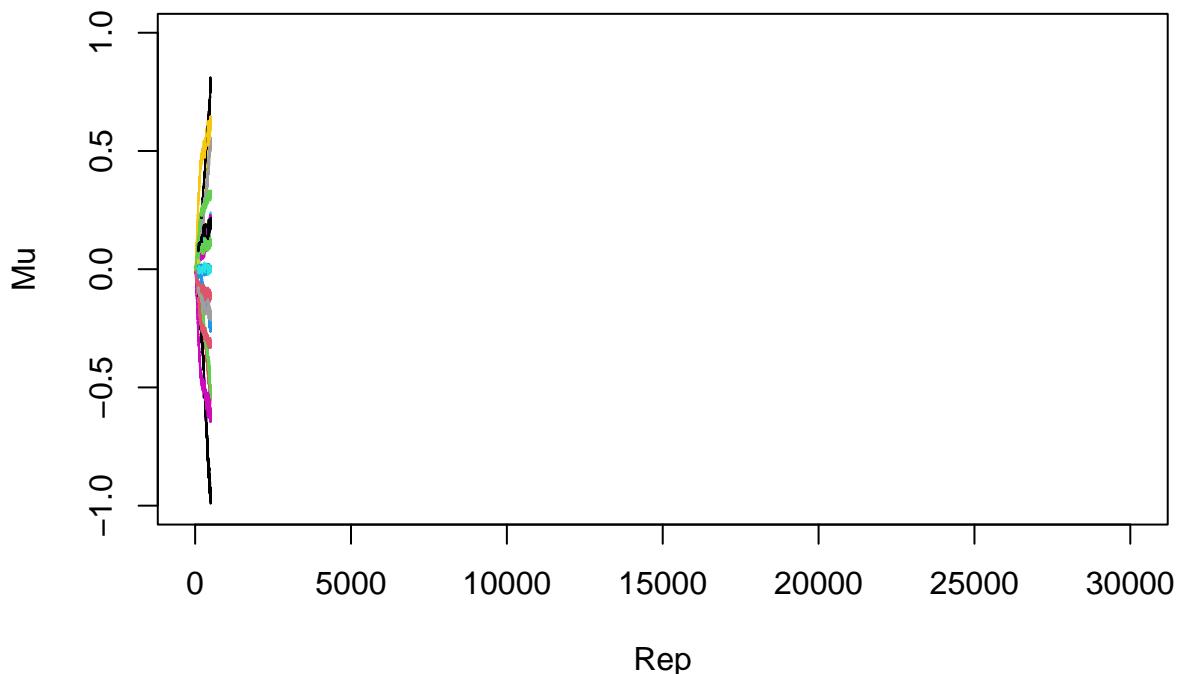
cbc.hb <- estimateMNLfromDesignHB(tmp.des=cbc.tab, tmp.win=cbc.win,
                                    kCards=cbc.concepts, kTrials=cbc.tasks,
                                    kResp=N , mcmcIter=30000)

