

nuclear energy in comparison

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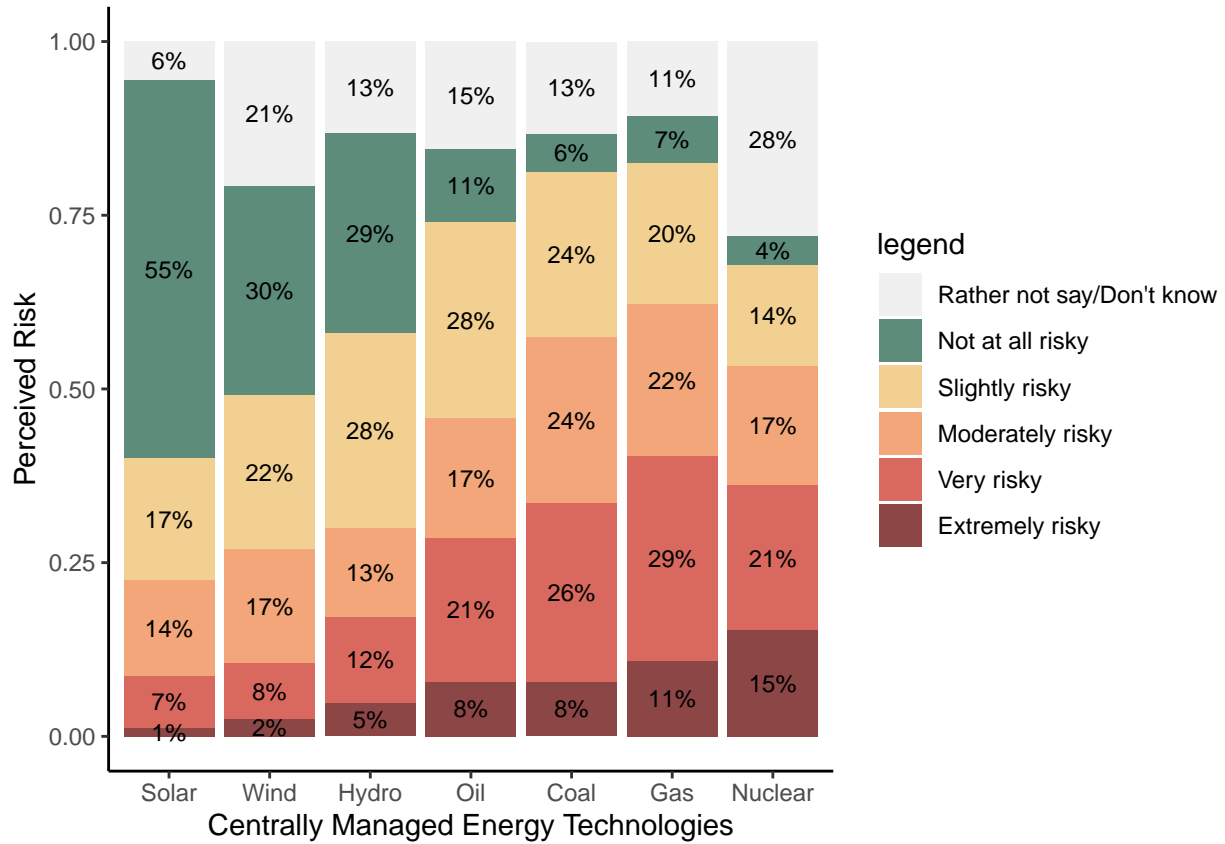
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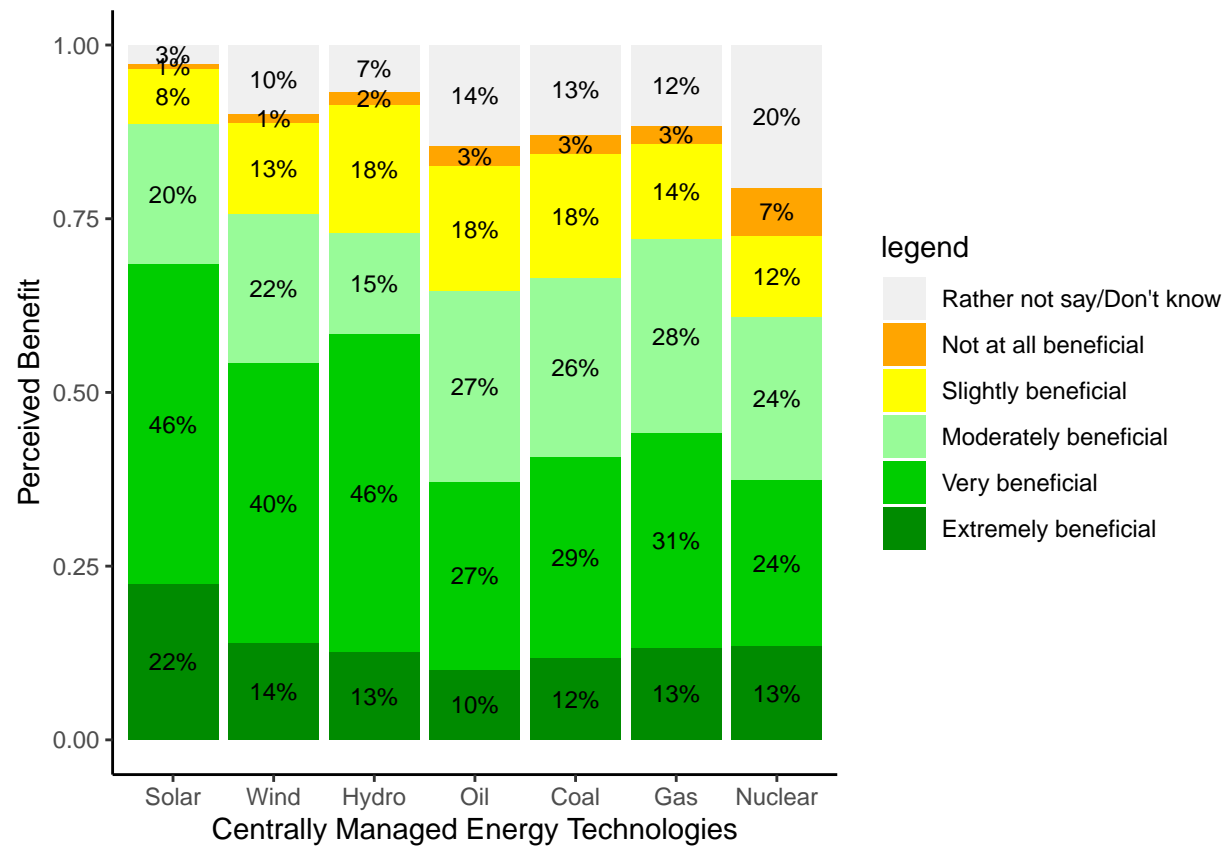
Abstract

H1: Nuclear Energy will be seen as riskier than other energy technologies in India. this paper explores nuclear energy in comparison with other technologies

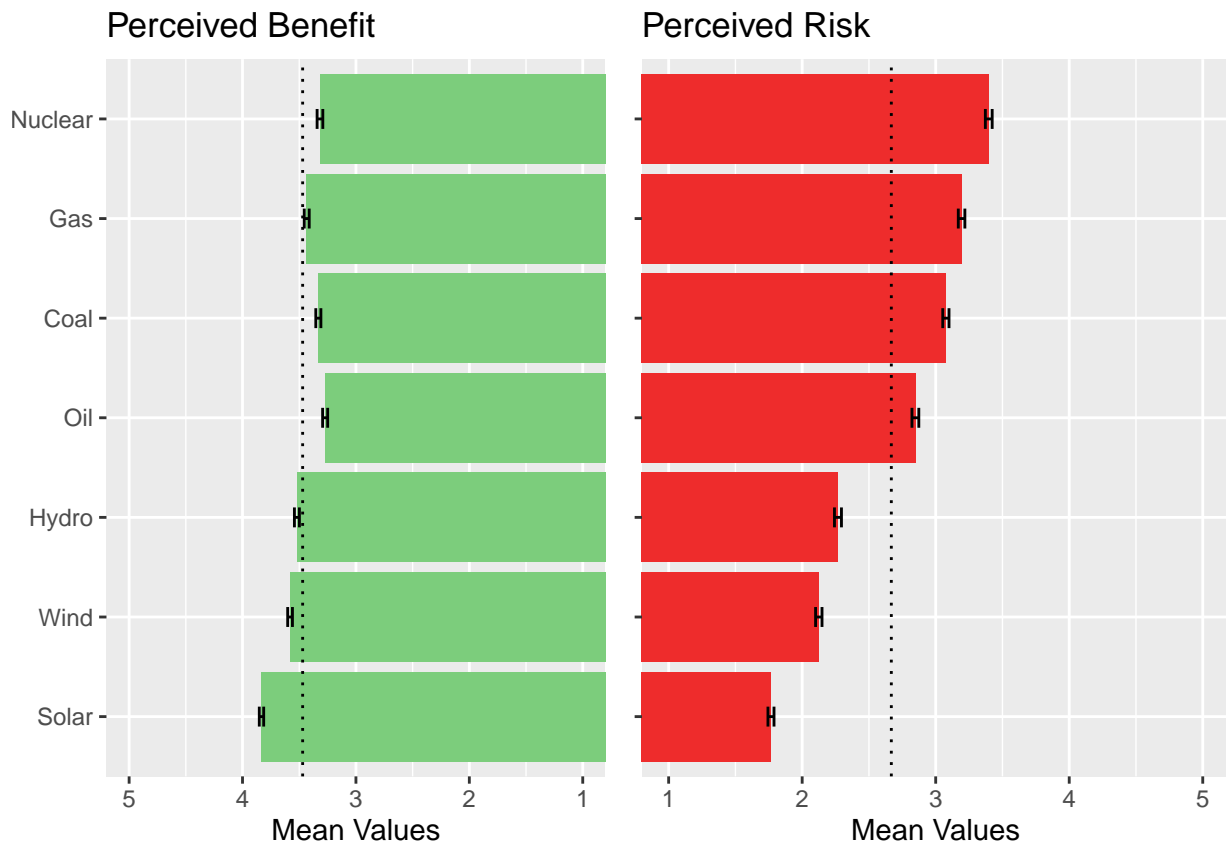
Likert Responses (n= 2160)

The percentages are rounded off to whole numbers.

