Statistics/Data Analysis

```
      name:  <unnamed>
       log:  C:\Users\eaj628\Documents\hwk4.smcl
  log type:  smcl
 opened on:  16 Oct 2016, 18:28:56

. /*
>         Assignment 4
>
>         Evan Johnston
> */
.
. set more off

. cd "\\tsclient\Stat Apps Server\hwk4"
\\tsclient\Stat Apps Server\hwk4

.
. use "\\tsclient\Stat Apps Server\Data Sets- STATA\lee-moretti-butler.dta", clear

.
. * prob 1
. graph twoway scatter demvoteshare lagdemvoteshare, title("Prob 1")

. graph export scatter1.png, replace
(note: file scatter1.png not found)
(file scatter1.png written in PNG format)

.
. * prob 2 and 3
. matrix DiffDemVoteShares = I(5)

. matrix rownames DiffDemVoteShares = E_DemVS_Lag1 N_Lag1_h E_DemVS_Lag0 N_Lag0_h Diff
> erence

. matrix colnames DiffDemVoteShares = All h=0.2 h=0.1 h=0.05 h=0.01

. gen h = 1

. foreach i in 1 2 3 4 5 {
  2.         replace h = 0.2 if `i'==2
  3.         replace h = 0.1 if `i'==3
  4.         replace h = 0.05 if `i'==4
  5.         replace h = 0.01 if `i'==5
  6.
.         sum demvoteshare if (lagdemocrat==1 & abs(lagdemvoteshare-0.5)<h)
  7.         matrix DiffDemVoteShares[1,`i'] = r(mean)
  8.         matrix DiffDemVoteShares[2,`i'] = r(N)
  9.         sum demvoteshare if (lagdemocrat==0 & abs(lagdemvoteshare-0.5)<h)
 10.         matrix DiffDemVoteShares[3,`i'] = r(mean)
 11.         matrix DiffDemVoteShares[4,`i'] = r(N)
 12.         matrix DiffDemVoteShares[5,`i'] = DiffDemVoteShares[1,`i'] - DiffDemVoteS
> hares[3,`i']
 13. }
(0 real changes made)
(0 real changes made)
(0 real changes made)
(0 real changes made)

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
demvoteshare |      5,092    .6513242    .1033738   .3653148   .9696784

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
demvoteshare |      4,696    .3865028    .0871629   .0731092    .657481
(9,788 real changes made)
(0 real changes made)
(0 real changes made)
(0 real changes made)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**3,631**	**.6147946**	**.0845498**	**.3653148**	**.9180683**

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**3,953**	**.4011779**	**.0806511**	**.13428**	**.657481**

(0 real changes made)
(9,788 real changes made)
(0 real changes made)
(0 real changes made)

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**1,989**	**.5853051**	**.0770751**	**.3653148**	**.8840256**

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**2,203**	**.4231697**	**.0794044**	**.1644806**	**.657481**

(0 real changes made)
(0 real changes made)
(9,788 real changes made)
(0 real changes made)

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**1,079**	**.5653583**	**.0736557**	**.3653148**	**.7891594**

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**1,044**	**.4375783**	**.0790396**	**.201031**	**.657481**

(0 real changes made)
(0 real changes made)
(0 real changes made)
(9,788 real changes made)

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**196**	**.5427536**	**.0609861**	**.428734**	**.7478687**

Variable	Obs	Mean	Std. Dev.	Min	Max
demvoteshare	**169**	**.4439418**	**.0722764**	**.2528701**	**.657481**

```
19. matrix list DiffDemVoteShares

DiffDemVoteShares[5,5]
                    All       h=0.2       h=0.1      h=0.05      h=0.01
E_DemVS_Lag1  .65132419   .6147946  .58530515  .56535835  .54275358
    N_Lag1_h       5092        3631        1989        1079         196
E_DemVS_Lag0  .38650276  .40117792  .42316971  .43757833  .44394176
    N_Lag0_h       4696        3953        2203        1044         169
  Difference  .26482142  .21361668  .16213544  .12778001  .09881182

20.
21. * prob 4
22. foreach i in 4 5 {
    2.          replace h = 0.05 if `i'==4
    3.          replace h = 0.01 if `i'==5
    4.
```

