Illustration 7 – Question 1

```
. drop if ltotexp==.
(109 observations deleted)


. summarize ltotexp suppins totchr age female white
    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     ltotexp |      2,955    8.059866    1.367592   1.098612   11.74094
     suppins |      2,955    .5915398    .4916322          0          1
      totchr |      2,955    1.808799    1.294613          0          7
         age |      2,955    74.24535    6.375975         65         90
      female |      2,955    .5840948    .4929608          0          1
-------------+---------------------------------------------------------
       white |      2,955    .9736041    .1603368          0          1
```

Illustration 7 – Question 1

```
. summarize ltotexp, d
                   ln(totexp) if totexp > 0
-------------------------------------------------------------
      Percentiles      Smallest
 1%     4.394449       1.098612
 5%     5.703783       1.791759
10%     6.364751       2.197225       Obs               2,955
25%     7.267525       2.639057       Sum of Wgt.       2,955

50%     8.111928                      Mean           8.059866
                        Largest       Std. Dev.      1.367592
75%     8.922258       11.56003
90%     9.772752       11.59225       Variance       1.870308
95%     10.23785       11.72489       Skewness      -.3857887
99%     11.05072       11.74094       Kurtosis       3.842263
```

Illustration 7 – Question 1

```
. quantile ltotexp
```

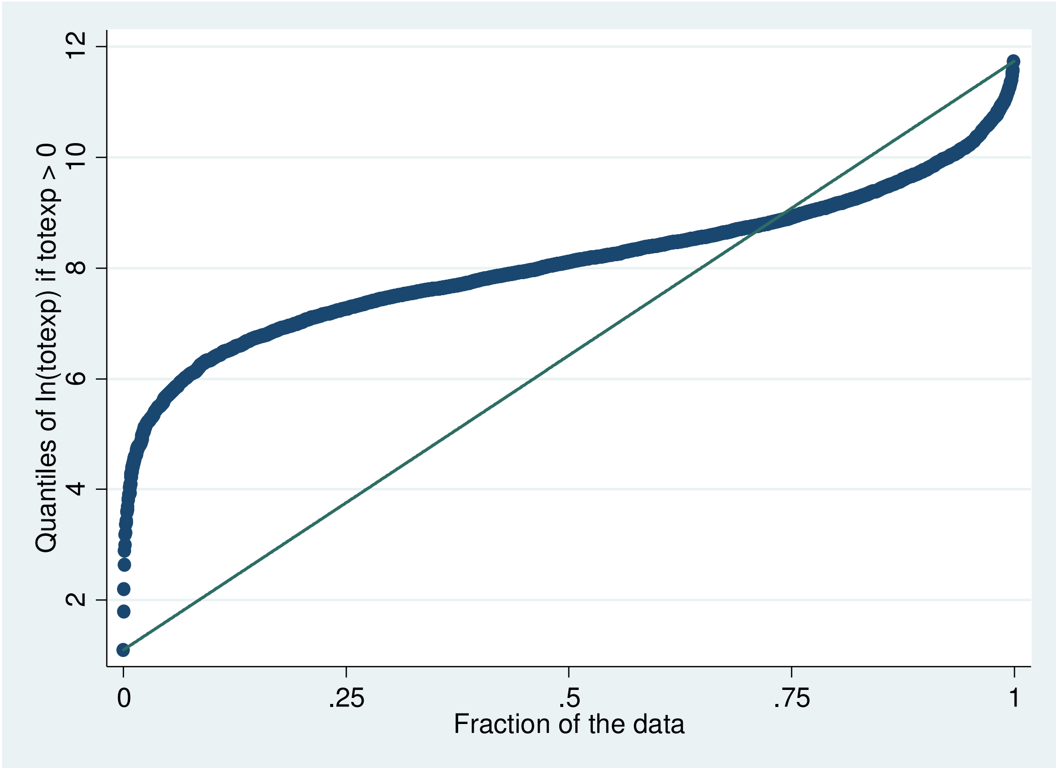


Illustration 7 – Question 2

```
. qreg ltotexp suppins totchr age female white, nolog

Median regression                                   Number of obs =      2,955
  Raw sum of deviations  1555.48 (about 8.111928)
  Min sum of deviations 1398.492                    Pseudo R2     =     0.1009

------------------------------------------------------------------------------
    ltotexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    suppins |   .2769771   .0535936     5.17   0.000     .1718924    .3820617
     totchr |   .3942664   .0202472    19.47   0.000     .3545663    .4339664
        age |   .0148666   .0041479     3.58   0.000     .0067335    .0229996
     female |  -.0880967   .0532006    -1.66   0.098    -.1924109    .0162175
      white |   .4987457   .1630984     3.06   0.002     .1789474     .818544
      _cons |   5.648891    .341166    16.56   0.000     4.979943    6.317838
------------------------------------------------------------------------------
```