## Loading required package: ChoiceModelR

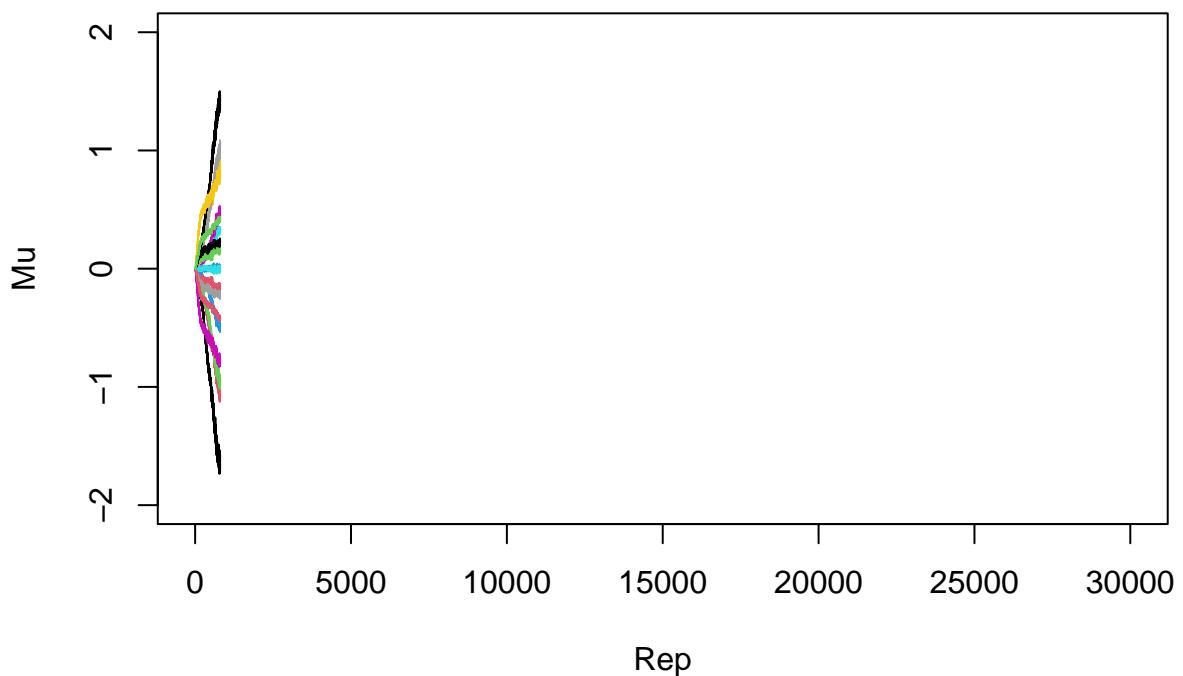
##          Logit Data
## -----
## Attribute   Type      Levels
## -----
## Attribute 1 Part Worth    9
## Attribute 2 Part Worth    2
## Attribute 3 Part Worth    2
## Attribute 4 Part Worth    2
## Attribute 5 Part Worth    2
## Attribute 6 Part Worth    2
##
## 13 parameters to be estimated.
##
## 1810 total units.
## Average of 2 alternatives in each of 12 sets per unit.
## 21720 tasks in total.
##
## Table of choice data pooled across units:
## Choice Count Pct.
## -----
##     1    10799 49.72%
##     2    10921 50.28%
##
##          MCMC Inference for Hierarchical Logit
## -----
## Total Iterations:      30000
## Draws used in estimation: 1000
## Units:                  1810
## Parameters per unit:    13
## Constraints not in effect.
## Draws are to be saved.
## Prior degrees of freedom: 5
## Prior variance:        2
##

```

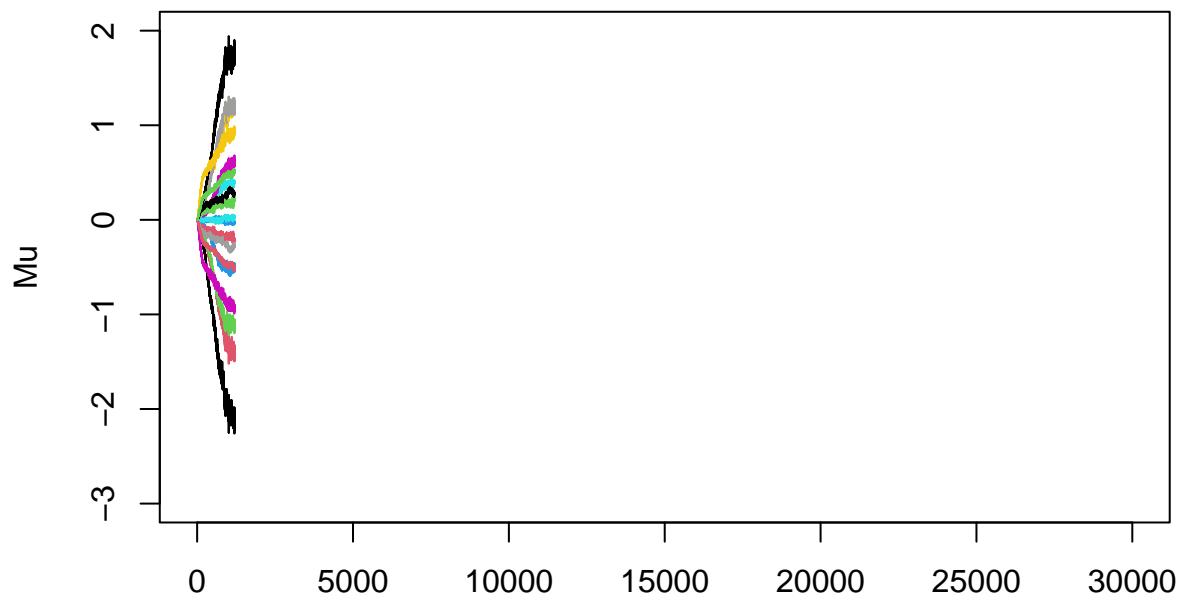
```
## MCMC Iteration Beginning...
```



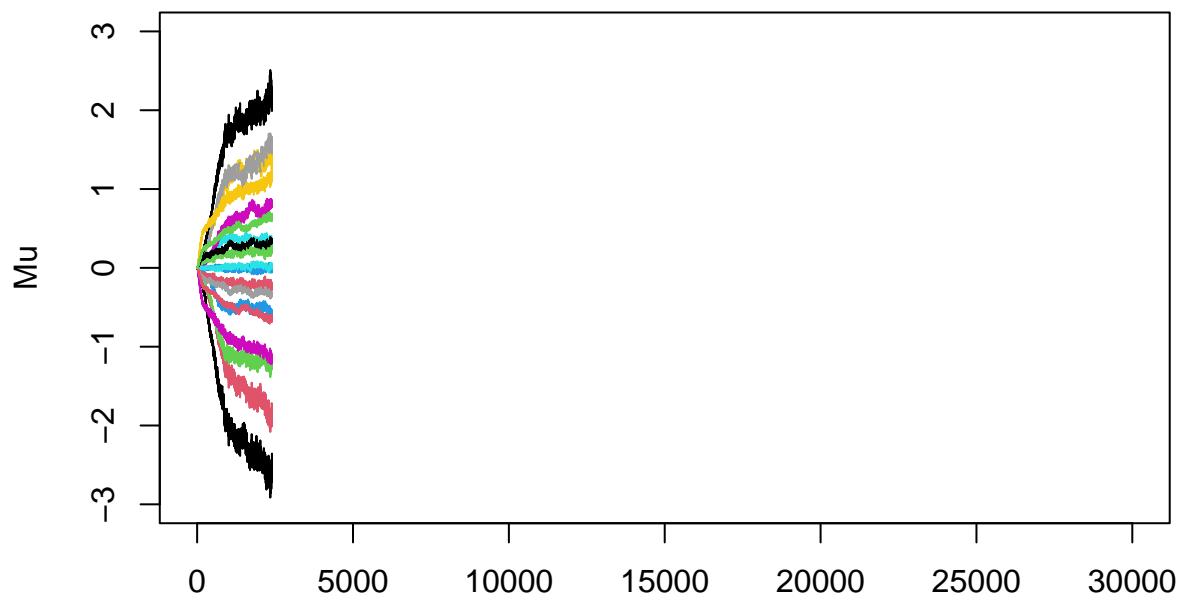
## Iteration	Acceptance	RLH	Pct. Cert.	Avg. Var.	RMS	Time to End
## 100	0.372	0.543	0.114	0.04	0.13	7:26
## 200	0.301	0.606	0.271	0.10	0.28	7:03
## 300	0.304	0.653	0.381	0.17	0.42	6:56
## 400	0.303	0.684	0.450	0.26	0.56	6:51
## 500	0.303	0.707	0.499	0.35	0.68	6:49



## 600	0.300	0.727	0.539	0.51	0.84	6:49
## 700	0.307	0.743	0.571	0.69	1.01	6:46
## 800	0.301	0.756	0.595	0.94	1.19	6:44

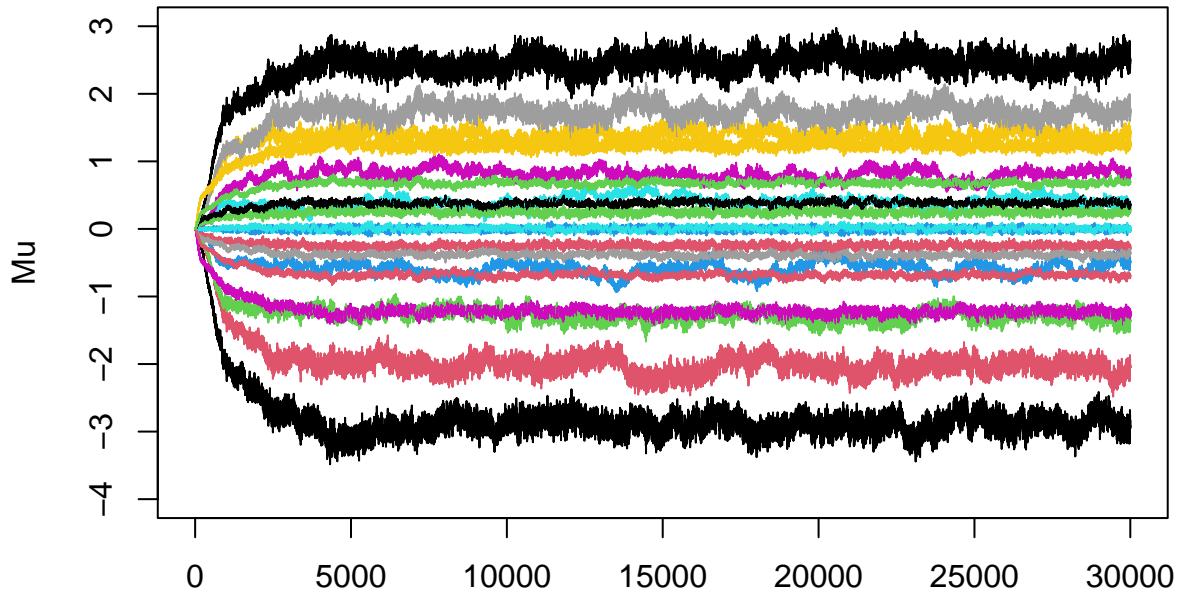


##	900	0.305	0.767	0.617	1.24	1.36	6:42
##	1000	0.301	0.775	0.631	1.49	1.49	6:42
##	1100	0.300	0.780	0.641	1.61	1.57	6:40
##	1200	0.302	0.783	0.647	1.69	1.61	6:38



##	1300	0.299	0.787	0.654	1.86	1.68	6:38
##	1400	0.304	0.788	0.657	1.93	1.71	6:38
##	1500	0.301	0.790	0.661	1.96	1.72	6:36
##	1600	0.301	0.791	0.661	2.05	1.75	6:34
##	1700	0.303	0.794	0.667	2.20	1.82	6:33
##	1800	0.300	0.798	0.675	2.37	1.88	6:31

##	1900	0.301	0.800	0.677	2.41	1.90	6:29
##	2000	0.305	0.799	0.677	2.39	1.90	6:27
##	2100	0.304	0.802	0.682	2.41	1.91	6:26
##	2200	0.301	0.803	0.683	2.54	1.95	6:25
##	2300	0.304	0.806	0.689	2.72	2.02	6:23
##	2400	0.302	0.809	0.695	2.90	2.08	6:21



##	2500	0.304	0.812	0.700	3.01	2.13	6:20
##	2600	0.303	0.811	0.698	3.06	2.15	6:18
##	2700	0.305	0.811	0.698	3.15	2.17	6:17
##	2800	0.302	0.813	0.701	3.20	2.19	6:15
##	2900	0.299	0.813	0.701	3.16	2.17	6:14
##	3000	0.301	0.813	0.701	3.01	2.13	6:12
##	3100	0.301	0.812	0.699	2.97	2.11	6:12
##	3200	0.299	