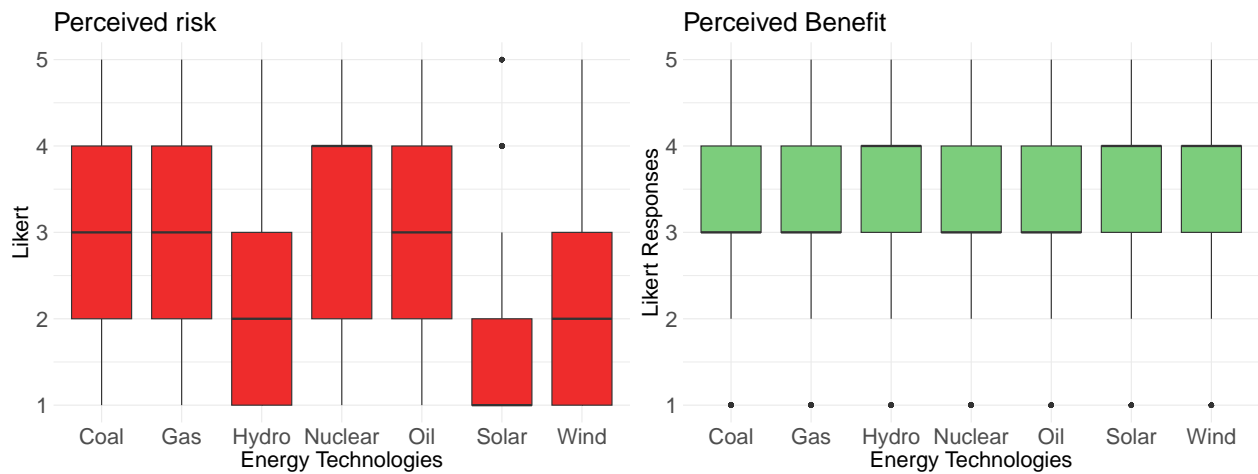




Introduction: Mean Perceived Risk and Mean Perceived Benefit for all energy technologies.

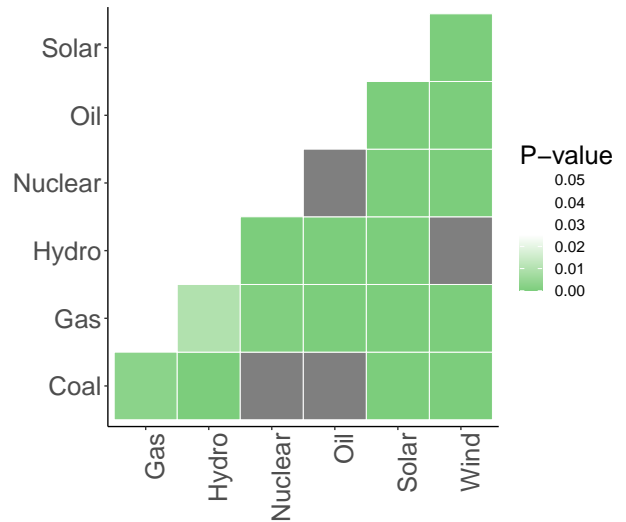
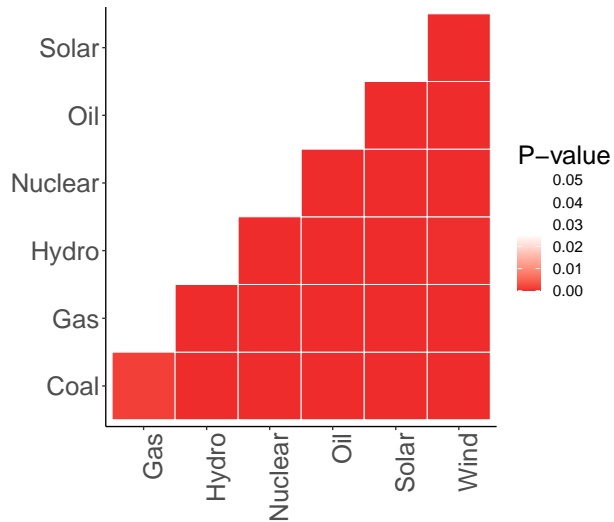


Boxplot for perceived benefit and perceived risk by technology

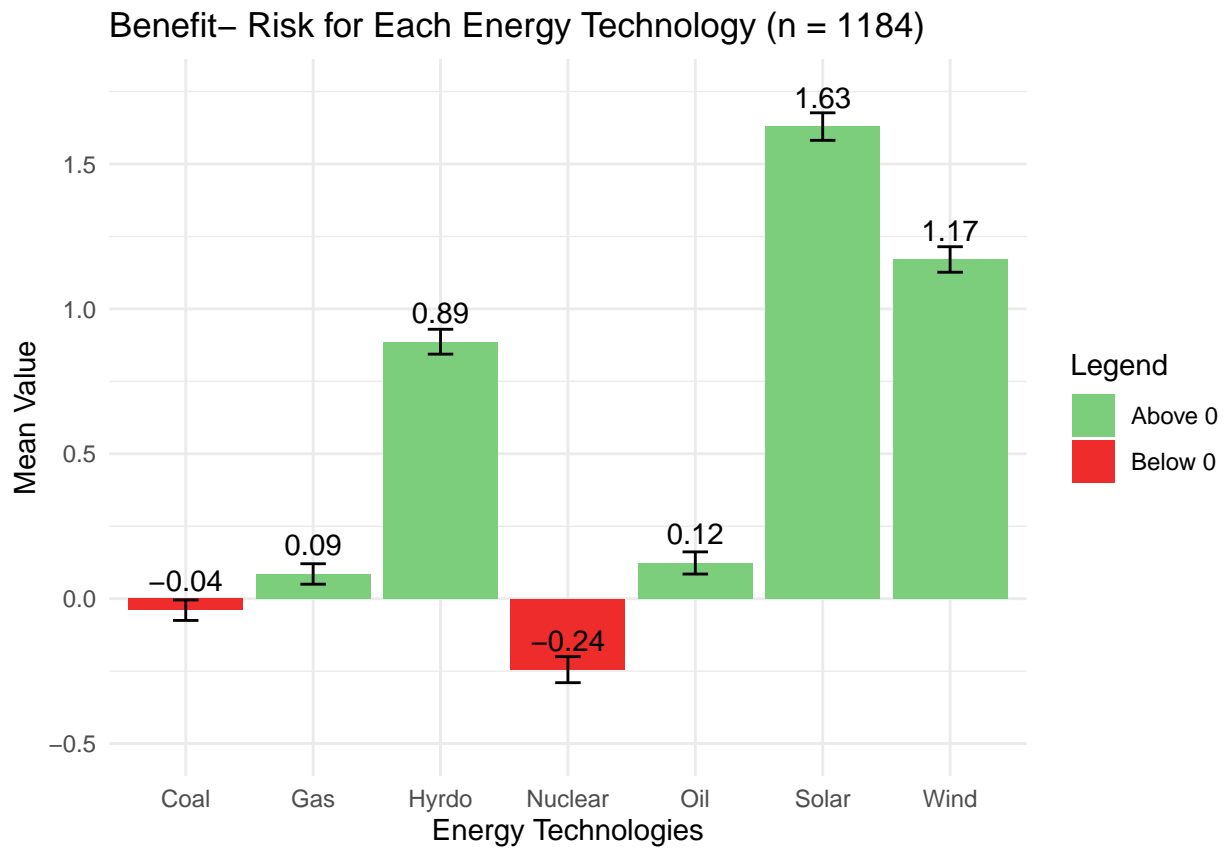


Pairwise T-test: Mean perceived risk and mean perceived benefit (all energy technologies)

The red and green pairs indicate that there is a statistically significant difference between the means of the two groups. White and grey indicate - no differences between the means of the two groups.



Benefit - Risk for each technology



Claim 1: Demographic variables: nuclear, solar, coal

Linear Regression with demographic variables (caste, religion, gender and age)

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Wed, Jan 10, 2024 - 09:43:59

Table 1: Linear Models: Perceived Risk and Net Perceived Benefit(Nuclear, Solar and Coal)

	<i>Dependent variable:</i>					
	RiskNuclear	RiskSolar	RiskCoal	NetBenNuclear	NetBenSolar	NetBenCoal
	(1)	(2)	(3)	(4)	(5)	(6)
Uppercaste	0.106 (0.066)	−0.065 (0.059)	0.051 (0.060)	−0.199** (0.093)	−0.020 (0.094)	−0.096 (0.075)
Male	0.122* (0.066)	−0.291*** (0.060)	0.056 (0.061)	−0.046 (0.095)	0.456*** (0.096)	−0.004 (0.076)
Hindu	−0.115 (0.076)	−0.237*** (0.068)	0.017 (0.070)	0.400*** (0.106)	0.501*** (0.107)	0.039 (0.085)
UrbanUrban	−0.099 (0.065)	0.521*** (0.058)	0.110* (0.059)	0.390*** (0.092)	−0.711*** (0.093)	−0.015 (0.073)
age	0.050* (0.029)	−0.070*** (0.026)	0.012 (0.026)	−0.116*** (0.044)	0.187*** (0.045)	−0.038 (0.036)
Constant	3.309*** (0.108)	2.325*** (0.097)	3.005*** (0.099)	−0.355** (0.154)	0.835*** (0.156)	0.059 (0.124)
Observations	1,444	1,444	1,444	1,183	1,183	1,183
R ²	0.012	0.100	0.003	0.041	0.122	0.003
Adjusted R ²	0.009	0.097	0.00003	0.037	0.118	−0.001
Residual Std. Error	1.176 (df = 1438)	1.053 (df = 1438)	1.080 (df = 1438)	1.517 (df = 1177)	1.533 (df = 1177)	1.217 (df = 1177)
F Statistic	3.552*** (df = 5; 1438)	31.870*** (df = 5; 1438)	1.010 (df = 5; 1438)	10.122*** (df = 5; 1177)	32.725*** (df = 5; 1177)	0.705 (df = 5; 1177)

Note:

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


```

##
## Regression Models Summary
## =====
##                                     Dependent variable:
## -----
##               RiskNuclear          RiskSolar          RiskCoal          NetBen
##               (1)                (2)                (3)
## -----
## Uppercaste          0.106          -0.065          0.051          -0.
##               (0.066)          (0.059)          (0.060)          (0
##
## Male                0.122*          -0.291***          0.056          -0
##               (0.066)          (0.060)          (0.061)          (0
##
## Hindu               -0.115          -0.237***          0.017          0.4
##               (0.076)          (0.068)          (0.070)          (0
##
## UrbanUrban          -0.099          0.521***          0.110*          0.3
##               (0.065)          (0.058)          (0.059)          (0
##
## age                 0.050*          -0.070***          0.012          -0.
##               (0.029)          (0.026)          (0.026)          (0
##
## Constant            3.309***          2.325***          3.005***          -0
##               (0.108)          (0.097)          (0.099)          (0
##
## -----
## Observations          1,444          1,444          1,444          1
## R2                    0.012          0.100          0.003          0
## Adjusted R2           0.009          0.097          0.00003          0
## Residual Std. Error   1.176 (df = 1438)   1.053 (df = 1438)   1.080 (df = 1438)   1.517 (
## F Statistic           3.552*** (df = 5; 1438) 31.870*** (df = 5; 1438) 1.010 (df = 5; 1438) 10.122***
## =====
## Note:

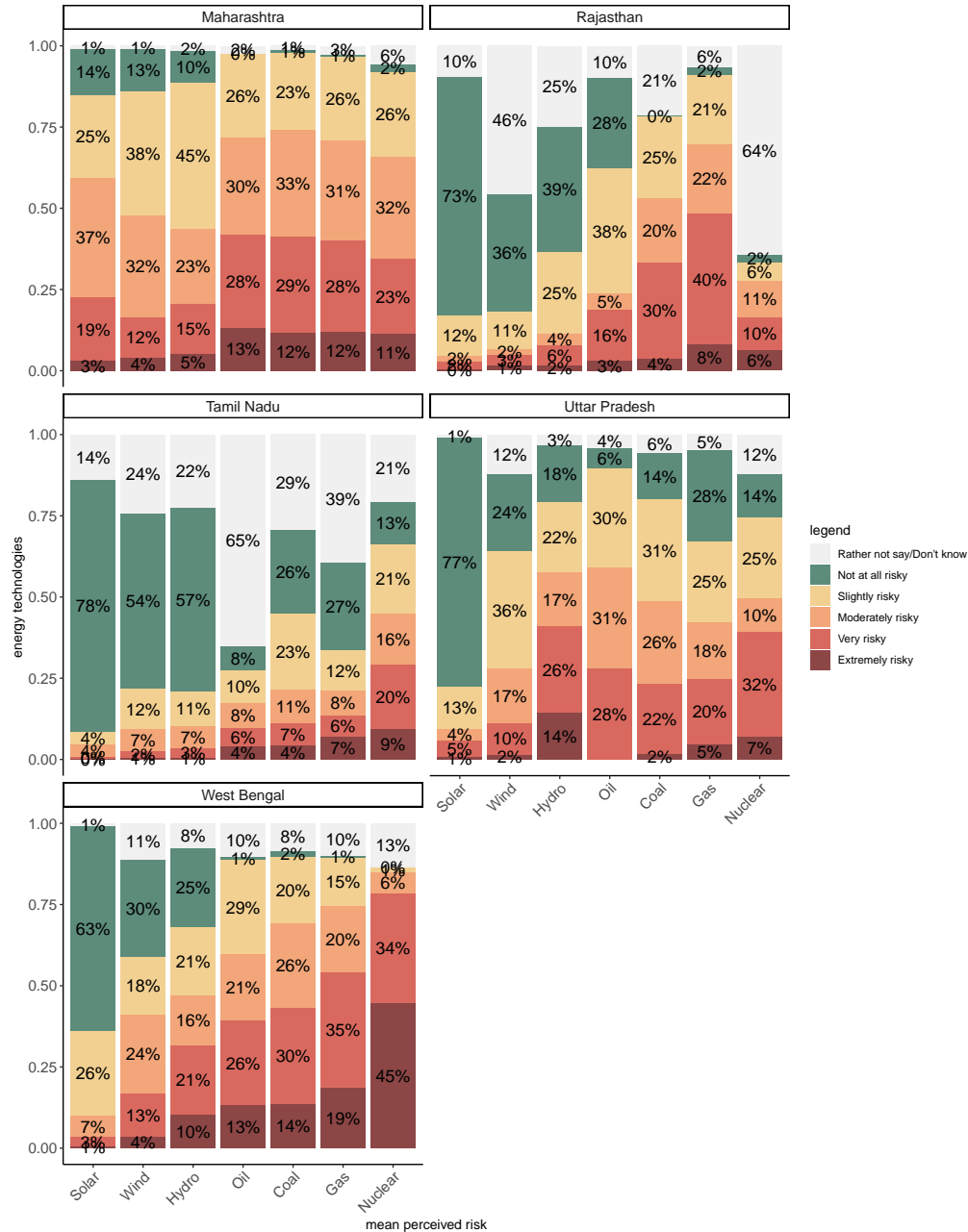
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Claim 2: Regional differences

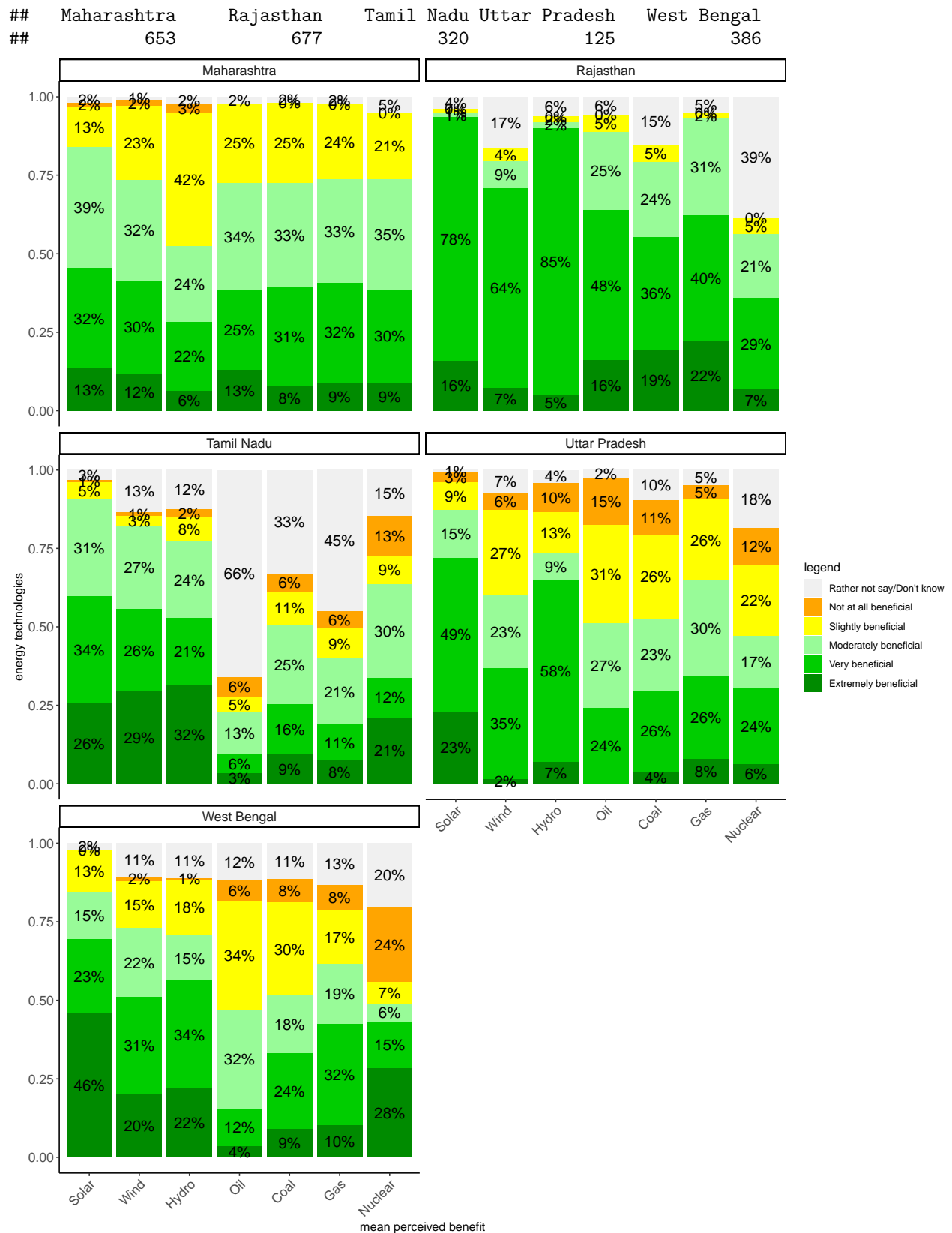
We see huge differences for perceived risk and perceived benefit for each technology from state to state. These graphs explore that. The number of respondents from each state are also reported below.