Illustration 7 – Question 2

```
. mat b = e(b)
. qui predict double xb
. qui gen double expxb = exp(xb)
. su expxb, mean
. mat b = r(mean) * b
. mat li b, ti("Marginal effects ($) on total medical expenditures")

b[1,6]:  Marginal effects ($) on total medical expenditures
        suppins      totchr         age      female       white       _cons
y1     1037.755   1477.2049   55.700813  -330.07346   1868.6593     21164.8
```

- Interpretation of some effects on the conditional median of expenditures
    - An additional chronic medical condition increases the conditional median of expenditures on 1477,20$
    - A individial with private insurante presents a conditional median of expenditures 1037,755$ higher than na individual that does not possess insurance

Illustration 7 – Question 3

```
. quietly regress ltotexp suppins totchr age female white
. estimates store OLS

. quietly qreg ltotexp suppins totchr age female white, quantile(.25)
. estimates store Q25

. quietly qreg ltotexp suppins totchr age female white, quantile(.50)
. estimates store Q50

. quietly qreg ltotexp suppins totchr age female white, quantile(.75)
. estimates store Q75

. set seed 10101
. quietly bsqreg ltotexp suppins totchr age female white, quantile(.50) reps(400)
. estimates store bsQ50
```

Illustration 7 – Question 3

```
. estimates table OLS Q25 Q50 Q75 bsQ50, b(%7.3f) star(0.1 0.05 0.01)
```

Variable	OLS	Q25	Q50	Q75	bsQ50
suppins	0.257***	0.386***	0.277***	0.149**	0.277***
totchr	0.445***	0.459***	0.394***	0.374***	0.394***
age	0.013***	0.016***	0.015***	0.018***	0.015***
female	-0.077*	-0.016	-0.088*	-0.122**	-0.088*
white	0.318**	0.338*	0.499***	0.193	0.499**
_cons	5.898***	4.748***	5.649***	6.600***	5.649***

legend: * p<.1; ** p<.05; *** p<.01

- Individual significance is similar for *suppins*, *totchr* and *age*, but differs for *female* and *white*
- Robust individual significance for LAD is equivalent to standard case
- OLS and QR coefficients differ, even when comparing OLS with LAD (both measures of central location)
- Specially for *suppins,* impact differs across quantiles: impact is higher in low quantiles

Illustration 7 – Question 4

```
. quietly regress ltotexp suppins totchr age female white

. estat hettest suppins totchr age female white, iid

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: suppins totchr age female white

         chi2(5)      =    71.38
         Prob > chi2  =   0.0000
```

- Homoskedasticity is rejected. The previous interpretation of partial effects would need adjustments.
- Check this result with the Machado and Santos Silva command qreg2 (needs to be previously installed)…

Illustration 7 – Question 5

```
. set seed 10101
. sqreg ltotexp suppins totchr age female white, quantile(0.25,.50,0.75)
reps(400)
(…)
Simultaneous quantile regression                   Number of obs =      2,955
  bootstrap(400) SEs                               .25 Pseudo R2 =     0.1292
                                                   .50 Pseudo R2 =     0.1009
                                                   .75 Pseudo R2 =     0.0873
------------------------------------------------------------------------------
             |              Bootstrap
     ltotexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
q25          |
     suppins |   .3856797   .0642742     6.00   0.000     .2596529    .5117065
      totchr |    .459022   .0234579    19.57   0.000     .4130265    .5050175
         age |   .0155106   .0043944     3.53   0.000     .0068941    .0241271
      female |  -.0160694   .0581328    -0.28   0.782    -.1300543    .0979155
       white |   .3375936   .1110348     3.04   0.002       .11988    .5553072
       _cons |   4.747962   .3485751    13.62   0.000     4.064487    5.431438
-------------+----------------------------------------------------------------
(cont.)
```