0.814	0.703	3.06	2.14	6:10
##	3300	0.303	0.816	0.706	3.21	2.19	6:09
##	3400	0.306	0.817	0.708	3.33	2.24	6:08
##	3500	0.303	0.817	0.709	3.39	2.25	6:06
##	3600	0.301	0.818	0.710	3.37	2.23	6:05
##	3700	0.301	0.817	0.709	3.36	2.23	6:04
##	3800	0.304	0.819	0.711	3.30	2.22	6:02
##	3900	0.303	0.821	0.716	3.46	2.26	6:00
##	4000	0.302	0.822	0.717	3.52	2.28	5:59
##	4100	0.301	0.822	0.717	3.58	2.31	5:58
##	4200	0.299	0.821	0.716	3.62	2.32	5:56
##	4300	0.300	0.823	0.718	3.64	2.34	5:55
##	4400	0.302	0.825	0.722	3.73	2.36	5:53
##	4500	0.303	0.826	0.724	3.67	2.34	5:52
##	4600	0.304	0.826	0.725	3.67	2.35	5:50
##	4700	0.302	0.824	0.720	3.69	2.35	5:48
##	4800	0.304	0.824	0.721	3.74	2.36	5:47
##	4900	0.304	0.825	0.722	3.74	2.36	5:45
##	5000	0.303	0.824	0.721	3.72	2.36	5:44

##	5100	0.304	0.825	0.722	3.74	2.37	5:42
##	5200	0.302	0.826	0.725	3.82	2.38	5:41
##	5300	0.302	0.825	0.723	3.80	2.39	5:39
##	5400	0.300	0.824	0.721	3.69	2.35	5:38
##	5500	0.302	0.824	0.720	3.65	2.34	5:36
##	5600	0.302	0.825	0.722	3.56	2.31	5:35
##	5700	0.302	0.824	0.721	3.53	2.31	5:33
##	5800	0.306	0.824	0.720	3.51	2.29	5:32
##	5900	0.302	0.821	0.716	3.34	2.24	5:30
##	6000	0.302	0.819	0.713	3.38	2.24	5:29
##	6100	0.303	0.820	0.714	3.46	2.27	5:27
##	6200	0.302	0.819	0.712	3.42	2.26	5:26
##	6300	0.301	0.819	0.712	3.41	2.25	5:25
##	6400	0.305	0.819	0.712	3.35	2.24	5:23
##	6500	0.302	0.820	0.713	3.32	2.23	5:22
##	6600	0.301	0.821	0.716	3.51	2.29	5:21
##	6700	0.300	0.822	0.717	3.56	2.30	5:19
##	6800	0.303	0.821	0.715	3.49	2.28	5:18
##	6900	0.299	0.820	0.713	3.50	2.29	5:16
##	7000	0.298	0.822	0.717	3.57	2.30	5:15
##	7100	0.300	0.823	0.719	3.64	2.33	5:13
##	7200	0.304	0.825	0.723	3.70	2.35	5:12
##	7300	0.303	0.824	0.721	3.59	2.31	5:11
##	7400	0.303	0.823	0.720	3.56	2.30	5:09
##	7500	0.299	0.822	0.717	3.55	2.30	5:08
##	7600	0.300	0.821	0.716	3.49	2.30	5:06
##	7700	0.303	0.821	0.716	3.58	2.32	5:05
##	7800	0.304	0.820	0.713	3.46	2.28	5:03
##	7900	0.303	0.820	0.713	3.41	2.27	5:02
##	8000	0.303	0.821	0.715	3.43	2.27	5:01
##	8100	0.303	0.822	0.717	3.51	2.29	4:59
##	8200	0.301	0.823	0.719	3.61	2.31	4:58
##	8300	0.298	0.822	0.717	3.50	2.29	4:56
##	8400	0.302	0.821	0.715	3.48	2.27	4:55
##	8500	0.302	0.821	0.716	3.46	2.26	4:54
##	8600	0.304	0.822	0.717	3.52	2.27	4:52
##	8700	0.302	0.824	0.720	3.61	2.31	4:51
##	8800	0.304	0.823	0.719	3.64	2.31	4:49
##	8900	0.297	0.823	0.719	3.65	2.31	4:48
##	9000	0.303	0.821	0.716	3.68	2.32	4:47
##	9100	0.306	0.822	0.717	3.69	2.33	4:45
