**Homework 4**

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1. Run the 2SLS model using SAS (PROC SYSLIN) and estimate the effect of pioneering on market share. Be sure to consider the direct effects as well as the indirect effects. (read the paper on pioneering advantages for this interpretation).

Ans:

For mean and standard deviations of each variable:

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Second stage OLS summary:

The model is significant at 95% confidence interval. The independent variables explain about 27.5% of variation in the dependent variable.

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First stage regression for effect of Pioneering on Relative product Quality- Summary:

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First stage regression for effect of Pioneering on Relative product line breadth- Summary:

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First stage regression for effect of Pioneering on Price- Summary:

Graphical user interface, table

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System of Linear equations:

MS = 39.521 + 0.509\*Qual - 1.009\*plb + 0.875\*price + 7.175\*Pion + 5.792\*ef + 0.573\*phpf + 0.166\*plpf - 30.896\*psc - 1.464\*papc - 7.554\*ncomp - 0.291\*mktexp

Qual = -265.494 + 2.595\*price + 10.473\*dc - 0.398\*Pion - 2.236\*ef + 0.188\*tyrp - 0.489\*mktexp + 0.211\*pnp

Plb = 109.07 - 8.733\*dc + 1.715\*pion - 0.291\*tyrp - 0.129\*ef + 0.055\*pnp+ 3.94\*custtype + 0.226\*ncust + 0.520\*custsize

Price = 100.314 - 0.018\*ms + 0.141\*qual -0.457\*dc+1.66\*pion + 0.071\*ef - 1.421\*tyrp + 0.225\*mktexp - 0.021\*pnp

Dc = 1.141 + 0.005\*ms + 0.035\*qual - 0.077\*pion + 0.141\*ef +0.221\*tyrp -0.003\*penew + 0.0004\*cap-0.049\*rbvi + 0.002\*emprody + 0.001\*union

Direct effects of Pioneering on Market Share:

1. A pioneering company will have on average 7.175% higher market share than non-pioneering firms, given everything else stays constant.

Indirect effects of Pioneering on Market Share:

1. Indirect effect of Pioneering through mediator variable Relative Product quality:

Effect of Pioneering on Relative produce quality = -0.398

Effect of Relative Product quality on Market Share = 0.509

Total indirect effect of Pioneering on Market Share = -0.398\*0.509 = -0.202

2. Indirect effect of Pioneering through mediator variable Relative product line breadth:

Effect of Pioneering on Relative product line breadth = 1.715

Effect of Relative product line breadth on Market Share = -1.009

Total indirect effect of Pioneering on Market Share through Plb = -(1.715\* 1.009) = -1.73

3. Indirect effect of Pioneering through mediator variable Relative Price:

Effect of Pioneering on Relative Price = 1.66

Effect of Price on Market Share = 0.875

Total indirect effect of Pioneering on Market Share through Relative Price = 1.66\*0.875 = 1.452

Total direct effects = 7.175

Total indirect effects = -0.202 – 1.73 + 1.452 = -0.479

There, on average, holding everything else constant, pioneering firms have 6.696% greater market share as compared to non-pioneering firms.

1. Run a simple regression model of market share as given in the first equation. What is the effect of pioneering on market share using this simple model? How does this effect change across different models?

Model summary for regression on Market Share:

The model is significant at 95% confidence level and independent variables explains about 39% of the variation in Market share.

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Linear equation for regression on Market Share:

MS = 47.106 +0.168\*Qual - 0.489\*Plb + 0.338\*price + 9.85\*Pion + 4.96\*ef + 1.5\*phpf +1.151\*plpf – 20.9\*psc – 1.11\*papc – 7.533\*ncomp – 0.11\*mktexp

Hence, according to simple OLS model on Market share, on average, the market share is greater for pioneering companies by 9.85% as compared to non-pioneering companies.

The effect of pioneering on market share changes across models due to the presence of endogeneity in the simple OLS model. Endogeneity refers to the situation where a variable is correlated with the error term in a regression model, leading to biased estimates of the coefficients.

Here, in simple OLS, endogeneity in the variable pioneering leads to overestimation of its true effect on market share. This occurs because the variables product quality, price, and product line breadth are not truly endogenous. Pioneering affects market share directly but also affects relative product quality, Product line breadth, and Price. Hence, the simple OLS model is not considering the indirect effects of Pioneering dummy variable through other endogenous variables in the model, which the 2SLS model successfully does.

Hence, the true effect of pioneering on market share is that pioneering firms have, on average, 6.696% (and not 9.85%) higher market share as compared to non-pioneering firms, given everything else stays constant.