Illustration 7 – Question 5

(cont.)

```
-------------+----------------------------------------------------------------
q50          |
     suppins |   .2769771   .0579685     4.78   0.000     .1633144    .3906398
      totchr |   .3942664   .0195859    20.13   0.000      .355863    .4326698
         age |   .0148666   .0044102     3.37   0.001     .0062192    .0235139
      female |  -.0880967   .0554863    -1.59   0.112    -.1968926    .0206992
       white |   .4987457   .2199888     2.27   0.023     .0673984    .9300929
       _cons |   5.648891   .3966791    14.24   0.000     4.871095    6.426687
-------------+----------------------------------------------------------------
q75          |
     suppins |   .1488548   .0649951     2.29   0.022     .0214143    .2762952
      totchr |   .3735364   .0228424    16.35   0.000     .3287478     .418325
         age |   .0182506   .0049533     3.68   0.000     .0085383     .027963
      female |  -.1219365   .0562735    -2.17   0.030    -.2322759   -.0115971
       white |   .1931923   .2045296     0.94   0.345    -.2078428    .5942275
       _cons |   6.599972   .4247018    15.54   0.000      5.76723    7.432714
------------------------------------------------------------------------------
```

Illustration 7 – Question 5

```
. test [q25=q50=q75]:suppins

 ( 1)  [q25]suppins - [q50]suppins = 0
 ( 2)  [q25]suppins - [q75]suppins = 0

       F(  2,  2949) =    5.28
            Prob > F =    0.0051

. test [q25=q50=q75]: totchr

 ( 1)  [q25]totchr - [q50]totchr = 0
 ( 2)  [q25]totchr - [q75]totchr = 0

       F(  2,  2949) =    6.39
            Prob > F =    0.0017
```

- Equality of coefficients is rejected in both cases, at a significance level of 5%

Illustration 7 – Question 6

```
. ssc install grqreg
checking grqreg consistency and verifying not already installed...
installing into c:\ado\plus\...
installation complete.

. qreg ltotexp suppins totchr age female white, q(.50) nolog
Median regression                                   Number of obs =      2,955
  Raw sum of deviations  1555.48 (about 8.111928)
  Min sum of deviations 1398.492                    Pseudo R2     =     0.1009
------------------------------------------------------------------------------
     ltotexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     suppins |   .2769771   .0535936     5.17   0.000     .1718924    .3820617
      totchr |   .3942664   .0202472    19.47   0.000     .3545663    .4339664
         age |   .0148666   .0041479     3.58   0.000     .0067335    .0229996
      female |  -.0880967   .0532006    -1.66   0.098    -.1924109    .0162175
       white |   .4987457   .1630984     3.06   0.002     .1789474     .818544
       _cons |   5.648891    .341166    16.56   0.000     4.979943    6.317838
------------------------------------------------------------------------------

.  grqreg, cons ci ols olsci reps(40)
```