##	9200	0.303	0.823	0.719	3.58	2.31	4:44
##	9300	0.301	0.822	0.717	3.44	2.27	4:43
##	9400	0.302	0.822	0.717	3.42	2.25	4:41
##	9500	0.301	0.821	0.716	3.49	2.27	4:40
##	9600	0.301	0.822	0.717	3.51	2.29	4:38
##	9700	0.303	0.822	0.717	3.43	2.27	4:37
##	9800	0.304	0.821	0.715	3.38	2.26	4:35
##	9900	0.303	0.821	0.716	3.47	2.28	4:34
##	10000	0.305	0.820	0.713	3.36	2.25	4:33
##	10100	0.303	0.822	0.716	3.35	2.25	4:31
##	10200	0.301	0.819	0.712	3.31	2.23	4:30
##	10300	0.305	0.819	0.713	3.34	2.24	4:28
##	10400	0.305	0.820	0.714	3.44	2.28	4:27

##	10500	0.302	0.819	0.711	3.41	2.26	4:26
##	10600	0.299	0.818	0.709	3.34	2.24	4:24
##	10700	0.303	0.819	0.712	3.25	2.21	4:23
##	10800	0.302	0.818	0.711	3.29	2.21	4:22
##	10900	0.301	0.818	0.711	3.41	2.26	4:20
##	11000	0.303	0.820	0.714	3.51	2.29	4:19
##	11100	0.302	0.821	0.715	3.53	2.29	4:18
##	11200	0.299	0.821	0.716	3.44	2.26	4:16
##	11300	0.302	0.823	0.719	3.45	2.25	4:15
##	11400	0.302	0.822	0.717	3.53	2.28	4:14
##	11500	0.301	0.821	0.715	3.57	2.29	4:12
##	11600	0.304	0.820	0.714	3.55	2.29	4:11
##	11700	0.299	0.821	0.716	3.54	2.29	4:10
##	11800	0.305	0.821	0.715	3.57	2.29	4:09
##	11900	0.305	0.823	0.718	3.60	2.31	4:08
##	12000	0.300	0.822	0.718	3.45	2.27	4:06
##	12100	0.302	0.820	0.713	3.31	2.23	4:05
##	12200	0.304	0.819	0.712	3.34	2.23	4:03
##	12300	0.302	0.818	0.711	3.29	2.22	4:02
##	12400	0.304	0.818	0.710	3.32	2.22	4:00
##	12500	0.304	0.820	0.713	3.43	2.25	3:59
##	12600	0.301	0.819	0.712	3.43	2.26	3:57
##	12700	0.302	0.819	0.713	3.48	2.28	3:56
##	12800	0.300	0.817	0.709	3.43	2.26	3:55
##	12900	0.305	0.819	0.711	3.40	2.25	3:53
##	13000	0.303	0.820	0.714	3.42	2.27	3:52
##	13100	0.301	0.822	0.716	3.41	2.27	3:51
##	13200	0.303	0.822	0.716	3.41	2.26	3:49
##	13300	0.304	0.822	0.717	3.56	2.30	3:48
##	13400	0.304	0.822	0.717	3.60	2.31	3:47
##	13500	0.301	0.822	0.718	3.63	2.32	3:45
##	13600	0.304	0.822	0.717	3.58	2.31	3:44
##	13700	0.304	0.823	0.719	3.49	2.28	3:42
##	13800	0.304	0.823	0.719	3.60	2.32	3:41
##	13900	0.300	0.823	0.719	3.63	2.34	3:40
##	14000	0.302	0.822	0.717	3.59	2.32	3:38
##	14100	0.301	0.822	0.718	3.67	2.34	3:37
##	14200	0.303	0.823	0.718	3.75	2.35	3:35
##	14300	0.301	0.825	0.723	3.84	2.37	3:34
##	14400	0.303	0.823	0.718	3.74	2.35	3:33
##	14500	0.305	0.825	0.722	3.84	2.39	3:31
##	14600	0.303	0.825	0.722	3.78	2.37	3:30
##	14700	0.303	0.824	0.720	3.73	2.36	3:28
##	14800	0.305	0.824	0.720	3.68	2.36	3:27
##	14900	0.300	0.826	0.724	3.72	2.37	3:26
##	15000	0.301	0.826	