```
23.         regress demvoteshare lagdemocrat if abs(lagdemvoteshare-0.5)<h, robust
    5.          display "Naive estimate from 3: " DiffDemVoteShares[5,`i']
    6. }
  (9,788 real changes made)
  (0 real changes made)
```

Linear regression

Number of obs	**2,123**
F(1, 2121)	**1482.73**
Prob > F	**0.0000**
R-squared	**0.4120**
Root MSE	**.07635**

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	**.12778**	**.0033184**	**38.51**	**0.000**	**.1212723**	**.1342877**
_cons	**.4375783**	**.0024462**	**178.88**	**0.000**	**.4327811**	**.4423755**

Naive estimate from 3: .12778001

(0 real changes made)
(9,788 real changes made)

Linear regression

Number of obs	**365**
F(1, 363)	**195.74**
Prob > F	**0.0000**
R-squared	**0.3560**
Root MSE	**.06645**

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	**.0988118**	**.0070626**	**13.99**	**0.000**	**.0849231**	**.1127005**
_cons	**.4439418**	**.0055585**	**79.87**	**0.000**	**.4330109**	**.4548727**

Naive estimate from 3: .09881182

```
24.
25. * prob 5 and 6
26. gen lagdemVS_diff = lagdemvoteshare-0.5

27. gen interact1 = lagdemocrat*lagdemVS_diff

28. gen lagdemVS_diff_sqr = lagdemVS_diff^2

29. gen interact2 = lagdemocrat*lagdemVS_diff^2

30.
31. * part a
32. regress demvoteshare lagdemocrat lagdemVS_diff, robust
```

Linear regression

Number of obs	**9,788**
F(2, 9785)	**18748.36**
Prob > F	**0.0000**
R-squared	**0.7890**
Root MSE	**.07509**

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	**.0881409**	**.0027132**	**32.49**	**0.000**	**.0828224**	**.0934594**
lagdemVS_diff	**.6776434**	**.0084739**	**79.97**	**0.000**	**.6610327**	**.6942541**
_cons	**.465433**	**.0015018**	**309.92**	**0.000**	**.4624893**	**.4683768**

```
33. predict demVS_a
  (option xb assumed; fitted values)

34. graph twoway scatter demVS_a lagdemvoteshare, title("Prob 5.a") ytitle("Fitted Value
  > s demVS_a")

35. graph export fitted_a.png, replace
  (note: file fitted_a.png not found)
  (file fitted_a.png written in PNG format)

36.
37. *part b
38. regress demvoteshare lagdemocrat lagdemVS_diff interact1, robust

  Linear regression                               Number of obs     =      9,788
                                                  F(3, 9784)        =   12681.48
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7900
                                                  Root MSE          =     .0749

------------------------------------------------------------------------------
             |               Robust
 demvoteshare|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  lagdemocrat|   .0916436   .0027697    33.09   0.000     .0862144    .0970729
lagdemVS_diff|   .5931319   .0149976    39.55   0.000     .5637335    .6225302
    interact1|   .1284697   .0180475     7.12   0.000     .0930929    .1638465
        _cons|   .4555893   .0021046   216.48   0.000     .4514639    .4597147
------------------------------------------------------------------------------

39. predict demVS_b
  (option xb assumed; fitted values)

40. graph twoway scatter demVS_b lagdemvoteshare, title("Prob 5.b") ytitle("Fitted Value
  > s demVS_b")

41. graph export fitted_b.png, replace
  (note: file fitted_b.png not found)
  (file fitted_b.png written in PNG format)

42.
43. * part c
44. regress demvoteshare lagdemocrat lagdemVS_diff lagdemVS_diff_sqr, robust

  Linear regression                               Number of obs     =      9,788
                                                  F(3, 9784)        =   12843.02
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7902
                                                  Root MSE          =     .07487

------------------------------------------------------------------------------
             |               Robust
 demvoteshare|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  lagdemocrat|   .0931659    .002812    33.13   0.000     .0876538     .098678
lagdemVS_diff|   .6491509   .0094243    68.88   0.000     .6306775    .6676244
lagdemVS_diff_sqr|   .2086096   .0268831     7.76   0.000     .1559132     .261306
        _cons|   .4581286    .001823   251.31   0.000     .4545552     .461702
------------------------------------------------------------------------------
```