Illustration 7 – Question 6

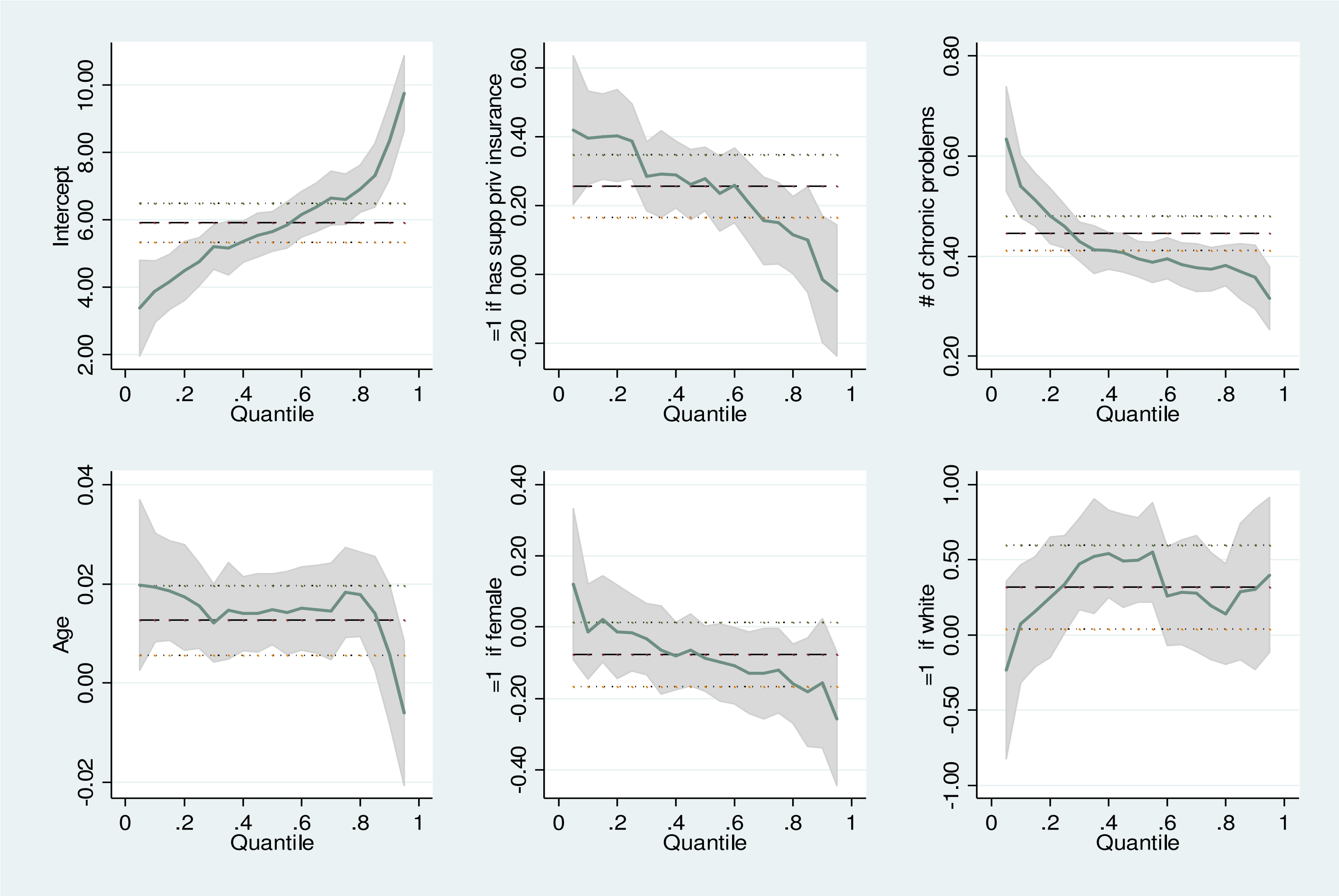


Illustration 8 – Question 1

```
. sum docvis private totchr age female white

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
      docvis |      3677    6.822682    7.394937          0        144
     private |      3677    .4966005    .5000564          0          1
      totchr |      3677    1.843351    1.350026          0          8
         age |      3677    74.24476    6.376638         65         90
      female |      3677    .6010335    .4897525          0          1
-------------+--------------------------------------------------------
       white |      3677    .9709002    .1681092          0          1
```

Illustration 8 – Question 1

```
. sum docvis, d

                           docvis
-------------------------------------------------------------
      Percentiles      Smallest
 1%            0              0
 5%            0              0
10%            0              0       Obs                3677
25%            2              0       Sum of Wgt.        3677

50%            5                      Mean           6.822682
                        Largest       Std. Dev.      7.394937
75%            9             59
90%           15             73       Variance       54.68509
95%           20            106       Skewness       4.174335
99%           33            144       Kurtosis       49.67923

. set seed 10101
. generate docvisu= docvis+runiform()
. quantile docvis
. quantile docvisu
```