0.724	3.78	2.38	3:24
##	15100	0.303	0.826	0.725	3.76	2.38	3:23
##	15200	0.303	0.824	0.721	3.55	2.32	3:22
##	15300	0.302	0.823	0.718	3.46	2.29	3:20
##	15400	0.302	0.821	0.715	3.51	2.30	3:19
##	15500	0.304	0.822	0.717	3.58	2.31	3:18
##	15600	0.307	0.823	0.719	3.64	2.32	3:16
##	15700	0.304	0.822	0.717	3.73	2.36	3:15
##	15800	0.303	0.823	0.719	3.68	2.35	3:14

##	15900	0.305	0.822	0.718	3.66	2.35	3:12
##	16000	0.304	0.824	0.720	3.63	2.33	3:11
##	16100	0.304	0.824	0.721	3.63	2.33	3:10
##	16200	0.303	0.824	0.721	3.72	2.35	3:09
##	16300	0.303	0.825	0.722	3.71	2.35	3:07
##	16400	0.301	0.823	0.719	3.56	2.31	3:06
##	16500	0.302	0.821	0.716	3.39	2.25	3:05
##	16600	0.301	0.821	0.715	3.34	2.23	3:03
##	16700	0.305	0.821	0.716	3.30	2.22	3:02
##	16800	0.299	0.821	0.716	3.24	2.19	3:01
##	16900	0.303	0.820	0.714	3.22	2.19	2:59
##	17000	0.302	0.821	0.715	3.32	2.23	2:58
##	17100	0.301	0.823	0.719	3.32	2.24	2:57
##	17200	0.300	0.821	0.716	3.27	2.22	2:55
##	17300	0.302	0.822	0.716	3.29	2.23	2:54
##	17400	0.303	0.820	0.714	3.40	2.26	2:53
##	17500	0.303	0.820	0.714	3.43	2.25	2:51
##	17600	0.305	0.821	0.715	3.43	2.25	2:50
##	17700	0.305	0.822	0.717	3.54	2.29	2:49
##	17800	0.305	0.823	0.720	3.65	2.33	2:48
##	17900	0.306	0.825	0.723	3.77	2.36	2:46
##	18000	0.303	0.825	0.723	3.73	2.35	2:45
##	18100	0.303	0.823	0.720	3.77	2.36	2:44
##	18200	0.302	0.823	0.720	3.69	2.33	2:43
##	18300	0.296	0.823	0.718	3.67	2.32	2:41
##	18400	0.302	0.820	0.714	3.60	2.31	2:40
##	18500	0.301	0.819	0.712	3.44	2.27	2:39
##	18600	0.304	0.820	0.714	3.36	2.25	2:37
##	18700	0.303	0.822	0.717	3.41	2.26	2:36
##	18800	0.302	0.823	0.720	3.51	2.30	2:35
##	18900	0.300	0.822	0.717	3.49	2.30	2:34
##	19000	0.303	0.823	0.719	3.54	2.31	2:33
##	19100	0.304	0.823	0.719	3.58	2.32	2:32
##	19200	0.305	0.822	0.718	3.48	2.28	2:31
##	19300	0.302	0.822	0.718	3.45	2.27	2:29
##	19400	0.306	0.821	0.715	3.41	2.25	2:28
##	19500	0.301	0.821	0.715	3.42	2.25	2:27
##	19600	0.303	0.821	0.715	3.43	2.25	2:26
##	19700	0.302	0.823	0.719	3.52	2.28	2:25
##	19800	0.300	0.823	0.719	3.56	2.30	2:23
##	19900	0.304	0.825	0.722	3.54	2.31	2:22
##	20000	0.302	0.824	0.721	3.46	2.28	2:21
##	20100	0.304	0.825	0.722	3.54	2.30	2:19
##	20200	0.301	0.827	0.725	3.62	2.32	2:18
##	20300	0.299	0.826	0.724	3.66	2.31	2:17
##	20400	0.305	0.825	0.722	3.65	2.32	2:15
##	20500	0.303	0.824	0.721	3.59	2.31	2:14
##	20600	0.304	0.826	0.724	3.63	2.32	2:12
##	20700	0.299	0.823	0.720	3.53	2.29	2:11
##	20800	0.302	0.824	0.720	3.55	