Exercise 2

ETC4420 Microeconometrics

Task A

Figure 1 Histogram investigating the relationship between 'logincome' with 'GP visits'



Question 1

Table 1 Linear regression model

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Linear regression model | | | | | |
| GP visits | Coefficients | Standard Deviation | T-stats | P-value | 95% CI |
|  |  |  |  |  |  |
| age3039 | -0.001 | (0.018) | -0.029 | 0.977 | -0.036 0.035 |
| age4049 | -0.003 | (0.018) | -0.161 | 0.872 | -0.039 0.033 |
| age5059 | 0.014 | (0.019) | 0.747 | 0.455 | -0.023 0.052 |
| age6069 | 0.095\*\*\* | (0.021) | 4.595 | 0.000 | 0.055 0.136 |
| age70up | 0.194\*\*\* | (0.021) | 9.461 | 0.000 | 0.154 0.235 |
| male | -0.084\*\*\* | (0.011) | -7.510 | 0.000 | -0.105 -0.062 |
| logincome | 0.003 | (0.007) | 0.441 | 0.659 | -0.011 0.017 |
| mcity | 0.027\*\* | (0.011) | 2.324 | 0.020 | 0.004 0.049 |
| poor | 0.459\*\*\* | (0.028) | 16.562 | 0.000 | 0.405 0.513 |
| fair | 0.297\*\*\* | (0.020) | 14.617 | 0.000 | 0.257 0.337 |
| good | 0.094\*\*\* | (0.016) | 5.714 | 0.000 | 0.062 0.127 |
| verygood | 0.023 | (0.016) | 1.483 | 0.138 | -0.007 0.054 |
| Constant | 0.152\*\*\* | (0.047) | 3.247 | 0.001 | 0.060 0.244 |
|  |  |  |  |  |  |

Table 2 Poisson Regression model

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Poisson regression | |  | Number of obs=10,000 | | |  |  |
|  |  |  | LR Chi2=785.60 | |  |  |  |
|  |  |  | Prob>Chi2=0.00 | |  |  |  |
| log likelihood=-6464.3469 | | | Pseudo R2=0.0573 | | |  |  |
|  |  |  |  |  |  |  |  |
| GP visits | Coef. | Std. Err. | z | P>|z| | ME | Std. Err. | z |
|  |  |  |  |  |  |  |  |
| age3039 | 0.011 | (0.071) | 0.150 | 0.881 | 0.003 | 0.020 | 0.150 |
| age4049 | 0.008 | (0.071) | 0.107 | 0.915 | 0.002 | 0.020 | 0.107 |
| age5059 | 0.090 | (0.072) | 1.246 | 0.213 | 0.026 | 0.021 | 1.246 |
| age6069 | 0.344\*\*\* | (0.072) | 4.790 | 0.000 | 0.099\*\*\* | 0.021 | 4.790 |
| age70up | 0.544\*\*\* | (0.068) | 8.028 | 0.000 | 0.157\*\*\* | 0.020 | 8.028 |
| male | -0.297\*\*\* | (0.039) | -7.657 | 0.000 | -0.086\*\*\* | 0.011 | -7.657 |
| logincome | 0.003 | (0.025) | 0.128 | 0.898 | 0.001 | 0.007 | 0.128 |
| mcity | 0.088\*\* | (0.039) | 2.268 | 0.023 | 0.025\*\* | 0.011 | 2.268 |
| poor | 1.199\*\*\* | (0.079) | 15.207 | 0.000 | 0.345\*\*\* | 0.024 | 15.21 |
| fair | 0.941\*\*\* | (0.069) | 13.579 | 0.000 | 0.271\*\*\* | 0.021 | 13.58 |
| good | 0.434\*\*\* | (0.066) | 6.588 | 0.000 | 0.125\*\*\* | 0.019 | 6.588 |
| verygood | 0.135\*\* | (0.066) | 2.023 | 0.043 | 0.039\*\* | 0.019 | 2.023 |
| Constant | -1.801\*\*\* | (0.173) | -10.405 | 0.000 |  |  |  |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | |  |  |  |  |