Illustration 8 – Question 2

```
. quantile docvis
```

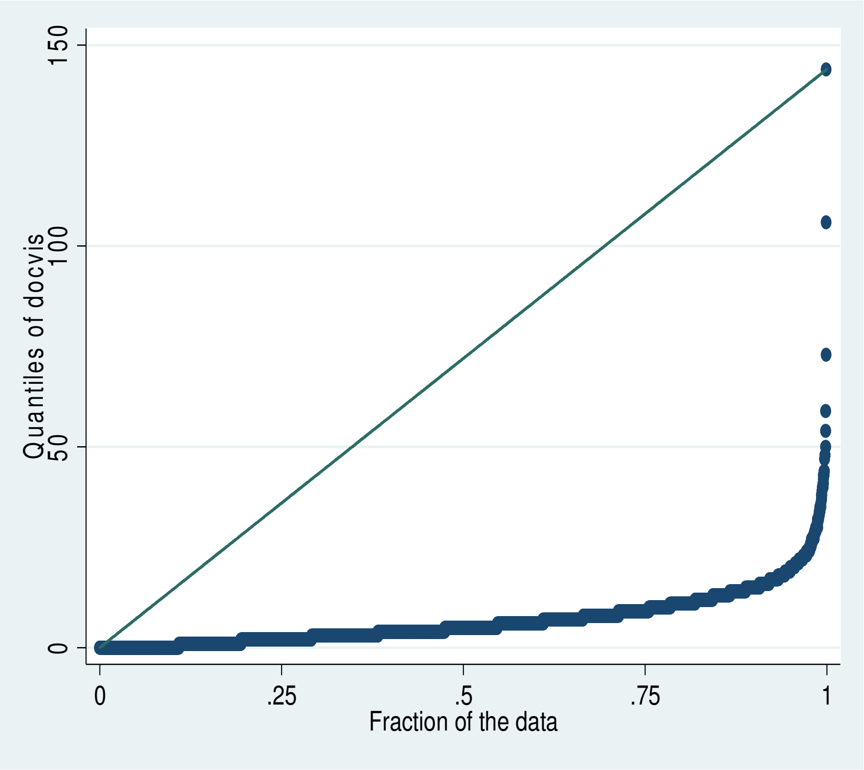
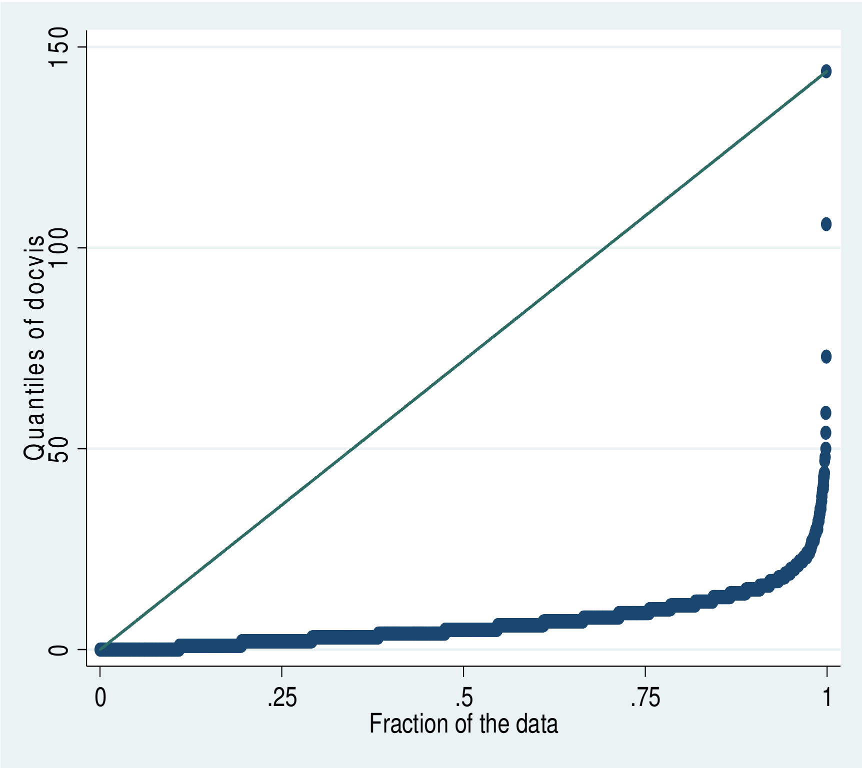


Illustration 8 – Question 2

```
. set seed 10101
. generate docvisu= docvis+runiform()
. quantile docvis
. quantile docvisu
```



