A note on parameter magnitudes in multinomial logit models

Looking at the magnitude of a variable's parameter in a multinomial logit model (and other models that we will be estimating) is not a good measure of the inlfuence of that variable.

The best way to see this is to look at the marginal effect. Consider the second example in the class Assignment #3 where the Freeway constant is -2.69 with a t-stat of 0.985 and the Rural constant is 2.81 with a t-stat of 2.011. If you looked at just the parameter magnitudes you would arrive at the conclusion that the influence of the Freeway constant on outcome probabilities is almost the same as the influence of the Arterial constant (although opposite in sign), even though the Freeway constant is statistically insignificant and the Arterial constant is statistically significant.

However, this is not the case. If we run that same model with marginal effects using the commands:

nlogit;lhs=x1;choices=arterial,rural,freeway;model:
u(arterial)=dista*x7/
u(rural)=rural*one+distr*x7+cager*cage/
u(freeway)=freeway*one+distf*x7+malef*x11+cagef*cage
;prob=proute
;effects:one[rural]/one[freeway]$

We get the marginal effects:

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| Derivative (times 100) averaged over observations.|
| Attribute is ONE      in choice RURAL             |
| Effects on probabilities of all choices in model: |
| * = Direct Derivative effect of the attribute.    |
|                             Mean      St.Dev       |
|      Choice=ARTERIAL       -33.0018   20.2741      |
| *    Choice=RURAL           46.8662   19.6674      |
|      Choice=FREEWAY        -13.8644   15.8987      |
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| Derivative (times 100) averaged over observations.|
| Attribute is ONE      in choice FREEWAY           |
| Effects on probabilities of all choices in model: |
| * = Direct Derivative effect of the attribute.    |
|                             Mean      St.Dev       |
|      Choice=ARTERIAL         4.5077    7.9280      |
|      Choice=RURAL           13.2383   15.1807      |
| *    Choice=FREEWAY        -17.7460   18.6503      |
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These are multiplied by 100 which means the Freeway constant has a 0.177 effect on the probability whereas the Rural constant has a 0.469 effect on the probability (looking at their absolute values). So although the parameter estimates are almost the same, the rural constant has more than 2.5 times the effect.

Elasticities also help in determining the impact of variables (their intent is similar to that of a

margianl effect), but you have to be careful because elasticities are a function of the base probabilities. In Assignment #3, the probability of the freeway choice is quite small. So a variable that has a 2.2 elasticity for the freeway has much less of an effect than a variable that has a 2.2 for the rural road because a 2.2% increase in the freeway probability is a much smaller probability value than a 2.2% increase in the rural probability value. This is why marginal effects are probably better than elasticities for interpretation...they take the small-probability effect out of the interpretation.