Perceived risk by State

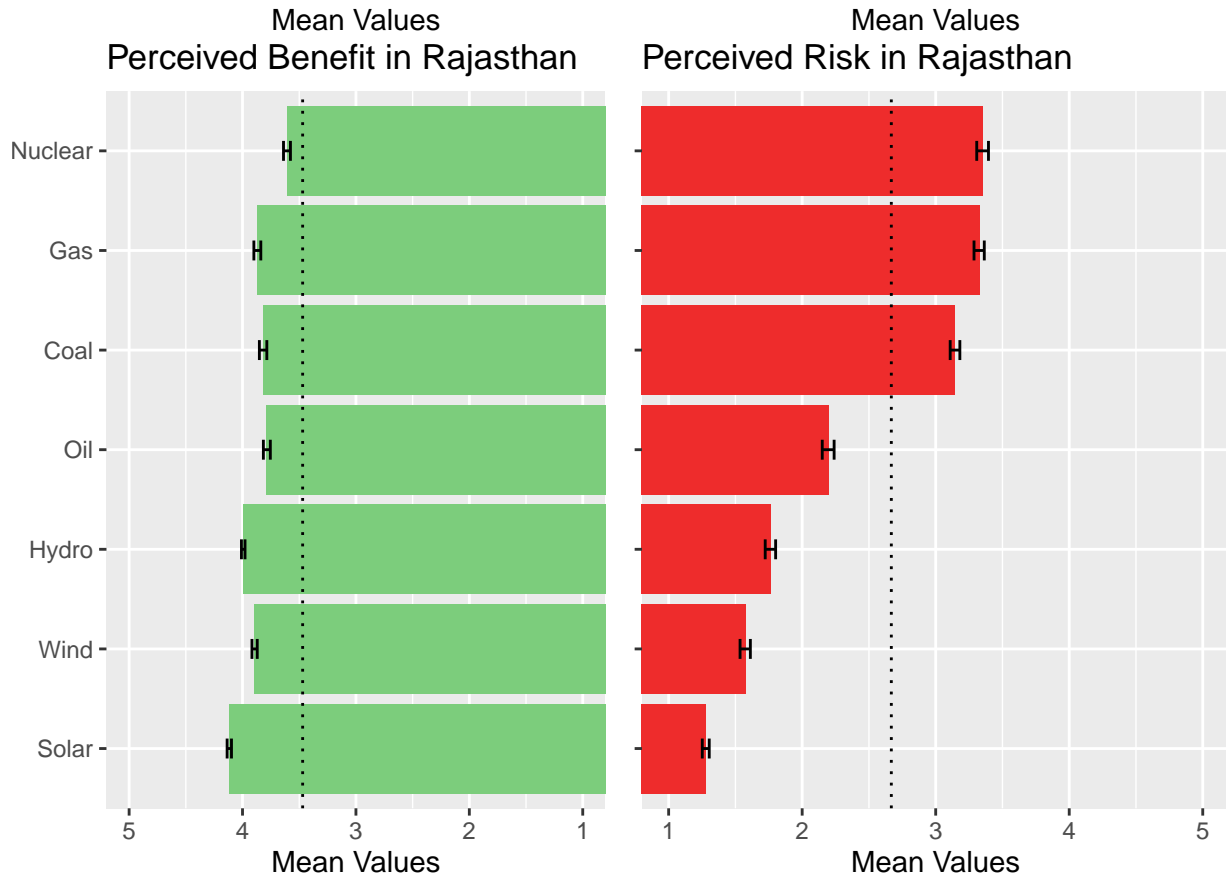
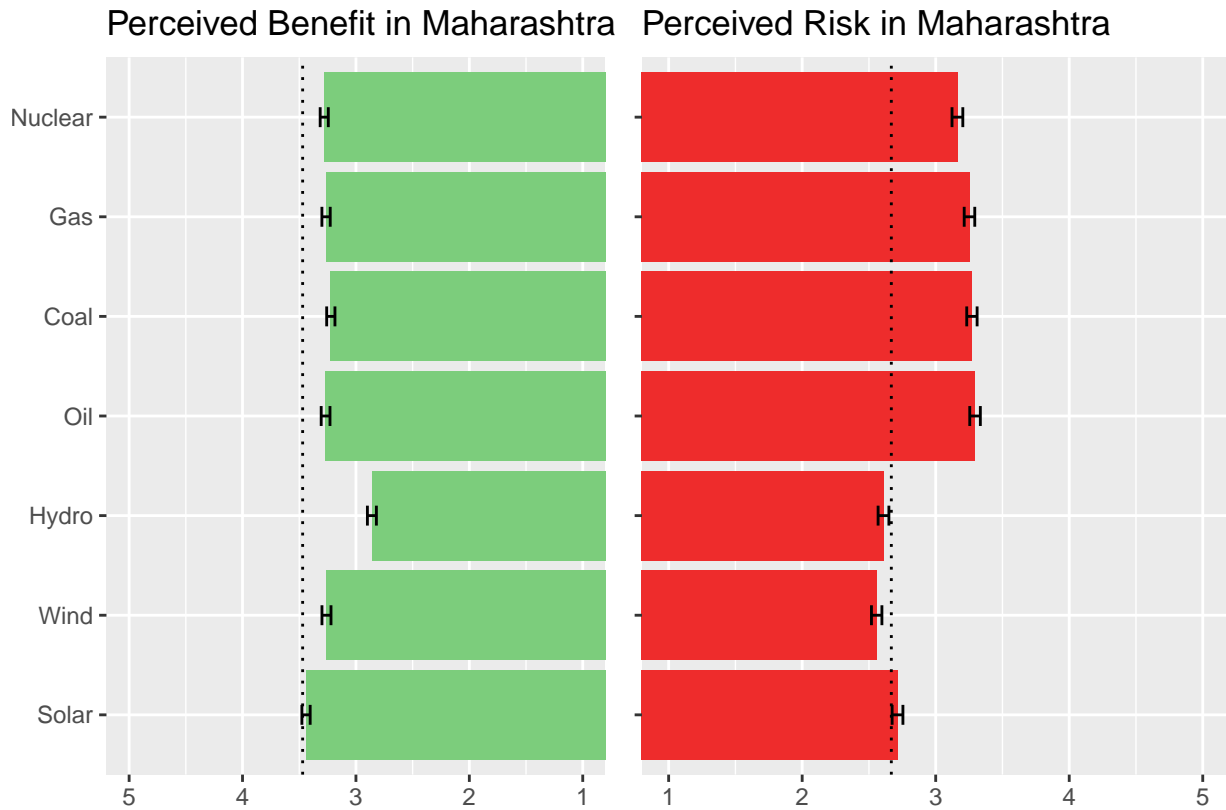
Maharashtra Rajasthan Tamil Nadu Uttar Pradesh West Bengal
653 677 320 125 386

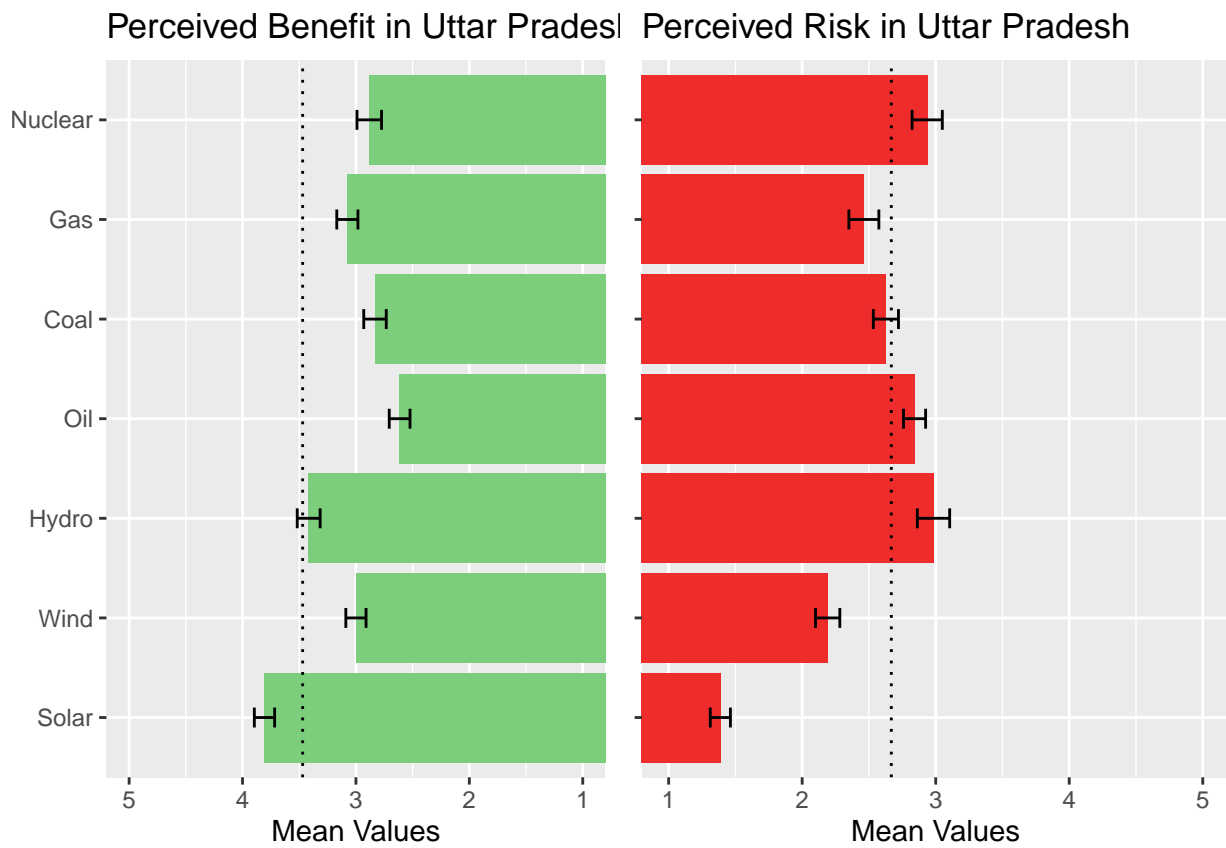
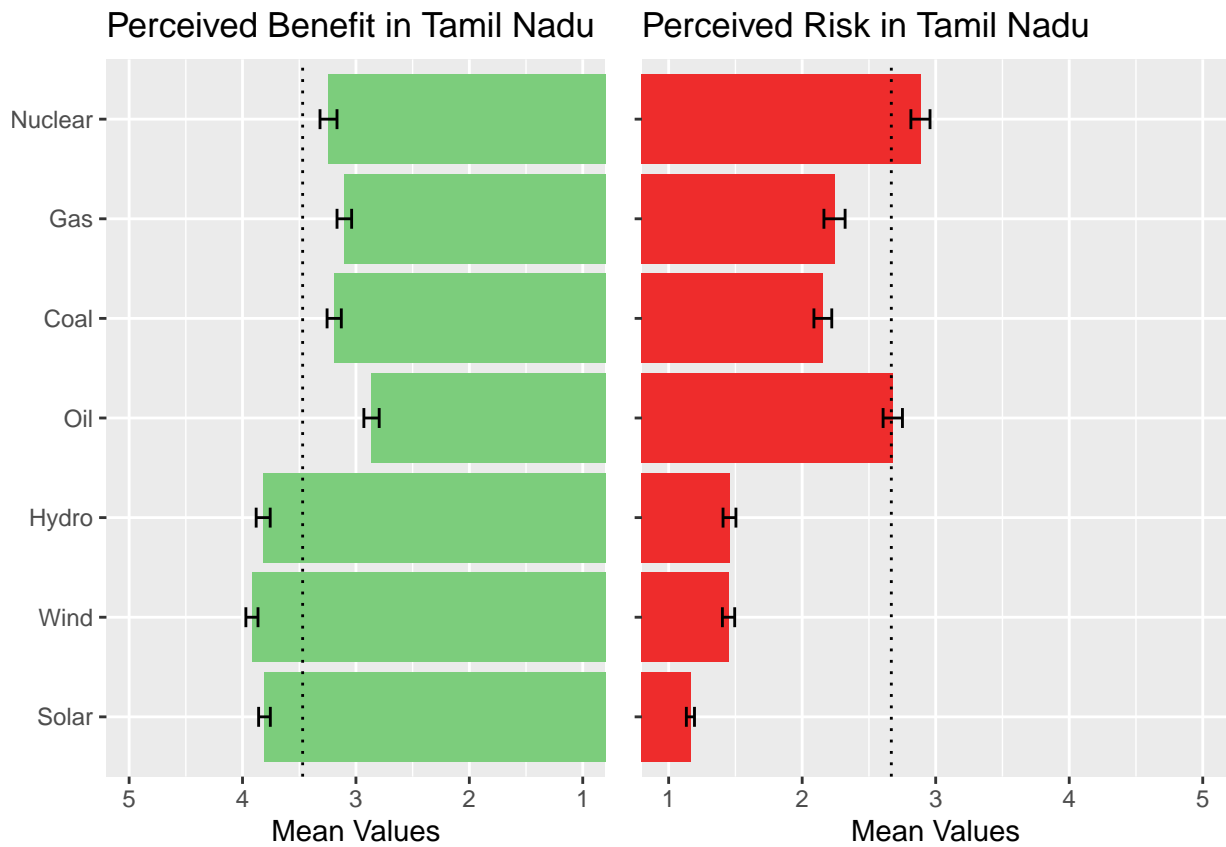


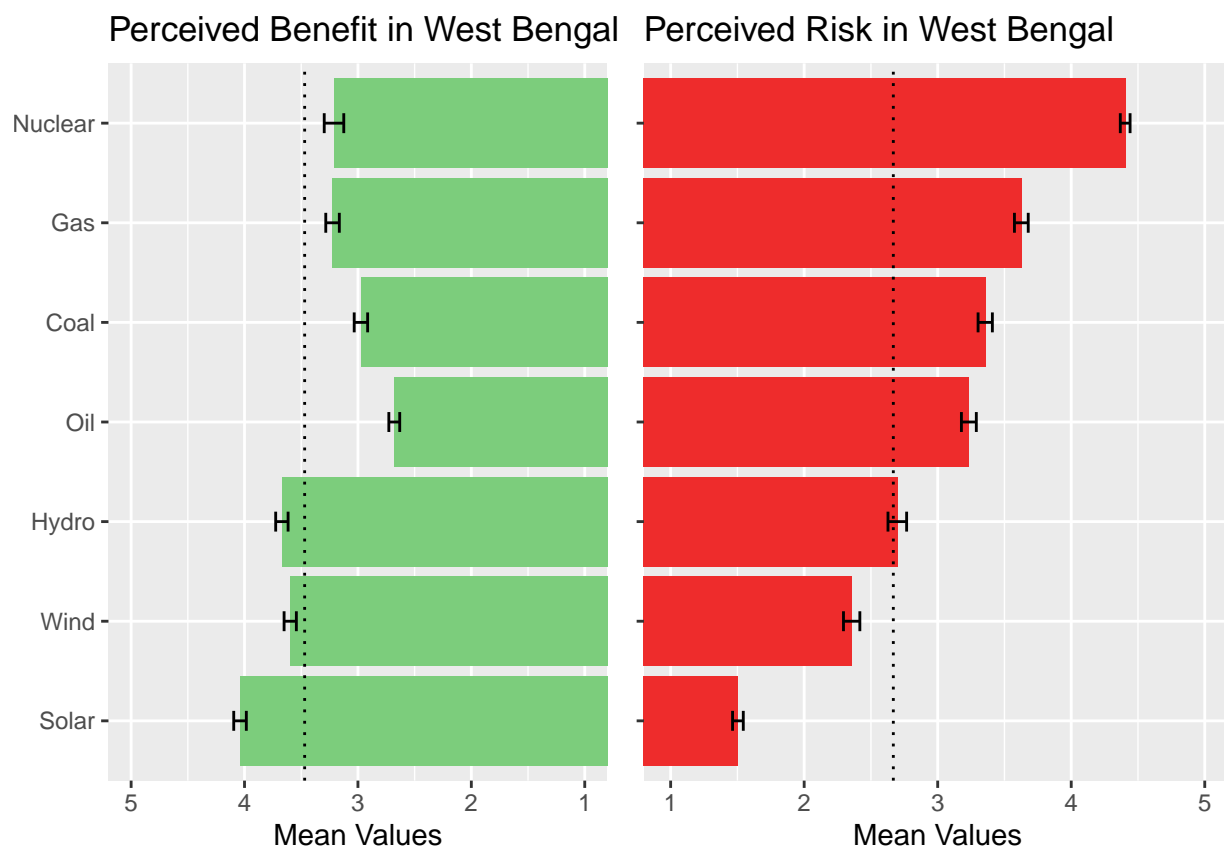
Perceived Benefit by State



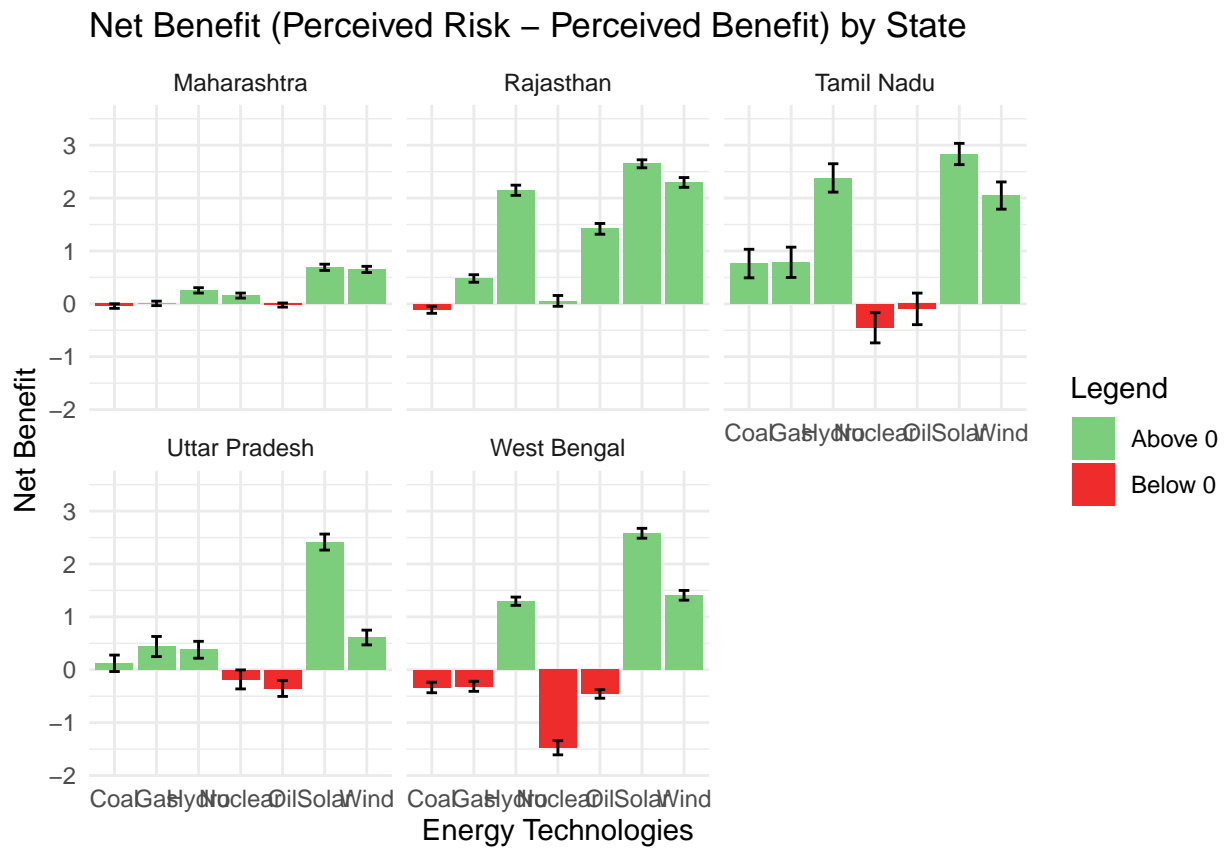
Radar chart - risk and benefit by state



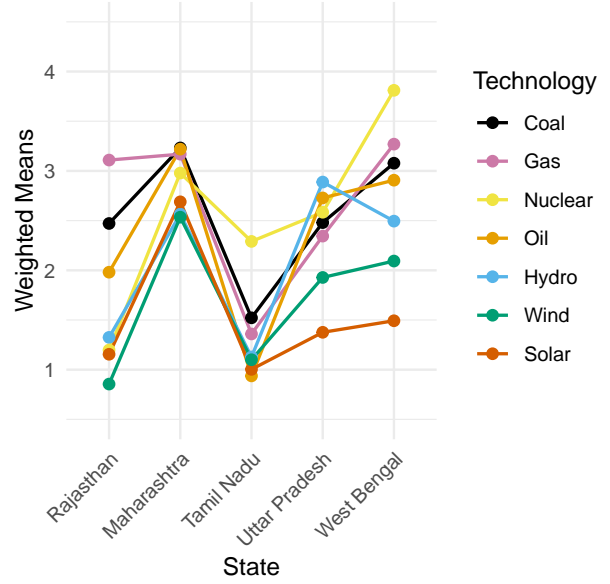
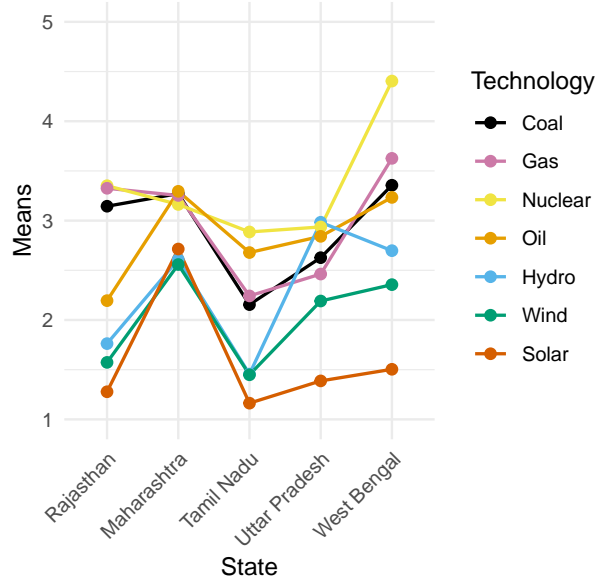




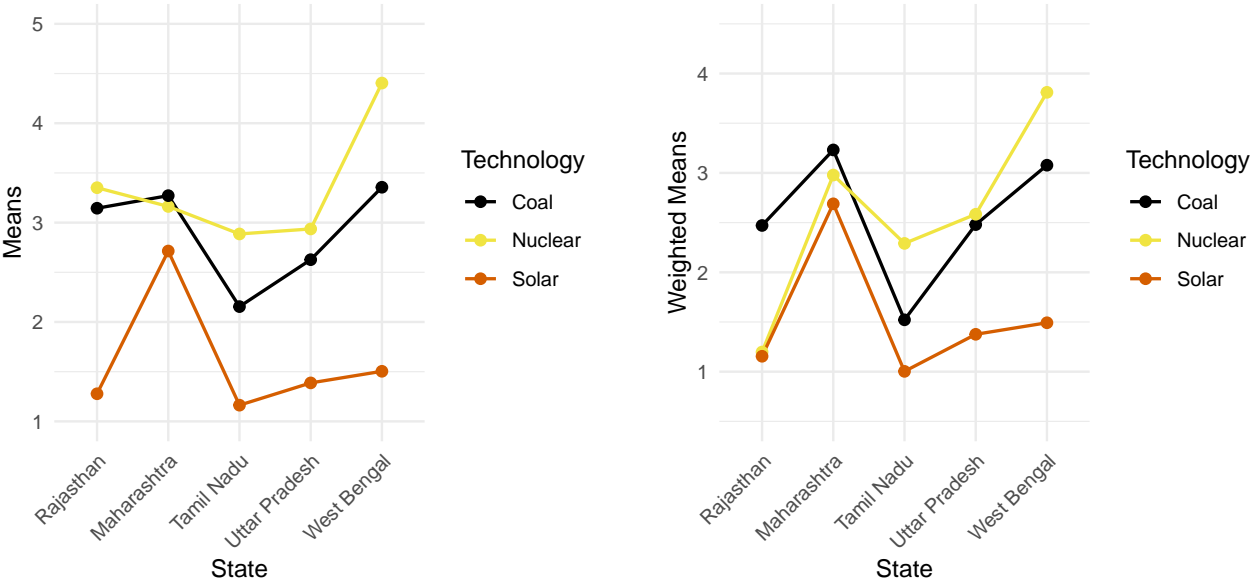
Net benefit by state



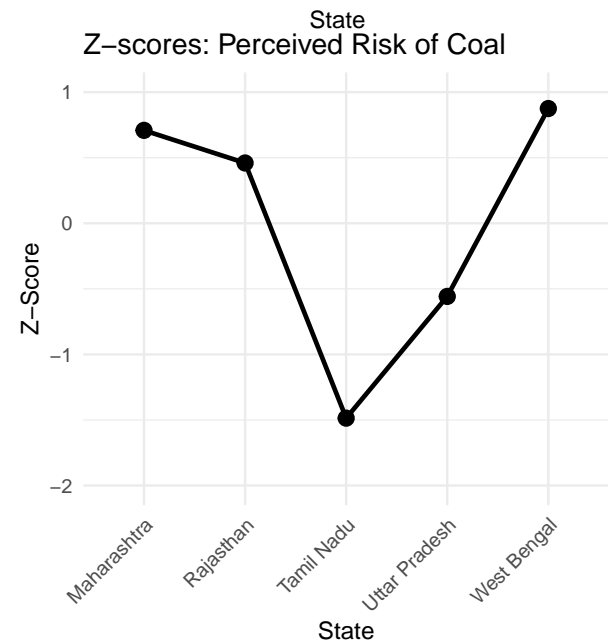
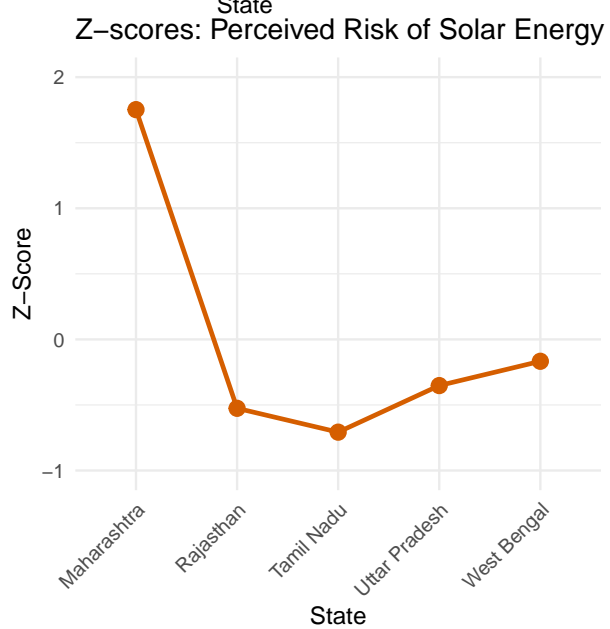
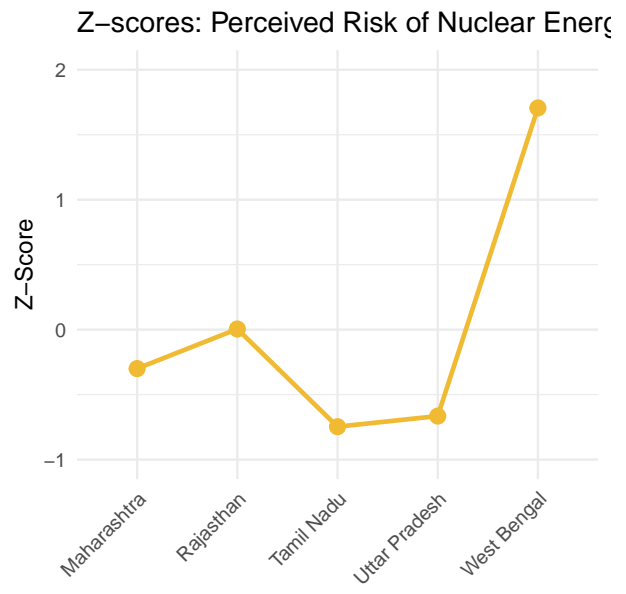
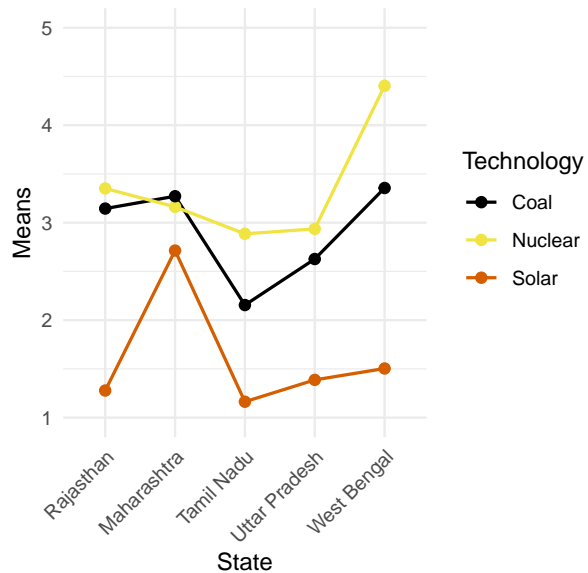
Mean Perceived Risk and Weighted Mean



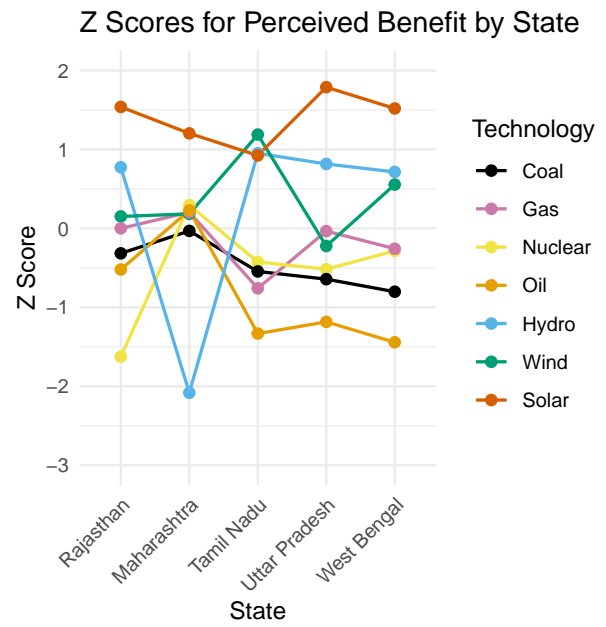
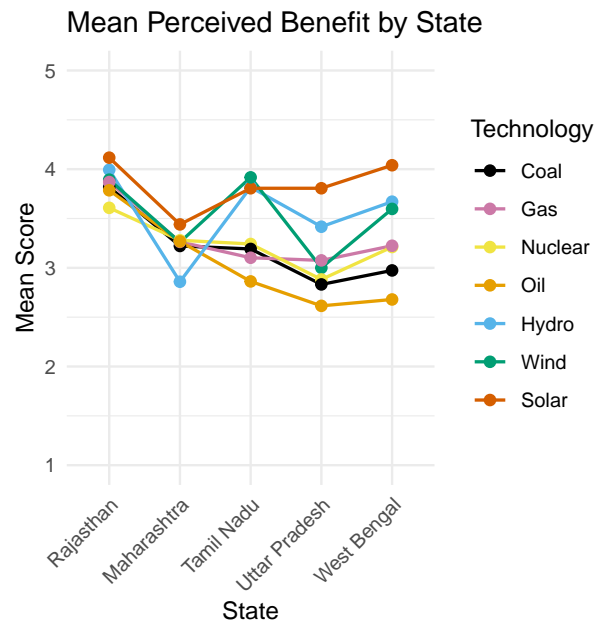
Mean Perceived risk and weighten means by Technologies- solar, coal and nuclear



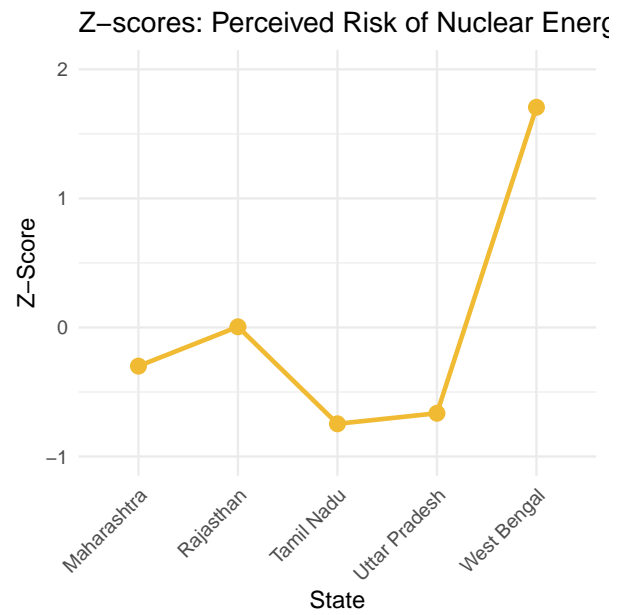
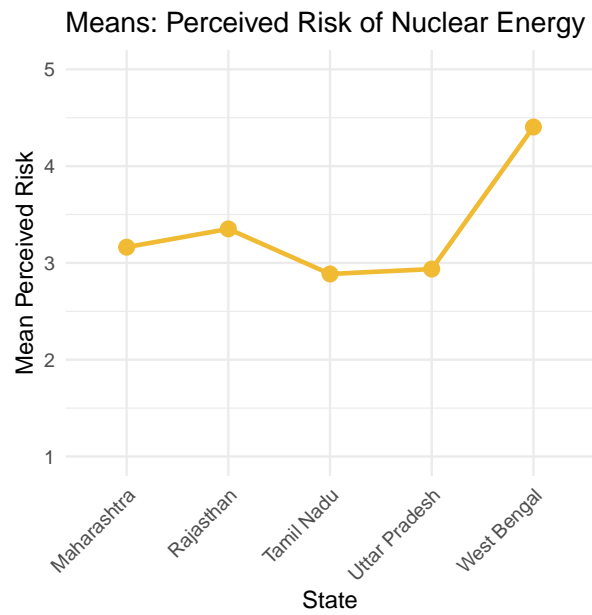
Zscores - 3 techs - solar, nuclear and coal



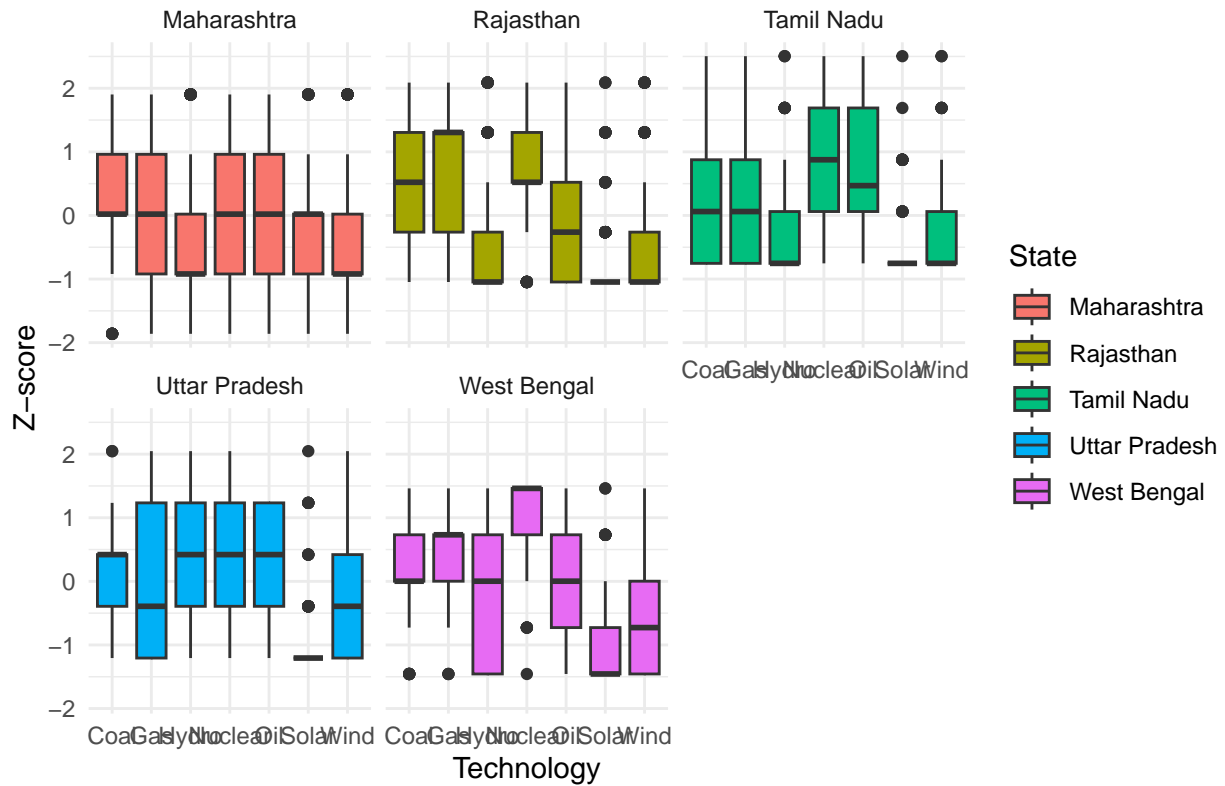
Mean Perceived Benefit and Z-scores by State



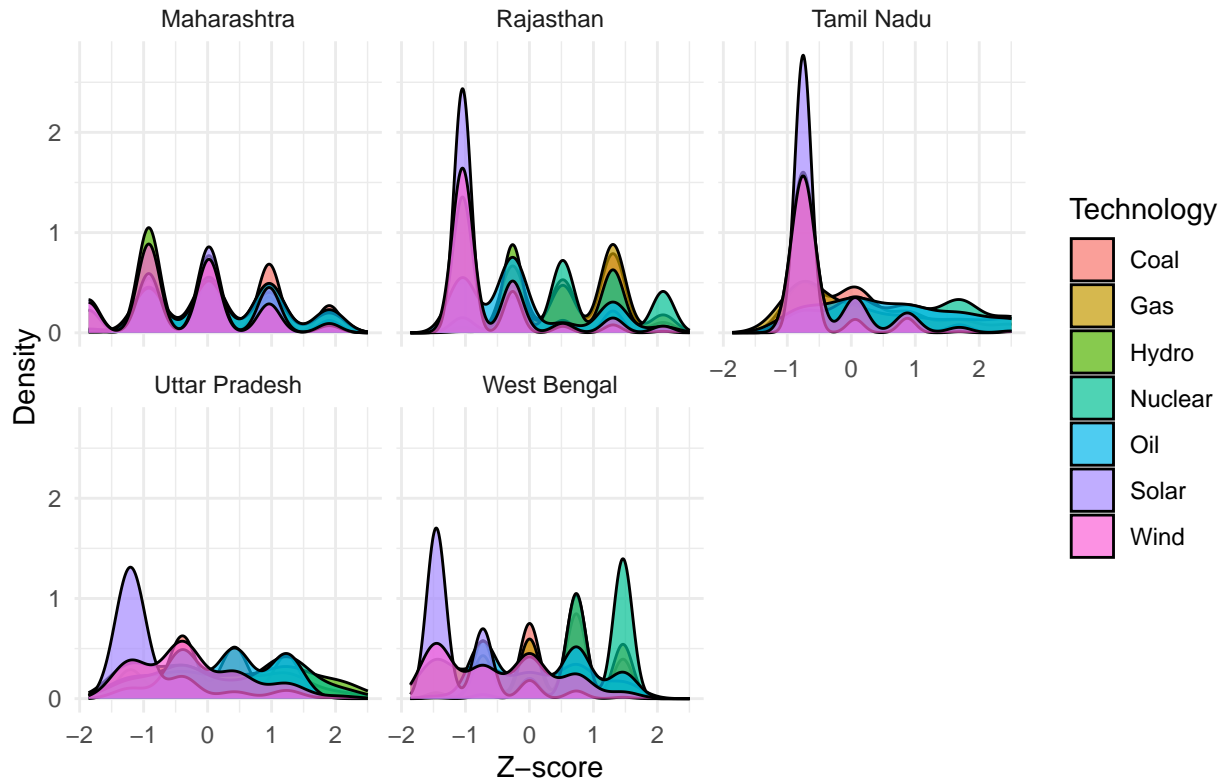
Mean Perceived Benefit and Z-scores by State - coal solar and nuclear



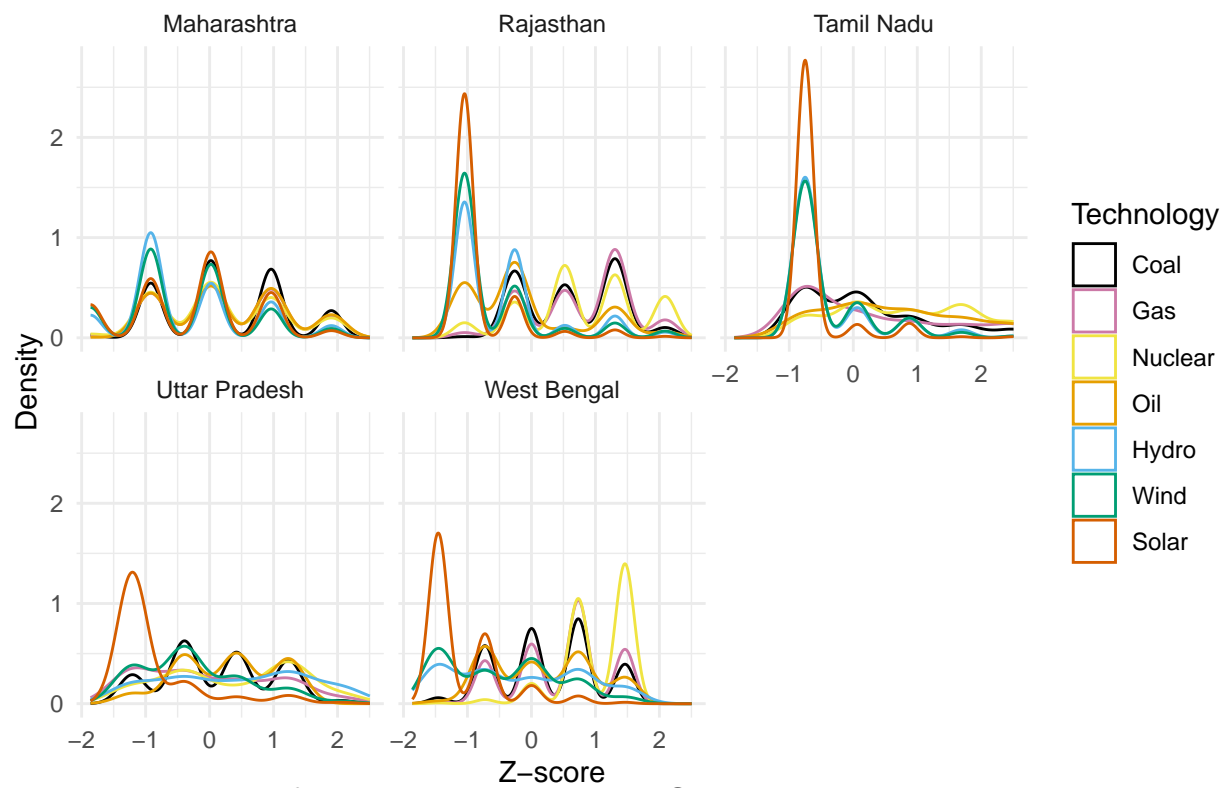
Boxplot of Riskiness Z-scores by State and Technology



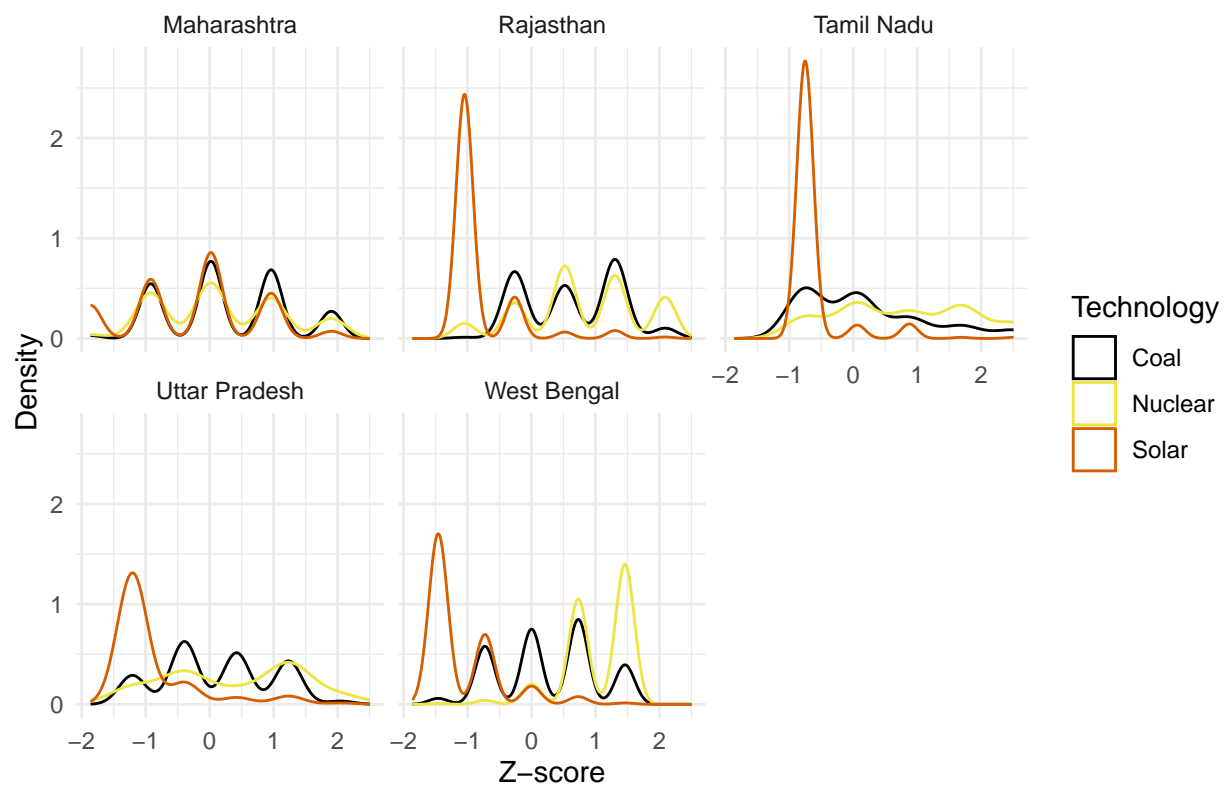
Density Plot of Riskiness Z-scores by State and Technology



Density Plot of Riskiness Z-scores by State and Technology



Density Plot of Riskiness Z-scores by State and Technology



Linear Regression : Perceived Risk and Net Benefit- demographic variables including State

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Table 2: Linear Models: Perceived Risk and Net Perceived Benefit(Nuclear, Solar and Coal)

	<i>Dependent variable:</i>					
	RiskNuclear	RiskSolar	RiskCoal	NetBenNuclear	NetBenSolar	NetBenCoal
	(1)	(2)	(3)	(4)	(5)	(6)