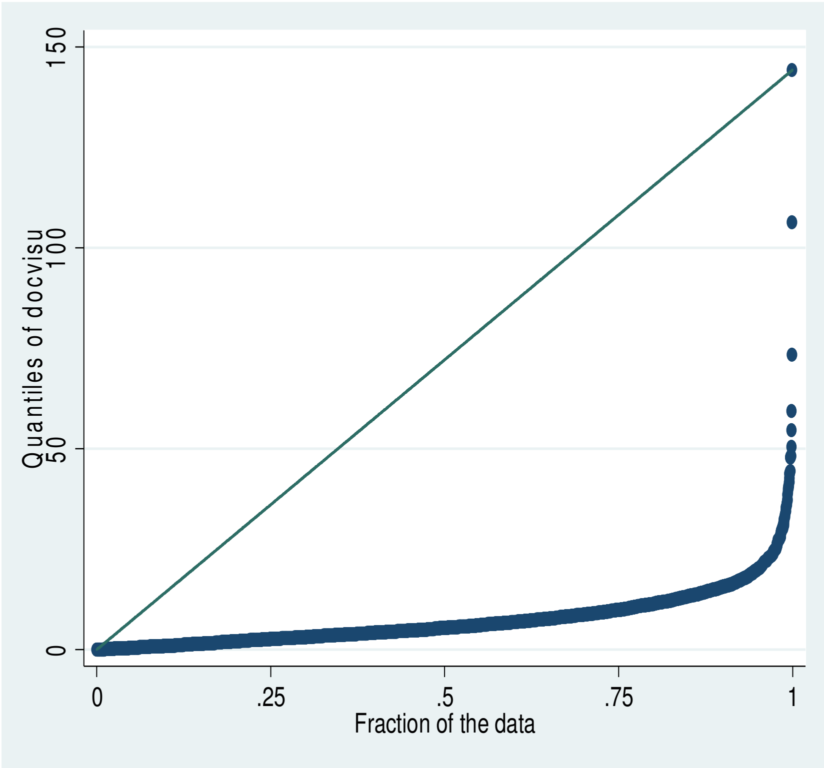


Illustration 8 – Question 3

```
. nbreg docvis private totchr age female white, vce(robust)
Negative binomial regression                      Number of obs   =       3677
Dispersion           = mean                       Wald chi2(5)    =     642.51
Log pseudolikelihood = -10634.246                 Prob > chi2     =     0.0000
------------------------------------------------------------------------------
             |               Robust
      docvis |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     private |   .1721237   .0344177     5.00   0.000     .1046663    .2395811
      totchr |   .3002597   .0123475    24.32   0.000     .2760591    .3244604
         age |    .005416   .0028296     1.91   0.056    -.0001299     .010962
      female |   -.022273   .0345702    -0.64   0.519    -.0900292    .0454833
       white |   .0811637   .0981205     0.83   0.408     -.111149    .2734764
       _cons |   .7305526   .2290788     3.19   0.001     .2815665    1.179539
-------------+----------------------------------------------------------------
    /lnalpha |  -.4123734   .0387841                     -.4883889   -.3363579
-------------+----------------------------------------------------------------
       alpha |    .662077   .0256781                      .6136142    .7143674
------------------------------------------------------------------------------
```

- Only two significant variables, with the expected signs

Illustration 8 – Question 3

```
. mfx

Marginal effects after nbreg
      y  = Predicted number of events (predict)
         =  6.2779353
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
 private*|   1.082549      .21481    5.04   0.000   .661523  1.50358     .4966
  totchr |   1.885011       .0771   24.45   0.000    1.7339  2.03613   1.84335
     age |   .0340016      .01767    1.92   0.054  -.000622  .068626   74.2448
  female*|  -.1401461      .21798   -0.64   0.520  -.567381  .287089   .601033
   white*|   .4905679      .57117    0.86   0.390   -.62891  1.61005     .9709
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1
```

Illustration 8 – Question 4

```
. ssc install qcount
checking qcount consistency and verifying not already installed...
installing into c:\ado\stbplus\...
installation complete.

. qcount docvis private totchr age female white, q(.50) rep(500)
Count Data Quantile Regression
( Quantile 0.50 )
                                          Number of obs          =      3677
                                          No. jittered samples   =       500
------------------------------------------------------------------------------
      docvis |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     private |   .2026718    .040978     4.95   0.000     .1223564    .2829872
      totchr |   .3465017   .0181826    19.06   0.000     .3108645     .382139
         age |   .0084275   .0033868     2.49   0.013     .0017896    .0150655
      female |   .0025244   .0413117     0.06   0.951     -.078445    .0834937
       white |   .1200437   .0980561     1.22   0.221    -.0721427    .3122302
       _cons |   .0338473   .2525817     0.13   0.893    -.4612037    .5288983
------------------------------------------------------------------------------
```

