Introduction to Statistics: Homework 3

Interactions in Multivariate Regression

DUE TUESDAY, NOVEMBER 30th

*Please type your responses. For the analysis: copy your regression output and paste it into your document. <u>When you are asked to "interpret the coefficient" you should evaluate the statistical significance of the coefficient as well as the magnitude of the relationship. **Be sure to interpret coefficients in the context of the full regression!**</u>*

1. Many political scientists are interested in the "gender gap" in the political arena. The gender gap refers to the idea that men and women tend to think about and evaluate the political world differently. Using the *iraq2008* dataset, examine how attitudes about the war in Iraq are predicted by gender and political ideology. The variables in the dataset are:

Variable	Description
Iraq	Iraq War Position (1=Should leave immediately; 2=Should leave before the end of next year; 3=Should stay for at least another year; 4=Should stay as long as it takes)
Ideol	Political Ideology (-2=very conservative; -1=conservative; 0=middle of the road; 1=liberal; 2=very liberal)
Gender	Gender (0=male; 1=female)
gendXideol	Gender x Ideology

    a. Start by estimating a model predicting Iraq War Position using Gender and Political Ideology.

        i.   Interpret the coefficient on each of the two independent variables. [6 points]

        ii. Interpret the coefficient on the constant. [3 points]

    b. One possibility is that the relationship between ideology and support for the war in Iraq is different for men and women (for example, women may be either more or less likely to see war as an ideological issue). Test this possibility by adding the interaction term (gendXideol) to the model.

        i.   Interpret the coefficient on each of the two component terms (gender and ideology) [6 points]

        ii. What does the statistical significance of the coefficient on the interaction term tell us? [3 points]

        iii. What is the estimated (slope of the) relationship between ideology and Iraq War Position among men? Among women? [8 points]

    c. Fill in this table with predicted values [12 points]

Gender	Ideology	Predicted Value
Male	Very Conservative	
Male	Middle-of-the-Road	
Male	Very Liberal	
Female	Very Conservative	
Female	Middle-of-the-Road	
Female	Very Liberal	

  d. Use the predicted values you just calculated to graph the relationship between ideology and Iraq war position for men and women (ideology on the x-axis, support for Iraq war on the y-axis, two separate lines). What does your graph tell us about how ideology and gender affect support for the Iraq war? [8 points]

2. Pocketbook voting refers to the idea that people's vote choices are affected by their personal financial situation – people whose finances have gotten worse in the period leading up to an election tend to punish the incumbent party while those whose situation has improved tend to reward the incumbent party by voting for them. Use the *pocketbook* dataset for these questions. This dataset is from 2008 and includes the following variables:

Variable	Description
Voteobama	2008 presidential vote choice (0=McCain; 1=Obama)
pocketbook	Pocketbook: Evaluations of change in personal economic situation over the past year (1=much better, 2=better; 3=about the same; 4=worse; 5=much worse)
pid7	Party Identification (-3=strong Republican; -2=weak Republican; -1=lean Republican; 0=pure independent; 1=lean Democrat; 2=weak Democrat; 3=strong Democrat)
pocketbookXpid	Pocketbook assessment x Party ID

  a. Start by estimating a model predicting vote choice using Pocketbook evaluations and party identification.

    i. Interpret the coefficient on each of the two independent variables. [6 points]

    ii. Interpret the coefficient on the constant. [3 points]

  b. One possibility is that economic evaluations are more consequential among people who are inclined to support the incumbent's party (Republicans in 2008). Another possibility is that the opposite is true – e.g., people who identify with the incumbent president's party (in this case Republicans) are less likely to blame the president for their financial situation. If this is the case, we should expect a weaker relationship between pocketbook assessments and vote choice among Republicans. Use the interaction term (pocketbookXpid) to test whether the relationship between pocketbook assessments and vote choice depends on an individual's party identification.

    i. Interpret the coefficient on each of the two component terms (pocketbook and pid7) [6 points]

ii. What does the statistical significance of the coefficient on the interaction term tell us? [3 points]

iii. What is the estimated (slope of the) relationship between pocketbook assessments and vote choice among strong Republicans? Among weak Democrats? [8 points]

c. Fill in this table with predicted values [12 points]

Party Identification	Pocketbook assessment	Predicted Value
Strong Republican	Much better	
Strong Republican	Much worse	
Pure Independent	Much better	
Pure Independent	Much worse	
Strong Democrat	Much better	
Strong Democrat	Much worse	

d. Use the predicted values you just calculated to graph the relationship between pocketbook assessments and vote choice for Strong Republicans, Pure Independents, and Strong Republicans (pocketbook assessments on the x-axis, probability of voting for Obama on the y-axis, three separate lines). What does your graph tell us about how the relationship between pocketbook evaluations and vote choice varies across different party groups? [8 points]

e. Recall that interactions can be interpreted symmetrically – we can think of the relationship between pocketbook assessments and vote choice as depending on people's party identification **or** we can think of the relationship between party identification and vote choice as depending on pocketbook assessments. For example, we might think that people who say their financial situation has gotten much worse are less likely to rely on their party identification when deciding who to vote for. Use your predicted values from c) above to draw a graph that shows how the relationship between party identification varies depending on economic assessments. Party identification should now be on the x-axis and you should draw two lines – one for those who said their personal finances had gotten much better, one for people who said their finances had gotten much worse. Interpret the graph. [8 points]