Uncertainty and Individual Discretion in Allocating Research Funds

Appendix

Table A1: Predicting Selection by Review Score Distribution – Logit Model

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable:  ARPA-E Selected Proposal for Funding |  |  |  |  |  |  |  |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Mean Overall Score | 3.415\*\*\* (1.130) |  |  |  | 6.480\*\*\* (1.743) |  |  |
| Min. Overall Score |  | 1.507\* (0.351) |  |  |  | 1.155 (0.240) | 0.853 (0.170) |
| Max. Overall Score |  |  | 3.410\*\*\* (0.880) |  |  | 3.196\*\*\* (0.697) | 1.750\*\* (0.414) |
| SD Overall Score |  |  |  | 1.358 (0.474) | 3.077\*\*\* (1.263) |  |  |
| Med. Overall Score |  |  |  |  |  |  | 2.620\*\*\* (0.532) |
| Program F.E. | Y | Y | Y | Y | Y | Y | Y |
| N | 1216 | 1216 | 1216 | 1173 | 1173 | 1216 | 1216 |
| Pseudo R2 | 0.120 | 0.067 | 0.117 | 0.052 | 0.163 | 0.118 | 0.137 |

Notes: Standard errors in parentheses. All regressions are logit with robust standard error, clustered by technical program. Coefficients are exponentiated, i.e. odds ratio of outcome for two groups with a difference of 1 score unit in the independent variable.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A2: Predicting Selection by Component Scores

|  |  |  |  |
| --- | --- | --- | --- |
| Dependent Variable:  ARPA-E Selected Proposal for Funding |  |  |  |
|  | (1) | (2) | (3) |
| Min. Impact Score | 0.054\* (0.030) |  |  |
| Min. Merit Score | 0.075\*\* (0.034) |  |  |
| Min. Qualifications Score | -0.049 (0.030) |  |  |
| Min. Management Score | 0.012 (0.012) |  |  |
| Mean Impact Score |  | 0.103\*\*\* (0.030) |  |
| Mean Merit Score |  | 0.147\*\*\* (0.045) |  |
| Mean Qualifications Score |  | -0.025 (0.040) |  |
| Mean Management Score |  | -0.021 (0.021) |  |
| Max. Impact Score |  |  | 0.068\*\*\* (0.023) |
| Max. Merit Score |  |  | 0.104\*\*\* (0.032) |
| Max. Qualifications Score |  |  | 0.026 (0.022) |
| Max. Management Score |  |  | -0.023 (0.027) |
| Program F.E. | Y | Y | Y |
| N | 1216 | 1216 | 1216 |
| *R*2 | 0.096 | 0.156 | 0.141 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A3: Predicting Selection by Review Score Distribution (Impact)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable:  ARPA-E Selected Proposal for Funding |  |  |  |  |  |  |  |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Mean Impact Score | 0.200\*\*\* (0.029) |  |  |  | 0.233\*\*\* (0.022) |  |  |
| Min. Impact Score |  | 0.087\*\* (0.037) |  |  |  | 0.043 (0.037) | -0.012 (0.040) |
| Max. Impact Score |  |  | 0.158\*\*\* (0.016) |  |  | 0.141\*\*\* (0.016) | 0.048\*\* (0.021) |
| SD Impact Score |  |  |  | 0.046 (0.061) | 0.074 (0.056) |  |  |
| Med. Impact Score |  |  |  |  |  |  | 0.152\*\*\* (0.030) |
| Program F.E. | Y | Y | Y | Y | Y | Y | Y |
| N | 1216 | 1216 | 1216 | 1173 | 1173 | 1216 | 1216 |
| R2 | 0.145 | 0.086 | 0.128 | 0.063 | 0.169 | 0.134 | 0.155 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A4: Predicting Selection by Review Score Distribution (Merit)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable:  ARPA-E Selected Proposal for Funding |  |  |  |  |  |  |  |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Mean Merit Score | 0.201\*\*\* (0.030) |  |  |  | 0.234\*\*\* (0.022) |  |  |
| Min. Merit Score |  | 0.090\*\* (0.036) |  |  |  | 0.039 (0.035) | -0.026 (0.043) |
| Max. Merit Score |  |  | 0.165\*\*\* (0.021) |  |  | 0.148\*\*\* (0.018) | 0.055\* (0.027) |
| SD Merit Score |  |  |  | 0.064 (0.059) | 0.095\* (0.056) |  |  |
| Med. Merit Score |  |  |  |  |  |  | 0.162\*\*\* (0.038) |
| Program F.E. | Y | Y | Y | Y | Y | Y | Y |
| N | 1216 | 1216 | 1216 | 1173 | 1173 | 1216 | 1216 |
| R2 | 0.149 | 0.088 | 0.135 | 0.065 | 0.174 | 0.140 | 0.161 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A5: Predicting Counterfactual Selection by Scores

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable: | High Mean Score | High Mean Score | High Minimum Score | High Minimum Score | High Maximum Score | High Maximum Score |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Mean Overall Score | 0.468\*\*\* (0.033) | 0.470\*\*\* (0.040) |  |  |  |  |
| Min. Overall Score |  |  | 0.388\*\*\* (0.025) | 0.413\*\*\* (0.029) |  |  |
| Max. Overall Score |  |  |  |  | 0.415\*\*\* (0.037) | 0.468\*\*\* (0.044) |
| SD Overall Score |  | -0.142\*\*\* (0.029) |  | 0.059 (0.038) |  | 0.004 (0.026) |
| Program F.E. | Y | Y | Y | Y | Y | Y |
| N | 1216 | 1173 | 1216 | 1173 | 1216 | 1173 |
| R2 | 0.461 | 0.485 | 0.579 | 0.577 | 0.406 | 0.434 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program. The models include a fixed effect for technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A6: Predicting Selection by Review Score Distribution – Proposals with >2 External Reviews