- An additional significant variable: age

Illustration 8 – Question 4

```
. qcount_mfx
 Marginal effects after qcount
       y = Qz(0.50|X)
         =  5.05847 (0.0975)
------------------------------------------------------------------------------
                |      ME      Std. Err.      z     P>|z|  [   95% C.I   ]      X
----------------+-------------------------------------------------------------
private         |   .92609303  .18593848    4.98  0.0000  0.5617  1.2905    0.50
totchr          |   1.5795176  .07860898    20.1  0.0000  1.4254  1.7336    1.84
age             |   .03841669  .01533359    2.51  0.0122  0.0084  0.0685   74.24
female          |   .01150429  .18823153   .0611  0.9513 -0.3574  0.3804    0.60
white           |   .51745093   .4008875    1.29  0.1968 -0.2683  1.3032    0.97
------------------------------------------------------------------------------
-----------------------------------------
                |  ME   [95% C. Set]    X
----------------+------------------------
private         |  0       0   1      0.50
totchr          |  1       1   1      1.84
age             |  0       0   0     74.24
female          |  0      -1   0      0.60
white           |  0      -1   1      0.97
-----------------------------------------
```

- Over Qz, similar to those of BN. In the original scale, only *totchr* imposes variation on the count

Illustration 8 – Question 5

```
. quietly qcount docvis private totchr age female white, q(.25) rep(500)
. qcount_mfx
 Marginal effects after qcount
       y = Qz(0.25|X)
         =  2.47577 (0.0666)
-------------------------------------------------------------------------------
                |       ME      Std. Err.       z     P>|z|  [   95% C.I   ]        X
----------------+--------------------------------------------------------------
private         |  .76479684   .1149431     6.65  0.0000  0.5395  0.9901     0.50
totchr          |  1.0358285  .03800236     27.3  0.0000  0.9613  1.1103     1.84
age             |  .02386525  .00758687     3.15  0.0017  0.0090  0.0387    74.24
female          |  .15941462  .12641299     1.26  0.2073 -0.0884  0.4072     0.60
white           | -.14911412  .21579416    -.691  0.4896 -0.5721  0.2738     0.97
-------------------------------------------------------------------------------
-----------------------------------------
                | ME   [95% C. Set]     X
----------------+------------------------
private         |  1       1   1       0.50
totchr          |  1       1   1       1.84
age             |  0       0   0      74.24
female          |  0       0   0       0.60
white           |  0      -1   0       0.97
-----------------------------------------
```

Illustration 8 – Question 5

```
. quietly qcount docvis private totchr age female white, q(.75) rep(500)
. qcount_mfx
 Marginal effects after qcount
         y = Qz(0.75|X)
           =  9.06561 (0.1600)
-----------------------------------------------------------------------------------
                |       ME      Std. Err.       z     P>|z|  [   95% C.I   ]        X
----------------+------------------------------------------------------------------
-
private         |  1.2253771  .33163708    3.69  0.0002  0.5754  1.8754     0.50
totchr          |  2.3236381  .13395758    17.3  0.0000  2.0611  2.5862     1.84
age             |   .0264796  .02548337    1.04  0.2988 -0.0235  0.0764    74.24
female          | -.00437375  .32837804  -.0133  0.9894 -0.6480  0.6392     0.60
white           |  1.1880344  .81541512    1.46  0.1451 -0.4102  2.7862     0.97
-----------------------------------------------------------------------------------

------------------------------------------
                | ME   [95% C. Set]     X
----------------+-------------------------
private         |  1       0   1       0.50
totchr          |  2       2   2       1.84
age             |  0       0   0      74.24
female          |  0      -1   0       0.60
white           |  1      -1   2       0.97
```

Illustration 8 – Question 5

- Note that standard errors decrease as we go from q=0.25 to q=0.75, reflecting the fact that precision is higher where more observations concentrate. Typically, standard errors are expected to be smaller at the central location (LAD), but in this case we have lots of zeros and small counts

- Comparing the AME over the quantiles for the most significant covariates: *private* and *totchar*:

	q=0.25	q=0.50	q=0.75
private	1	0	1
totchar	1	1	2

  - Different impact at different locations