```
45. predict demVS_c
  (option xb assumed; fitted values)

46. graph twoway scatter demVS_c lagdemvoteshare, title("Prob 5.c") ytitle("Fitted Value
  > s demVS_c")

47. graph export fitted_c.png, replace
  (note: file fitted_c.png not found)
  (file fitted_c.png written in PNG format)

48.
49. * part d
50. regress demvoteshare lagdemocrat lagdemVS_diff lagdemVS_diff_sqr ///
  >         interact1 interact2, robust

  Linear regression                               Number of obs     =      9,788
                                                  F(5, 9782)        =    7930.20
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7910
                                                  Root MSE          =     .07474

------------------------------------------------------------------------------
             |               Robust
 demvoteshare|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  lagdemocrat|   .1094004   .0039152    27.94   0.000     .1017258    .1170751
 lagdemVS_diff|   .4105795   .0490714     8.37   0.000     .3143894    .5067696
lagdemVS_diff_sqr|  -.6749792   .1727354    -3.91   0.000    -1.013576   -.3363822
    interact1|   .1442806   .0583611     2.47   0.013     .0298808    .2586803
    interact2|   1.153707   .1915237     6.02   0.000     .7782807    1.529133
       _cons|   .4472222   .0030402   147.10   0.000     .4412627    .4531816
------------------------------------------------------------------------------

51. predict demVS_d
  (option xb assumed; fitted values)

52. graph twoway scatter demVS_d lagdemvoteshare, title("Prob 5.d = 6") ytitle("Fitted V
  > alues demVS_d")

53. graph export fitted_d.png, replace
  (note: file fitted_d.png not found)
  (file fitted_d.png written in PNG format)

54.
55. * part e
56. regress demvoteshare lagdemocrat lagdemVS_diff lagdemVS_diff_sqr ///
  >         interact1 interact2 year pcturban pctblack pcthighschl, robust

  Linear regression                               Number of obs     =      6,774
                                                  F(9, 6764)        =    3677.37
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.8129
                                                  Root MSE          =     .0759

------------------------------------------------------------------------------
             |               Robust
 demvoteshare|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  lagdemocrat|   .1436251   .0052552    27.33   0.000     .1333233    .1539269
 lagdemVS_diff|   .2664782    .062678     4.25   0.000     .1436097    .3893468
lagdemVS_diff_sqr|  -.7876536   .2056751    -3.83   0.000    -1.190841   -.3844658
    interact1|   .2500898   .0733381     3.41   0.001      .106324    .3938556
    interact2|   1.125062   .2295904     4.90   0.000      .674993    1.575132
         year|  -.0010104   .0001158    -8.73   0.000    -.0012373   -.0007834
     pcturban|   .0226917   .0043325     5.24   0.000     .0141987    .0311848
     pctblack|   .0819616   .0089769     9.13   0.000     .0643641    .0995591
   pcthighschl|  -.0494038   .0142773    -3.46   0.001    -.0773918   -.0214157
       _cons|   2.411116   .2303461    10.47   0.000     1.959565    2.862667
------------------------------------------------------------------------------
```

```
57. predict demVS_e
  (option xb assumed; fitted values)
  (3,014 missing values generated)

58. graph twoway scatter demVS_e lagdemvoteshare, title("Prob 5.e") ytitle("Fitted Value
  > s demVS_e")

59. graph export fitted_e.png, replace
  (note: file fitted_e.png not found)
  (file fitted_e.png written in PNG format)

60.
61. * prob 7
62. regress democrat lagdemocrat lagdemVS_diff lagdemVS_diff_sqr ///
  >         interact1 interact2, robust

  Linear regression                               Number of obs     =      9,788
                                                  F(5, 9782)        =   19336.31
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7291
                                                  Root MSE          =     .25975