Uppercaste	−0.135** (0.061)	−0.006 (0.051)	−0.056 (0.058)	0.026 (0.089)	−0.146* (0.084)	−0.021 (0.075)
Male	0.045 (0.062)	−0.047 (0.053)	0.015 (0.059)	0.008 (0.092)	0.058 (0.087)	−0.016 (0.078)
Hindu	−0.047 (0.070)	−0.057 (0.059)	0.099 (0.066)	0.362*** (0.100)	0.290*** (0.095)	−0.008 (0.085)
UrbanUrban	0.052 (0.067)	−0.076 (0.056)	0.055 (0.063)	0.172* (0.099)	0.143 (0.093)	0.014 (0.084)
age	−0.015 (0.027)	0.045** (0.023)	0.053** (0.025)	−0.008 (0.043)	0.045 (0.040)	−0.035 (0.036)
StateRajasthan	0.222** (0.094)	−1.285*** (0.080)	0.234*** (0.090)	−0.014 (0.135)	1.957*** (0.128)	0.077 (0.115)
StateTamil Nadu	−0.242** (0.099)	−1.547*** (0.084)	−1.103*** (0.094)	−0.625*** (0.191)	2.027*** (0.181)	0.795*** (0.162)
StateUttar Pradesh	−0.178 (0.120)	−1.344*** (0.102)	−0.638*** (0.114)	−0.250 (0.177)	1.612*** (0.168)	0.296*** (0.151)
StateWest Bengal	1.276*** (0.083)	−1.330*** (0.071)	0.071 (0.079)	−1.522*** (0.125)	1.853*** (0.118)	−0.222* (0.106)
Constant	3.208*** (0.100)	2.752*** (0.084)	3.053*** (0.095)	−0.240 (0.147)	0.323** (0.139)	0.022 (0.124)
Observations	1,444	1,444	1,444	1,183	1,183	1,183
R ²	0.204	0.353	0.141	0.171	0.338	0.035
Adjusted R ²	0.199	0.349	0.136	0.165	0.333	0.028
Residual Std. Error	1.057 (df = 1434)	0.894 (df = 1434)	1.004 (df = 1434)	1.413 (df = 1173)	1.334 (df = 1173)	1.199 (df = 1173)
F Statistic	40.720*** (df = 9; 1434)	86.983*** (df = 9; 1434)	26.208*** (df = 9; 1434)	26.873*** (df = 9; 1173)	66.499*** (df = 9; 1173)	4.789*** (df = 9; 1173)

Note:

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

Linear Models: Perceived Risk and Net Perceived Benefit (Nuclear, Solar and Coal)

Dependent variable:

RiskNuclear

RiskSolar

RiskCoal

NetBenNuclear

NetBenSolar

NetBenCoal

(1)

(2)

(3)

(4)

(5)

(6)

Uppercaste

-0.135**

-0.006

-0.056

0.026

-0.146*

-0.021

(0.061)

(0.051)

(0.058)

(0.089)

(0.084)

(0.075)

Male
0.045
-0.047
0.015
0.008
0.058
-0.016
(0.062)
(0.053)
(0.059)
(0.092)
(0.087)
(0.078)
Hindu
-0.047
-0.057
0.099