2.28	2:10
##	20900	0.305	0.822	0.718	3.56	2.29	2:09
##	21000	0.302	0.821	0.716	3.61	2.31	2:08
##	21100	0.303	0.822	0.717	3.60	2.31	2:07
##	21200	0.301	0.821	0.716	3.74	2.35	2:05

##	21300	0.303	0.822	0.716	3.76	2.36	2:04
##	21400	0.303	0.822	0.718	3.73	2.35	2:03
##	21500	0.304	0.824	0.721	3.71	2.35	2:01
##	21600	0.300	0.824	0.720	3.68	2.33	2:00
##	21700	0.302	0.823	0.720	3.66	2.34	1:59
##	21800	0.297	0.824	0.720	3.63	2.33	1:57
##	21900	0.301	0.824	0.720	3.58	2.31	1:56
##	22000	0.305	0.822	0.718	3.50	2.29	1:55
##	22100	0.303	0.823	0.718	3.52	2.30	1:54
##	22200	0.298	0.823	0.719	3.48	2.28	1:52
##	22300	0.305	0.823	0.719	3.60	2.31	1:51
##	22400	0.306	0.823	0.719	3.58	2.30	1:49
##	22500	0.304	0.823	0.720	3.49	2.29	1:49
##	22600	0.305	0.824	0.721	3.48	2.29	1:48
##	22700	0.300	0.823	0.719	3.50	2.28	1:46
##	22800	0.302	0.823	0.719	3.65	2.33	1:45
##	22900	0.301	0.824	0.721	3.72	2.37	1:43
##	23000	0.301	0.824	0.721	3.77	2.38	1:42
##	23100	0.305	0.825	0.722	3.86	2.40	1:40
##	23200	0.302	0.824	0.721	3.79	2.38	1:39
##	23300	0.299	0.824	0.720	3.70	2.35	1:38
##	23400	0.303	0.822	0.717	3.67	2.33	1:37
##	23500	0.301	0.820	0.714	3.54	2.30	1:35
##	23600	0.301	0.820	0.714	3.56	2.30	1:34
##	23700	0.302	0.821	0.716	3.57	2.32	1:33
##	23800	0.306	0.822	0.717	3.54	2.31	1:32
##	23900	0.302	0.822	0.718	3.62	2.33	1:30
##	24000	0.304	0.822	0.717	3.53	2.30	1:29
##	24100	0.307	0.823	0.718	3.46	2.29	1:28
##	24200	0.301	0.822	0.717	3.49	2.29	1:26
##	24300	0.303	0.821	0.716	3.50	2.28	1:25
##	24400	0.298	0.822	0.716	3.43	2.26	1:23
##	24500	0.304	0.819	0.712	3.33	2.22	1:22
##	24600	0.307	0.819	0.711	3.27	2.20	1:20
##	24700	0.302	0.816	0.707	3.18	2.18	1:19
##	24800	0.301	0.820	0.713	3.29	2.21	1:17
##	24900	0.304	0.819	0.713	3.45	2.27	1:16
##	25000	0.305	0.819	0.712	3.43	2.25	1:14
##	25100	0.302	0.820	0.713	3.34	2.23	1:13
##	25200	0.306	0.819	0.713	3.35	2.23	1:11
##	25300	0.302	0.820	0.714	3.40	2.24	1:10
##	25400	0.304	0.821	0.715	3.49	2.27	1:08
##	25500	0.305	0.823	0.719	3.50	2.29	1:07
##	25600	0.304	0.822	0.718	3.50	2.29	1:05
##	25700	0.301	0.823	0.718	3.55	2.30	1:04
##	25800	0.306	0.822	0.717	3.57	2.31	1:02
##	25900	0.303	0.822	0.717	3.58	2.31	1:01
##	26000	0.303	0.820	0.714	3.53	2.30	0:59
##	26100	0.305	0.820	0.714	3.52	2.30	0:58
##	26200	0.303	0.820	0.714	3.57	2.31	0:56
##	26300	0.302	0.822	0.716	3.71	2.35	0:55
##	26400	0.302	0.821	0.715	3.54	2.30	0:54
##	26500	0.302	0.820	0.713	3.39	2.26	0:52
##	26600	0.305	0.820	0.713	3.39	2.25	0:51