------------------------------------------------------------------------------
             |               Robust
    democrat |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 lagdemocrat |   .5251218   .0193691    27.11   0.000     .4871543    .5630893
lagdemVS_diff |   2.084919   .1903316    10.95   0.000      1.71183    2.458008
lagdemVS_diff_sqr |   4.239091   .5535692     7.66   0.000     3.153981    5.324201
   interact1 |  -.3032021   .2308067    -1.31   0.189    -.7556309    .1492267
   interact2 |  -7.628747   .6242246   -12.22   0.000    -8.852356   -6.405138
       _cons |   .2574678    .014635    17.59   0.000     .2287802    .2861553
------------------------------------------------------------------------------

63. predict demVS_7
  (option xb assumed; fitted values)

64. graph twoway scatter demVS_7 lagdemvoteshare, title("Prob 7") ytitle("Fitted Values
  > demVS_7")

65. graph export fitted_7.png, replace
  (note: file fitted_7.png not found)
  (file fitted_7.png written in PNG format)

66. summarize demVS_7

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     demVS_7 |      9,788    .5326931    .4260553   .0011106   1.016722

67.
68. * prob 8
69. foreach i in 1 2 3 4 5 {
    2.         local rstar = 0.41+`i'*0.03
    3.         replace lagdemVS_diff = lagdemvoteshare - `rstar'
    4.         display "Rstar = " `rstar'
    5.         regress demvoteshare lagdemocrat lagdemVS_diff, robust
    6.         predict demVS_Rstar_`i'
    7. }
  (9,788 real changes made)
  Rstar = .44

  Linear regression                               Number of obs     =      9,788
                                                  F(2, 9785)        =   18748.36
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7890
                                                  Root MSE          =     .07509
```

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	.0881409	.0027132	32.49	0.000	.0828224	.0934594
lagdemVS_diff	.6776434	.0084739	79.97	0.000	.6610328	.6942541
_cons	.4247744	.0012142	349.85	0.000	.4223944	.4271544

(option **xb** assumed; fitted values)
(9,788 real changes made)
Rstar = .47

Linear regression

Number of obs	=	9,788	
F(2, 9785)	=	18748.36	
Prob > F	=	0.0000	
R-squared	=	0.7890	
Root MSE	=	.07509	

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	.0881409	.0027132	32.49	0.000	.0828224	.0934594
lagdemVS_diff	.6776434	.0084739	79.97	0.000	.6610327	.6942541
_cons	.4451037	.0013417	331.75	0.000	.4424737	.4477337

(option **xb** assumed; fitted values)
(9,788 real changes made)
Rstar = .5

Linear regression

Number of obs	=	9,788	
F(2, 9785)	=	18748.36	
Prob > F	=	0.0000	
R-squared	=	0.7890	
Root MSE	=	.07509	

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	.0881409	.0027132	32.49	0.000	.0828224	.0934594
lagdemVS_diff	.6776434	.0084739	79.97	0.000	.6610327	.6942541
_cons	.465433	.0015018	309.92	0.000	.4624893	.4683768

(option **xb** assumed; fitted values)
(9,788 real changes made)
Rstar = .53

Linear regression

Number of obs	=	9,788	
F(2, 9785)	=	18748.36	
Prob > F	=	0.0000	
R-squared	=	0.7890	
Root MSE	=	.07509	

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	.0881409	.0027132	32.49	0.000	.0828224	.0934594
lagdemVS_diff	.6776434	.0084739	79.97	0.000	.6610328	.6942541
_cons	.4857623	.0016851	288.26	0.000	.4824591	.4890656

(option **xb** assumed; fitted values)
(9,788 real changes made)
Rstar = .56

Linear regression

Number of obs	=	9,788	
F(2, 9785)	=	18748.36	
Prob > F	=	0.0000	
R-squared	=	0.7890	
Root MSE	=	.07509	

demvoteshare	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagdemocrat	**.0881409**	**.0027132**	**32.49**	**0.000**	**.0828224**	**.0934594**
lagdemVS_diff	**.6776434**	**.0084739**	**79.97**	**0.000**	**.6610328**	**.6942541**
_cons	**.5060916**	**.001885**	**268.48**	**0.000**	**.5023965**	**.5097867**

(option **xb** assumed; fitted values)

```
70.
71. log close
      name:  <unnamed>
       log:  C:\Users\eaj628\Documents\hwk4.smcl
  log type:  smcl
 closed on:  16 Oct 2016, 18:30:14
```