0.362***
0.290***
-0.008
(0.070)
(0.059)
(0.066)
(0.100)
(0.095)
(0.085)

UrbanUrban

0.052

-0.076

0.055

0.172*

0.143

0.014

(0.067)

(0.056)

(0.063)

(0.099)

(0.093)

(0.084)

age

-0.015

0.045**

0.053**

-0.008

0.045

-0.035

(0.027)

(0.023)

(0.025)

(0.043)

(0.040)

(0.036)

StateRajasthan

0.222**

-1.285***

0.234***

-0.014

1.957***

0.077

(0.094)

(0.080)

(0.090)

(0.135)

(0.128)

(0.115)

StateTamil Nadu

-0.242**

-1.547***

-1.103***

-0.625***

2.027***

0.795***

(0.099)

(0.084)

(0.094)

(0.191)

(0.181)

(0.162)

StateUttar Pradesh

-0.178

-1.344***

-0.638***

-0.250

1.612***

0.296**

(0.120)

(0.102)

(0.114)

(0.177)

(0.168)

(0.151)

StateWest Bengal

1.276***

-1.330***

0.071

-1.522***

1.853***

-0.222**

(0.083)

(0.071)

(0.079)

(0.125)

(0.118)

(0.106)

Constant
3.208***
2.752***
3.053***
-0.240
0.323**
0.022
(0.100)
(0.084)
(0.095)
(0.147)
(0.139)
(0.124)
Observations
1,444
1,444
1,444
1,183
1,183
1,183
R2
0.204
0.353
0.141
0.171
0.338

0.035

Adjusted R2

0.199

0.349

0.136

0.165

0.333

0.028

Residual Std. Error

1.057 (df = 1434)

0.894 (df = 1434)

1.004 (df = 1434)

1.413 (df = 1173)

1.334 (df = 1173)

1.199 (df = 1173)

F Statistic

40.720*** (df = 9; 1434)

86.983*** (df = 9; 1434)

26.208*** (df = 9; 1434)

26.873*** (df = 9; 1173)

66.499*** (df = 9; 1173)

4.789*** (df = 9; 1173)

Note:

$p < 0.1$; $p < 0.05$; $p < 0.01$

Claim 3: Cultural, Political and Economic Values

CFA on eco-pol scale for Solar Energy

Table 3: Confirmatory Factor Analysis(CFA) on newly developed eco-pol scale

Scale	Items	Loadings	Standard Error	zvalue	pvalue	ci.lower	ci.upper	std.lv	std.all
People Centered Development	Solar energy poses a great risk to the health of people living around it.	0.965	0.050	19.455	0e+00	0.8678100	1.0622499	0.9650299	0.7747043
People Centered Development	Solar energy spoils the natural beauty of the landscape.	0.820	0.052	15.714	0e+00	0.7177752	0.9223481	0.8200617	0.6560430