```

##      26700 0.305      0.820 0.713      3.49      2.28 0:49
##      26800 0.304      0.820 0.714      3.52      2.29 0:48
##      26900 0.303      0.820 0.714      3.44      2.26 0:46
##      27000 0.303      0.820 0.713      3.42      2.26 0:45
##      27100 0.301      0.819 0.711      3.44      2.26 0:43
##      27200 0.301      0.819 0.712      3.39      2.24 0:42
##      27300 0.300      0.819 0.712      3.48      2.27 0:40
##      27400 0.304      0.819 0.712      3.46      2.28 0:39
##      27500 0.302      0.819 0.713      3.41      2.27 0:37
##      27600 0.306      0.820 0.713      3.44      2.27 0:36
##      27700 0.302      0.819 0.711      3.37      2.24 0:34
##      27800 0.303      0.818 0.711      3.33      2.23 0:33
##      27900 0.303      0.818 0.710      3.34      2.24 0:31
##      28000 0.300      0.820 0.714      3.52      2.29 0:30
##      28100 0.301      0.822 0.718      3.69      2.34 0:28
##      28200 0.299      0.821 0.715      3.66      2.34 0:27
##      28300 0.299      0.821 0.715      3.66      2.33 0:25
##      28400 0.304      0.820 0.713      3.60      2.32 0:24
##      28500 0.304      0.820 0.714      3.61      2.31 0:22
##      28600 0.305      0.818 0.711      3.57      2.31 0:21
##      28700 0.304      0.819 0.711      3.47      2.28 0:19
##      28800 0.302      0.817 0.709      3.40      2.25 0:18
##      28900 0.303      0.818 0.710      3.38      2.24 0:16
##      29000 0.302      0.820 0.713      3.37      2.23 0:15
##      29100 0.299      0.819 0.713      3.35      2.23 0:13
##      29200 0.304      0.820 0.714      3.35      2.23 0:12
##      29300 0.302      0.821 0.716      3.36      2.24 0:10
##      29400 0.304      0.821 0.715      3.41      2.25 0:09
##      29500 0.305      0.822 0.718      3.48      2.29 0:07
##      29600 0.301      0.824 0.721      3.65      2.34 0:06
##      29700 0.302      0.826 0.724      3.62      2.33 0:04
##      29800 0.304      0.827 0.725      3.56      2.32 0:03
##      29900 0.302      0.826 0.724      3.66      2.34 0:02
##      30000 0.303      0.825 0.722      3.64      2.33 0:00
##
## Total Time Elapsed: 7:26
##
## Writing estimated unit-level betas to Rbetas.csv in the working directory
##
## Writing RLH, the geometric mean of the likelihood of the choices made,
##
## across the choice sets of each unit to RLH.csv in the working directory
cbc.est      <- data.frame(extractHBetas(cbc.hb, cbc.attrs))
names(cbc.est) <- cbc.levels
cbc.est$ID    <- 1:nrow(cbc.est)

library(ggplot2)
library(reshape2)

