Introduction to Statistics: Homework 3 (Model Answers)

Interactions in Multivariate Regression

1.

    a.

        i.   The coefficient on gender is -.222. This means that, controlling for the relationship between ideology and support for the Iraq war, women were .222 units less supportive than men. This difference is statistically significant at the .05 level. The coefficient on ideology is -.607. Controlling for the relationship between gender and support for the war, for every one unit more liberal an individual is, we expect a .6 unit decrease in support for the Iraq war. Because the p-value is less than .05, we can say that this relationship is statistically significant.

       ii.   The constant is 2.58. This is the predicted value on the support for Iraq war scale for a male who says they are "middle of the road".

    b.

        i.   The coefficient on gender is -.209. This the estimated effect of gender when ideology is zero (i.e., for "middle of the road" respondents). Among those respondents, we predict .209 units less support for the Iraq war among females (relative to males). The relationship is statistically significant at the .05 level. The coefficient on ideology is -.652. This is the estimated slope of the relationship between ideology and support for the war among males (for whom "gender" = 0). This relationship is also statistically significant at the .05 level.

       ii.   The fact that the coefficient on the interaction term is statistically significant at the .05 level indicates that the estimated relationship between gender and support for the war varies across individuals with different political ideologies.

      iii.   The estimated slope of the relationship between ideology and Iraq War Position among men is -.652. The estimated slope among women is -.652+.092 = -.560.

    c.

Gender	Ideology	Predicted Value
Male	Very Conservative	3.874
Male	Middle-of-the-Road	2.570
Male	Very Liberal	1.266
Female	Very Conservative	3.480
Female	Middle-of-the-Road	2.361
Female	Very Liberal	1.241

d. The graph indicates that the (negative) relationship between ideology and support for the Iraq war is stronger among men than it is among women. The main difference between men and women seems to be among very conservative respondents. Among these respondents men were more supportive of the war than women. In contrast, among very liberal respondents we do not find a substantial difference between women and men.

2.

a.

i. The coefficient on pocketbook is .022. Holding party identification constant, for every one unit increase in this variable (one unit worse evaluation of one's financial situation), the likelihood of voting for Obama increases by 2.2 percentage points. The p-value is less than .05, indicating that this relationship is statistically significant. The coefficient on party identification is .162. Holding pocketbook economic assessments constant, for each one unit increase in party identification, we expect a 16.2 percentage point increase in the likelihood of voting for Obama.

ii. The constant is .445. This is the expected probability of voting for Obama for a pure independent with a pocketbook assessment of zero (this value is not included on the scale so this value is not particularly meaningful).

b.

i. The coefficient on *pocketbook* is .022. This is the estimated slope of the relationship between pocketbook economic assessments and likelihood of voting for Obama among pure independents (for whom pid7 = 0). The relationship is statistically significant (p-value<.05).

The coefficient on *pid7* is .178. This is the estimated slope of the relationship between party identification and likelihood of voting for Obama among people who's pocketbook assessments were 0. These people do not exist (zero is not part of the scale), so this estimate, while different from zero (p-value<.05), is not meaningful.

ii. The coefficient on the interaction term is statistically significant at the .05 level. This tells us that the relationship between party identification and vote choice depends on pocketbook evaluations (and, symmetrically, that the relationship between pocketbook economic evaluations and vote choice depends on party identification).

iii. The estimated slope of the relationship between pocketbook assessments and vote choice among strong Republicans is .022+(-3*-.004)=.034. Among weak Democrats the slope is .022+(2*-.004)=.014.

c.

Party Identification	Pocketbook assessment	Predicted Value
Strong Republican	Much better	-.054
Strong Republican	Much worse	.087
Pure Independent	Much better	.466
Pure Independent	Much worse	.556
Strong Democrat	Much better	.987
Strong Democrat	Much worse	1.024

d.
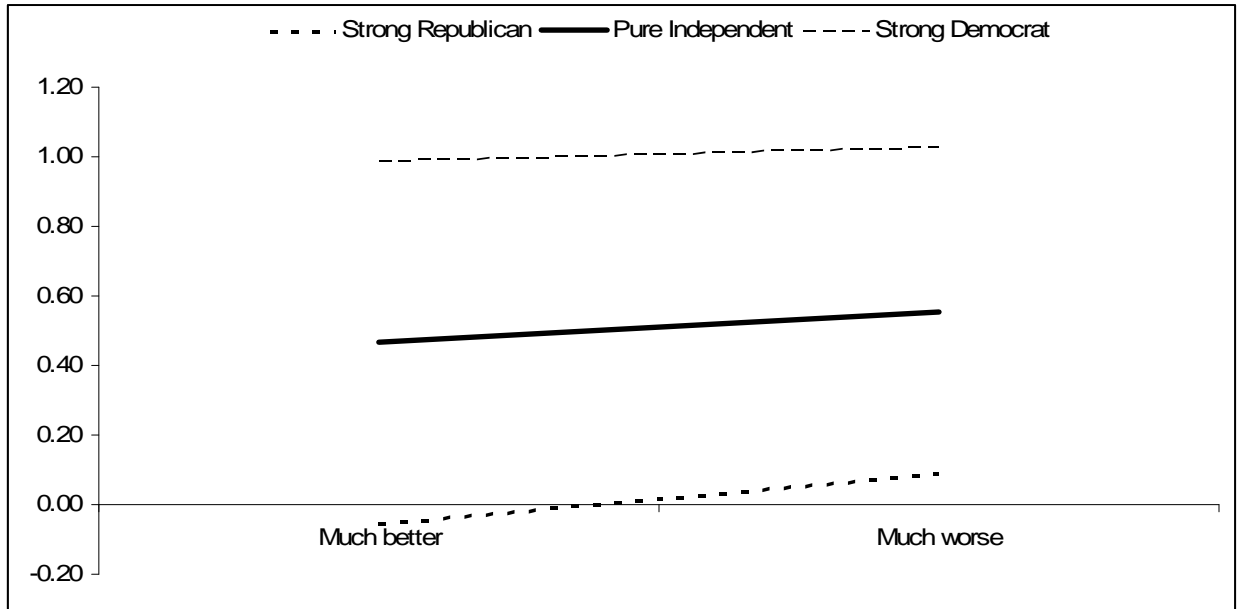
The graph shows that the relationship between pocketbook assessments and vote choice is strongest among Strong Republicans. Although the model predicts that strong Republicans were unlikely to vote for Obama, strong Republicans who thought their finances had gotten much worse were approximately 13 percentage points more likely to vote for Obama than strong Republicans who thought their finances had gotten much better (.087-(-.054)). In contrast, strong Democrats who thought their finances had gotten much worse were less than 4 percentage points more likely to vote for Obama than strong Democrats who thought their finances had gotten much better (1.024-.987).

e. The graph shows that the relationship between party identification and vote choice is stronger among those who thought their financial situation had gotten much worse that it is among those who thought their finances had gotten much better. Across categories of party identification, those who thought their finances had gotten much worse were more likely to vote for Obama than those who thought their finances had

gotten much better. However, this difference is larger among Strong Republicans than among independents or Strong Democrats (for whom the difference is smallest).

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