People Centered Development	Solar energy is leading to displacement of people from their land.	0.692	0.050	13.800	0e+00	0.5939852	0.7906393	0.6923123	0.5906886
People Centered Development	Solar energy increases pollution of air/water/land.	1.096	0.050	21.706	0e+00	0.9970923	1.1950355	1.0960639	0.8411179
People Centered Development	Large corporations are destroying the local industries in India and benefiting only a handful of people.	0.287	0.058	4.972	7e-07	0.1741052	0.4007040	0.2874046	0.2317296
People Centered Development	Regardless of ownership, the government should pass strong regulations and implement them.	0.296	0.052	5.733	0e+00	0.1949541	0.3974941	0.2962241	0.2659785
Nationalist Development	MECHANISATION	-0.445	0.052	-8.501	0e+00	-0.5481301	-0.3427323	-0.4454312	-0.3859243
Nationalist Development	Solar energy pushes forward the country's development.	1.042	0.046	22.549	0e+00	0.9518805	1.1331082	1.0424943	0.8341064
Nationalist Development	I would be proud if my community used solar energy	1.042	0.047	21.934	0e+00	0.9485906	1.1347564	1.0416735	0.8187225
Nationalist Development	Solar energy is a mark of pride for our nation.	0.959	0.047	20.244	0e+00	0.8658229	1.0514501	0.9586365	0.7748161
Nationalist Development	Solar energy brings economic prosperity to the surrounding regions.	0.980	0.047	20.803	0e+00	0.8876975	1.0723692	0.9800333	0.7896156
NA	Solar energy will bring jobs to the local community.	0.641	0.051	12.542	0e+00	0.5406190	0.7408777	0.6407483	0.5339818
NA	Solar energy poses a great risk to the health of people living around it.	0.620	0.054	11.424	0e+00	0.5139817	0.7268665	0.6204241	0.3998333

CFA on eco-pol scale for Coal

Table 4: Confirmatory Factor Analysis(CFA) on newly developed eco-pol scale

Scale	Items	Loadings	Standard Error	zvalue	pvalue	ci.lower	ci.upper	std.lv	std.all
People Centered Development	Coal powered plants poses a great risk to the health of people living around it.	0.713	0.051	14.083	0.0e+00	0.6140727	0.8126265	0.7133496	0.6482214