Table 3 Negative binomial model

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Negative binomial regression | | | Number of obs=10,000 | | |  |  |
|  |  |  | LR chi2(12)=718.40 | |  |  |  |
| Dispersion=mean | |  | Prob>chi2=0.0000 | |  |  |  |
| Log likelihood=-6459.9093 | | | Pseudo R2=0.0527 | |  |  |  |
| gpvisit | Coef. | Std. Err. | z | P>|z| | ME | Std. Err. | Z |
| age3039 | 0.010 | 0.072 | 0.14 | 0.889 | 0.003 | 0.021 | 0.14 |
| age4049 | 0.006 | 0.072 | 0.08 | 0.936 | 0.002 | 0.021 | 0.08 |
| age5059 | 0.089 | 0.073 | 1.21 | 0.225 | 0.026 | 0.021 | 1.21 |
| age6069 | 0.344 | 0.073 | 4.7 | 0 | 0.099 | 0.021 | 4.68 |
| age70up | 0.548 | 0.069 | 7.91 | 0 | 0.158 | 0.020 | 7.81 |
| male | -0.300 | 0.040 | -7.56 | 0 | -0.086 | 0.012 | -7.47 |
| logincome | 0.003 | 0.026 | 0.12 | 0.904 | 0.001 | 0.007 | 0.12 |
| mcity | 0.089 | 0.040 | 2.22 | 0.027 | 0.026 | 0.012 | 2.21 |
| poor | 1.202 | 0.081 | 14.83 | 0 | 0.346 | 0.024 | 14.21 |
| fair | 0.940 | 0.071 | 13.3 | 0 | 0.271 | 0.021 | 12.85 |
| good | 0.432 | 0.067 | 6.47 | 0 | 0.124 | 0.019 | 6.42 |
| verygood | 0.133 | 0.067 | 1.98 | 0.048 | 0.038 | 0.019 | 1.98 |
| \_cons | -1.799 | 0.177 | -10.18 | 0 |  |  |  |
| /lnalpha | -1.992 | 0.361 |  |  |  |  |  |
| alpha | 0.136 | 0.049 |  |  |  |  |  |
| Likelihood-ratio test of alpha=0: | | | chibar2(01)=8.88 | | Prob>=Chibar2=0.001 | | |

Question 2

Table 4 Prediction using Poisson model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Poisson Model |  |  |  |  |  |  |
|  | Variable | obs | Mean | Std. Dev. | Min | Max |
|  |  |  |  |  |  |  |
| Observed mean count | gpvisit | 10,000 | 0.288 | 0.572 | 0 | 3 |
| Predicted mean count | p\_gpvisit | 10,000 | 0.288 | 0.166 | 0.124 | 1.053 |
|  |  |  |  |  |  |  |
| Observed prob of count | 0 | 7,634 | 0.763 | 0.004 |  |  |
|  | 1 | 1,952 | 0.195 | 0.004 |  |  |
|  | 2 | 316 | 0.032 | 0.002 |  |  |
|  | 3 | 98 | 0.010 | 0.001 |  |  |
| Predicted prob of count | p\_visitspr0 | 10,000 | 0.759 | 0.109 | 0.349 | 0.883 |
|  | p\_visitspr1 | 10,000 | 0.201 | 0.066 | 0.110 | 0.368 |
|  | p\_visitspr2 | 10,000 | 0.034 | 0.034 | 0.007 | 0.194 |
|  | p\_visitspr3 | 10,000 | 0.005 | 0.009 | 0.000 | 0.068 |

Table 5 Prediction using Negative Binomial model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NegBin2 Model |  |  |  |  |  |  |
|  | Variable | obs | Mean | Std. Dev. | Min | Max |
|  |  |  |  |  |  |  |
| Observed mean count | gpvisit | 10,000 | 0.288 | 0.572 | 0 | 3 |
| Predicted mean count | p\_gpvisit | 10,000 | 0.288 | 0.167 | 0.124 | 1.063 |
|  |  |  |  |  |  |  |
| Observed prob of count | 0 | 7,634 | 0.763 | 0.004 |  |  |
|  | 1 | 1,952 | 0.195 | 0.004 |  |  |
|  | 2 | 316 | 0.032 | 0.002 |  |  |
|  | 3 | 98 | 0.010 | 0.001 |  |  |
| Predicted prob of count | nb\_visitspr0 | 10,000 | 0.764 | 0.105 | 0.371 | 0.884 |
|  | nb\_visitspr1 | 10,000 | 0.194 | 0.061 | 0.108 | 0.345 |
|  | nb\_visitspr2 | 10,000 | 0.035 | 0.033 | 0.007 | 0.181 |
|  | nb\_visitspr3 | 10,000 | 0.006 | 0.010 | 0.000 | 0.071 |