##
## Attaching package: 'reshape2'

## The following object is masked from 'package:tidyR':
##

```

```

##      smiths

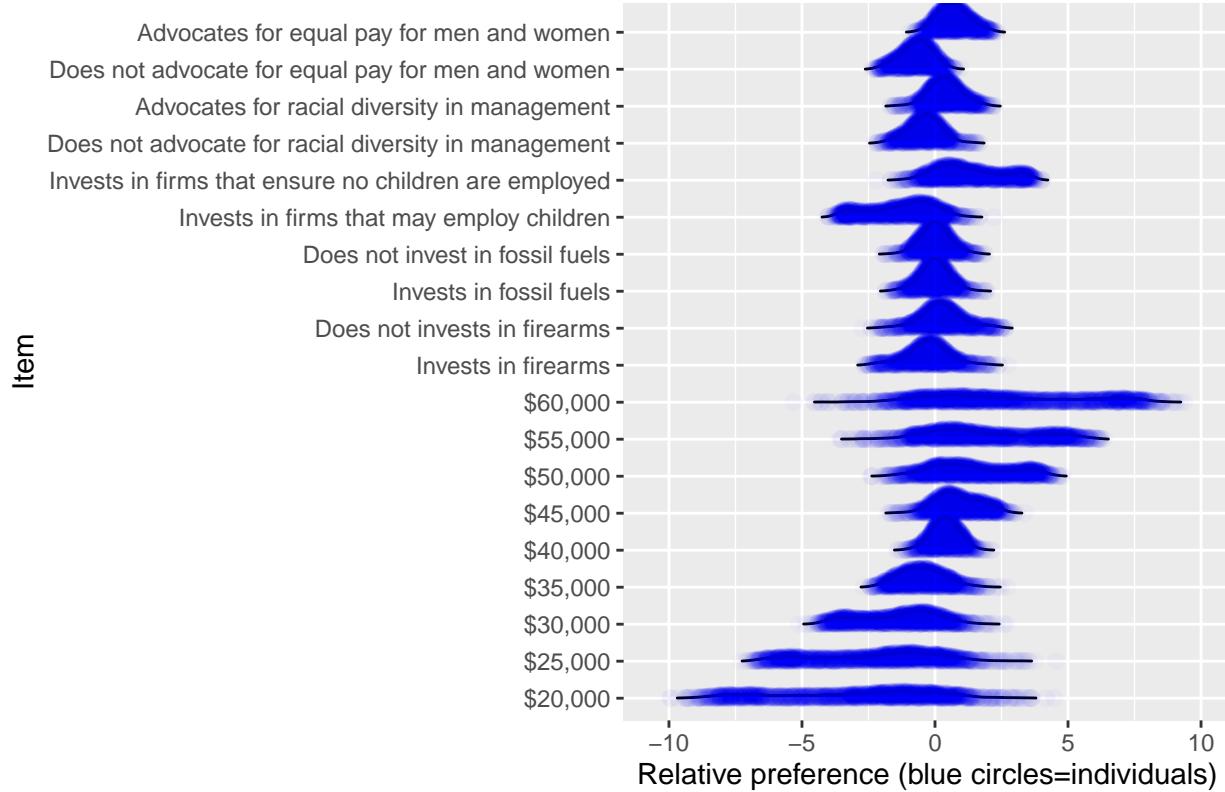
cbc.m <- melt(cbc.est, id.vars = "ID")

library(gggridges)
ggplot(data=cbc.m, aes(x=value, y=variable, group=variable)) +
  geom_density_ridges(scale=0.9, alpha=0, jittered_points=TRUE,
    rel_min_height=0.005,
    position="points_sina",
    point_color = "blue", point_alpha=1/sqrt(N),
    point_size=2.5) +
  ylab("Item") +
  xlab("Relative preference (blue circles=individuals)") +
  ggtitle("Preference estimates: Distribution of individuals")

```

## Picking joint bandwidth of 0.236

Preference estimates: Distribution of indi



```

# cbc.levels     <- c("$20,000" (1), "$25,000" (2), "$30,000" (3), "$35,000" (4), "$40,000" (5), "$45,000" (6),
#                      "Invests in firearms", (10)
#"Does not invests in firearms" (11), # firearms
#                      "Invests in fossil fuels" (12), "Does not invest in fossil fuels", # fossil fuel
#                      "Invests in firms that may employ children" (14), "Invests in firms that ensure no children are employed" (15)
#                      "Does not advocate for racial diversity in management" (16), "Advocates for racial diversity in management" (17)
#                      "Does not advocate for equal pay for men and women" (18), "Advocates for equal pay for men and women" (19)

prod1 <- c(5, 10, 12, 14, 16, 18)      # $40,000 pension with no sustainable features
prod2 <- c(5, 11, 13, 15, 17, 19)      # $40,000 pension with only sustainable features
usb.pref  <- marketSim(

```

```
cbc.est,                      # matrix of individual-level utilities
list(prod1, prod2),          # list of products to compare
use.none=FALSE,               # we have no "none" column
style="first")                # estimate share by first-choice approach

# see the overall preference share for the two products
colMeans(usb.pref)
```

```
## [1] 0.1414365 0.8585635
```

Multinomial Logit Model. Replicate with ChoiceModelR too! Follow vignettes.

TBD