People Centered Development	Coal powered plants spoils the natural beauty of the landscape.	0.714	0.048	14.818	0.0e+00	0.6198092	0.8087672	0.7142882	0.6750268
People Centered Development	Coal powered plants is leading to displacement of people from their land.	0.628	0.055	11.376	0.0e+00	0.5195755	0.7358706	0.6277231	0.5432527
People Centered Development	Coal powered plants increases pollution of air/water/land.	0.640	0.041	15.561	0.0e+00	0.5590262	0.7201432	0.6395847	0.7014985
People Centered Development	Large corporations are destroying the local industries in India and benefiting only a handful of people.	-0.634	0.057	-11.174	0.0e+00	-0.7449013	-0.5225822	-0.6337417	-0.5349921
People Centered Development	Regardless of ownership, the government should pass strong regulations and implement them.	-0.509	0.054	-9.351	0.0e+00	-0.6162708	-0.4027047	-0.5094877	-0.4577641
Nationalist Development	MECHANISATION	0.656	0.056	11.682	0.0e+00	0.5460463	0.7662170	0.6561317	0.5556245
Nationalist Development	Coal powered plants pushes forward the country's development.	0.626	0.055	11.326	0.0e+00	0.5177592	0.7344596	0.6261094	0.6242574
Nationalist Development	Coal powered plants brings economic prosperity to the surrounding regions.	0.547	0.054	10.086	0.0e+00	0.4408772	0.6535573	0.5472172	0.5535687
NA	Coal powered plants will bring jobs to the local community.	0.472	0.054	8.776	0.0e+00	0.3667103	0.5776005	0.4721554	0.4834144
NA	PRIDECOAL	0.338	0.062	5.485	0.0e+00	0.2173242	0.4590249	0.3381745	0.3081207
NA	NPRIDECOAL	0.284	0.061	4.667	3.1e-06	0.1645514	0.4027991	0.2836753	0.2634176
NA	Coal powered plants poses a great risk to the health of people living around it.	0.702	0.056	12.572	0.0e+00	0.5927046	0.8116380	0.7021713	0.5798090
NA	Coal powered plants spoils the natural beauty of the landscape.	0.610	0.050	12.173	0.0e+00	0.5113671	0.7076348	0.6095009	0.5443389
NA	Coal powered plants is leading to displacement of people from their land.	0.941	0.069	13.656	0.0e+00	0.8060444	1.0761975	0.9411209	0.7048765