61cc4641c86

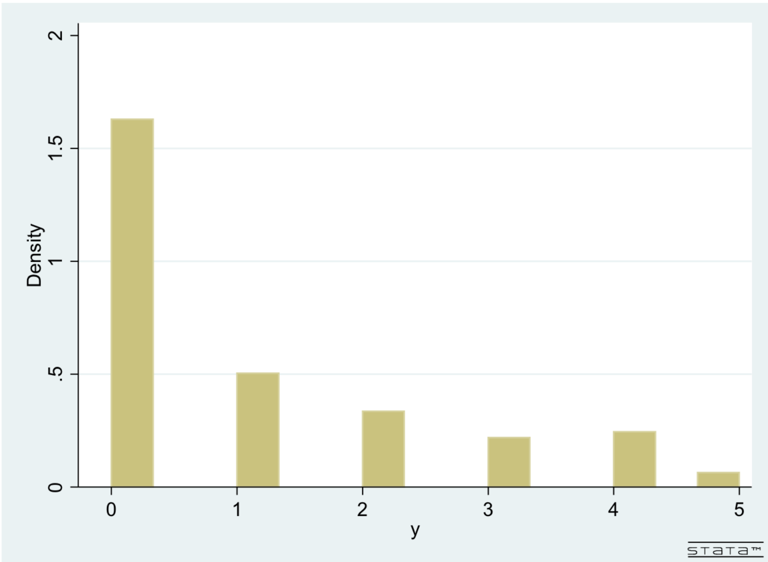
①

```
. reg y x1 x2 x3 x4
```

Source	SS	df	MS			
Model	44.7298499	4	11.1824625	Number of obs	=	232
Residual	425.748598	227	1.87554449	F(4, 227)	=	5.96
				Prob > F	=	0.0001
				R-squared	=	0.0951
				Adj R-squared	=	0.0791
Total	470.478448	231	2.03670324	Root MSE	=	1.3695

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1	.1016201	.0435073	2.34	0.020	.0158904	.1873499
x2	.1345044	.0462142	2.91	0.004	.0434407	.225568
x3	-.0748194	.0480457	-1.56	0.121	-.1694919	.0198531
x4	.1684563	.0688243	2.45	0.015	.0328401	.3040725
_cons	.9568064	.107007	8.94	0.000	.7459523	1.16766

2.



The counts data is not normally distributed, OLS will be biased

(3)

```
. poisson y x1 x2 x3 x4, nolog

Poisson regression                              Number of obs     =        232
                                                LR chi2(4)        =      43.33
                                                Prob > chi2       =     0.0000
Log likelihood = -342.88107                     Pseudo R2         =     0.0594
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
x1	.0971474	.0306762	3.17	0.002	.0370231	.1572717
x2	.1293024	.0330916	3.91	0.000	.064444	.1941607
x3	-.0715533	.0342177	-2.09	0.037	-.1386187	-.0044879
x4	.1734482	.0507707	3.42	0.001	.0739395	.2729569
_cons	-.1284876	.0849064	-1.51	0.130	-.294901	.0379259

```
. . estat gof

        Deviance goodness-of-fit =  409.4921
        Prob > chi2(227)         =    0.0000

        Pearson goodness-of-fit  =  423.3541
        Prob > chi2(227)         =    0.0000

. . lincom x1, ir

 ( 1)  [y]x1 = 0
```

y	IRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
(1)	1.102023	.0338059	3.17	0.002	1.037717	1.170314

```
. . lincom x2, ir

 ( 1)  [y]x2 = 0
```

y	IRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
(1)	1.138034	.0376594	3.91	0.000	1.066566	1.214291

```
. . lincom x3, ir

 ( 1)  [y]x3 = 0
```

y	IRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
(1)	.9309467	.0318548	-2.09	0.037	.8705599	.9955222

```
. . lincom x4, ir

 ( 1)  [y]x4 = 0
```

y	IRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
(1)	1.189399	.0603866	3.42	0.001	1.076742	1.313844

```
. . mfx

Marginal effects after poisson
      y  = Predicted number of events (predict)
         =  .95621703
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.	]	X
x1	.092894	.02882	3.22	0.001	.036403	.149385	-.317697
x2	.1236411	.0308	4.01	0.000	.063277	.184005	.812709
x3	-.0684205	.03246	-2.11	0.035	-.13204	-.004801	-.818103
x4	.1658541	.04736	3.50	0.000	.073022	.258686	-.28275

From GOF test H_0 is rejected, poisson model is not appropriate

(4)

```
. nbreg y x1 x2 x3 x4, nolog

Negative binomial regression                    Number of obs      =       232
                                                LR chi2(4)         =     21.24
Dispersion     = mean                           Prob > chi2        =    0.0003
Log likelihood = -317.49278                     Pseudo R2          =    0.0324
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
x1	.1285534	.0506934	2.54	0.011	.0291962	.2279106
x2	.151011	.0506477	2.98	0.003	.0517434	.2502785
x3	-.0672859	.0481376	-1.40	0.162	-.1616339	.0270621
x4	.1726312	.0707035	2.44	0.015	.034055	.3112075
_cons	-.1435596	.1177204	-1.22	0.223	-.3742874	.0871682
/lnalpha	.0479945	.2389531			-.4203449	.5163339
alpha	1.049165	.2507012			.6568202	1.675872

Likelihood-ratio test of alpha=0: chibar2(01) = 50.78 Prob>=chibar2 = 0.000

```
. mfx

Marginal effects after nbreg
      y  = Predicted number of events (predict)
         =  .94607122
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
x1	.1216207	.04796	2.54	0.011	.02763	.215611	-.317697
x2	.1428671	.04796	2.98	0.003	.048862	.236872	.812709
x3	-.0636573	.04556	-1.40	0.162	-.152956	.025642	-.818103
x4	.1633214	.06686	2.44	0.015	.032269	.294374	-.28275

From the LR test H_0 is rejected, the negative binomial is appropriate

(5)

```
3 . zip y x1 x2 x3, inflate(x4) vuong

Fitting constant-only model:

Iteration 0:   log likelihood = -355.48956
Iteration 1:   log likelihood =  -321.8304
Iteration 2:   log likelihood = -317.80147
Iteration 3:   log likelihood = -317.79274
Iteration 4:   log likelihood = -317.79274

Fitting full model:

Iteration 0:   log likelihood = -317.79274
Iteration 1:   log likelihood = -312.73621
Iteration 2:   log likelihood =  -312.6159
Iteration 3:   log likelihood =  -312.6158
Iteration 4:   log likelihood =  -312.6158

Zero-inflated Poisson regression                Number of obs     =        232
                                                Nonzero obs       =        106
                                                Zero obs          =        126

Inflation model = logit                         LR chi2(3)        =      10.35
Log likelihood  = -312.6158                     Prob > chi2       =     0.0158
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
y						
x1	.0805446	.0398159	2.02	0.043	.0025068	.1585824
x2	.0857883	.0372107	2.31	0.021	.0128567	.1587199
x3	-.0672468	.0357098	-1.88	0.060	-.1372367	.002743
_cons	.4589728	.1106031	4.15	0.000	.2421947	.6757508
inflate						
x4	-.2738532	.1212311	-2.26	0.024	-.5114618	-.0362446
_cons	-.3379298	.1908217	-1.77	0.077	-.7119334	.0360738

Vuong test of zip vs. standard Poisson: z = 3.92 Pr>z = 0.0000

from LR test H_0 is rejected, ZIP model is appropriate

(6) ZIP model is the most appropriate. Because, it's the only model that the model is appropriate and significant in individual test.