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable:  ARPA-E Selected Proposal for Funding |  |  |  |  |  |  |  |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Mean Overall Score | 0.251\*\*\* (0.039) |  |  |  | 0.263\*\*\* (0.036) |  |  |
| Min. Overall Score |  | 0.101\*\* (0.048) |  |  |  | 0.044 (0.049) | -0.011 (0.050) |
| Max. Overall Score |  |  | 0.216\*\*\* (0.030) |  |  | 0.195\*\*\* (0.032) | 0.091\*\* (0.039) |
| SD Overall Score |  |  |  | 0.034 (0.084) | 0.105 (0.074) |  |  |
| Med. Overall Score |  |  |  |  |  |  | 0.161\*\*\* (0.034) |
| Program F.E. | Y | Y | Y | Y | Y | Y | Y |
| N | 943 | 943 | 943 | 943 | 943 | 943 | 943 |
| R2 | 0.168 | 0.106 | 0.150 | 0.082 | 0.174 | 0.154 | 0.175 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A7: Reviewer Disagreement Over “Promoted” and “Demoted” Proposals

|  |  |  |  |
| --- | --- | --- | --- |
| Dependent Variable:  Standard Deviation of Overall Scores |  |  |  |
|  | (1) | (2) | (3) |
| “Promoted” (low min. score) | -0.049 (0.060) |  |  |
| Min. Overall Score | -0.535\*\*\* (0.050) |  |  |
| “Promoted” (low mean score) |  | 0.227\*\* (0.106) |  |
| Mean Overall Score |  | -0.303\*\* (0.148) |  |
| “Promoted” (low max. score) |  |  | 0.031 (0.098) |
| Max. Overall Score |  |  | 0.375\*\*\* (0.073) |
| Program F.E. | Y | Y | Y |
| N | 376 | 340 | 353 |
| R2 | 0.799 | 0.440 | 0.388 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A8: Project Outputs vs. Scoring Element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dependent Variable: | At Least 1 Publication | At Least 1 Patent Application | Market Engagement | Any External Output | All External Outputs |
|  | (1) | (2) | (3) | (4) | (5) |
| Min. Overall Score | 0.047 (0.041) | 0.019 (0.027) | -0.038 (0.029) | 0.040 (0.026) | 0.011 (0.031) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.371 | 0.327 | 0.288 | 0.366 | 0.163 |
| Mean Overall Score | 0.076 (0.059) | 0.075 (0.057) | -0.049 (0.048) | 0.059\* (0.033) | 0.031 (0.036) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.372 | 0.333 | 0.287 | 0.366 | 0.166 |
| Max. Overall Score | 0.017 (0.037) | 0.102\*\* (0.041) | -0.008 (0.047) | 0.022 (0.037) | 0.022 (0.015) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.366 | 0.344 | 0.284 | 0.361 | 0.165 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program. The models include controls for the initial award amount, as well as a fixed effect for technical program and a fixed effect for the organization type.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Table A9: Outputs of “Promoted” Projects by Budget Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dependent Variable: | At Least 1 Publication | At Least 1 Patent Application | Market Engagement | Any External Output | All External Outputs |
|  | (1) | (2) | (3) | (4) | (5) |
| “Promoted” by budget (low min. overall score) | -0.015 (0.090) | -0.081 (0.095) | 0.074 (0.066) | -0.087 (0.087) | 0.035 (0.048) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.366 | 0.331 | 0.288 | 0.367 | 0.165 |
| “Promoted” by budget (low mean overall score) | -0.123 (0.072) | 0.002 (0.101) | 0.001 (0.081) | -0.025 (0.097) | -0.018 (0.060) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.375 | 0.326 | 0.284 | 0.361 | 0.163 |
| “Promoted” by budget (low max. overall score) | 0.040 (0.062) | -0.123 (0.077) | 0.019 (0.078) | -0.035 (0.081) | 0.055 (0.047) |
| N | 165 | 165 | 165 | 165 | 165 |
| *R*2 | 0.367 | 0.338 | 0.284 | 0.362 | 0.169 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program. The models include controls for the log of initial award amount, as well as a fixed effect for technical program and a fixed effect for the organization type.

Table A10: Additional Outputs of “Promoted” All Around vs. Not at All “Promoted” Projects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: | Number of Publications | At Least 1 Highly Cited Publication | At Least 1 Patent Issued | Private Funding Amount (Million USD) |
|  | (1) | (2) | (3) | (4) |
| “Promoted” all around (low mean, min., *and* max. overall score) | 0.912 (1.131) | 0.121\* (0.062) | 0.063 (0.109) | -4.114 (2.998) |
| Not “promoted” by any measure | 0.564 (0.867) | 0.117 (0.086) | -0.043 (0.071) | -1.586 (3.958) |
| N | 165 | 165 | 165 | 165 |
| *R*2 | 0.337 | 0.208 | 0.284 | 0.332 |

Notes: Standard errors in parentheses. All regressions are OLS with robust standard error, clustered by technical program. The models include controls for the initial award amount, as well as a fixed effect for technical program and a fixed effect for the organization type. The base category is projects that were “promoted” by one or two measures, but not all three.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01