Task B

Question 1

Table Heckman sample selection model two-step

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Heckman selection model--two-step estimates | | | | | Number of obs=7,773 | | |
| (regression model with sample selection) | | | | | Censored obs=3,188 | | |
|  |  |  |  |  | Uncensored obs=4,585 | | |
|  |  |  |  |  | Wald chi2(13)=1520.84 | | |
|  |  |  |  |  | Prob>chi12=0.000 | | |
|  |  | Coef. | Std. Err. | z | P>|z| | 95% CI |  |
| wscei |  |  |  |  |  |  |  |
|  | age1517 | -473.485 | 420.102 | -1.13 | 0.26 | -1296.870 | 349.900 |
|  | age1819 | -452.494 | 478.154 | -0.95 | 0.344 | -1389.658 | 484.670 |
|  | age2021 | -302.142 | 469.648 | -0.64 | 0.52 | -1222.635 | 618.351 |
|  | age2224 | -159.431 | 486.055 | -0.33 | 0.743 | -1112.082 | 793.219 |
|  | age2534 | 11.954 | 478.754 | 0.02 | 0.98 | -926.387 | 950.295 |
|  | age3544 | 179.532 | 472.399 | 0.38 | 0.704 | -746.353 | 1105.417 |
|  | age4554 | 163.259 | 476.470 | 0.34 | 0.732 | -770.604 | 1097.122 |
|  | age5564 | 220.122 | 409.411 | 0.54 | 0.591 | -582.309 | 1022.552 |
|  | age6574 | 254.943 | 249.365 | 1.02 | 0.307 | -233.802 | 743.689 |
|  | male | 414.516 | 29.142 | 14.22 | 0 | 357.399 | 471.632 |
|  | bachabv | 476.812 | 72.075 | 6.62 | 0 | 335.548 | 618.077 |
|  | dipcert | 83.872 | 54.600 | 1.54 | 0.125 | -23.143 | 190.887 |
|  | year12 | 31.120 | 51.832 | 0.6 | 0.548 | -70.469 | 132.708 |
|  | \_cons | 752.887 | 615.306 | 1.22 | 0.221 | -453.091 | 1958.866 |
| working |  |  |  |  |  |  |  |
|  | age1517 | 2.219 | 0.149 | 14.89 | 0 | 1.927 | 2.512 |
|  | age1819 | 2.693 | 0.155 | 17.36 | 0 | 2.389 | 2.997 |
|  | age2021 | 2.622 | 0.156 | 16.79 | 0 | 2.316 | 2.928 |
|  | age2224 | 2.814 | 0.152 | 18.53 | 0 | 2.517 | 3.112 |
|  | age2534 | 2.780 | 0.141 | 19.78 | 0 | 2.505 | 3.056 |
|  | age3544 | 2.759 | 0.141 | 19.61 | 0 | 2.483 | 3.034 |
|  | age4554 | 2.764 | 0.139 | 19.94 | 0 | 2.492 | 3.035 |
|  | age5564 | 2.084 | 0.138 | 15.14 | 0 | 1.814 | 2.353 |
|  | age6574 | 0.797 | 0.146 | 5.47 | 0 | 0.511 | 1.083 |
|  | male | 0.193 | 0.033 | 5.93 | 0 | 0.129 | 0.257 |
|  | bachabv | 0.562 | 0.048 | 11.69 | 0 | 0.468 | 0.657 |
|  | dipcert | 0.381 | 0.044 | 8.69 | 0 | 0.295 | 0.467 |
|  | year12 | 0.323 | 0.053 | 6.04 | 0 | 0.218 | 0.427 |
|  | married | 0.075 | 0.039 | 1.92 | 0.054 | -0.001 | 0.151 |
|  | depkid | -0.200 | 0.043 | -4.65 | 0 | -0.285 | -0.116 |
|  | \_cons | -2.438 | 0.137 | -17.84 | 0 | -2.706 | -2.170 |
| mills |  |  |  |  |  |  |  |
|  | lambda | -354.234 | 228.668 | -1.55 | 0.121 | -802.415 | 93.947 |
|  | rho | -0.540 |  |  |  |  |  |
|  | sigma | 655.902 |  |  |  |  |  |