**Appendix**

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means proc 21:28 Wednesday, May 2, 2018 653

The MEANS Procedure

Variable Label N Mean Std Dev Minimum Maximum

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Year Year 54 2013.00 2.6062335 2009.00 2017.00

Tax\_Rate Tax\_Rate 54 0.1349426 0.9410505 -6.0769000 1.7378000

Margin Margin 54 0.1965111 0.4636563 -2.2879000 0.6131000

D\_E D\_E 54 0.3329630 0.4027061 0 1.8100000

IPOAGE IPOAGE 54 7.6666667 6.1028914 -4.0000000 19.0000000

FirmAge FirmAge 54 13.1666667 4.7134893 3.0000000 22.0000000

Market Market 54 0.1565333 0.0975261 0.0138000 0.3239000

GDP GDP 54 15720.78 873.5785747 14418.74 17096.18

t\_rate t\_rate 54 0.0253111 0.0063952 0.0188000 0.0373000

Age Age 54 0.5000000 0.5046949 0 1.0000000

IPO5 IPO5 54 13.6666667 6.1028914 2.0000000 25.0000000

market\_D\_E market\_D\_E 54 1.1144444 0.5302284 0.1200000 1.5800000

Mean\_Annual\_D\_E Mean Annual D\_E 54 0.3329630 0.1459275 0.1533333 0.6183333

firmagesq 54 195.1666667 120.6258444 9.0000000 484.0000000

twenty10 54 0.1111111 0.3172206 0 1.0000000

twenty11 54 0.1111111 0.3172206 0 1.0000000

twenty12 54 0.1111111 0.3172206 0 1.0000000

twenty13 54 0.1111111 0.3172206 0 1.0000000

twenty14 54 0.1111111 0.3172206 0 1.0000000

twenty15 54 0.1111111 0.3172206 0 1.0000000

twenty16 54 0.1111111 0.3172206 0 1.0000000

twenty17 54 0.1111111 0.3172206 0 1.0000000

FB 54 0.1666667 0.3761774 0 1.0000000

TW 54 0.1666667 0.3761774 0 1.0000000

EB 54 0.1666667 0.3761774 0 1.0000000

NF 54 0.1666667 0.3761774 0 1.0000000

SF 54 0.1666667 0.3761774 0 1.0000000

new 54 0.5000000 0.5046949 0 1.0000000

newage 54 4.6666667 5.1797865 0 14.0000000

newagesq 54 48.1111111 61.5690031 0 196.0000000

ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ

The CORR Procedure

7 Variables: Tax\_Rate Margin D\_E Age Market GDP t\_rate

Simple Statistics

Variable N Mean Std Dev Sum Minimum Maximum Label

Tax\_Rate 54 0.13494 0.94105 7.28690 -6.07690 1.73780 Tax\_Rate

Margin 54 0.19651 0.46366 10.61160 -2.28790 0.61310 Margin

D\_E 54 0.33296 0.40271 17.98000 0 1.81000 D\_E

Age 54 0.50000 0.50469 27.00000 0 1.00000 Age

Market 54 0.15653 0.09753 8.45280 0.01380 0.32390 Market

GDP 54 15721 873.57857 848922 14419 17096 GDP

t\_rate 54 0.02531 0.00640 1.36680 0.01880 0.03730 t\_rate

Pearson Correlation Coefficients, N = 54

Prob > |r| under H0: Rho=0

Tax\_Rate Margin D\_E Age Market GDP t\_rate

Tax\_Rate 1.00000 0.09931 0.02332 0.08895 -0.06943 -0.18136 0.04055

Tax\_Rate 0.4749 0.8670 0.5224 0.6179 0.1894 0.7710

Margin 0.09931 1.00000 0.22769 -0.27441 -0.00529 0.17921 -0.18589

Margin 0.4749 0.0978 0.0446 0.9697 0.1948 0.1784

D\_E 0.02332 0.22769 1.00000 -0.37226 -0.10941 0.31308 -0.07842

D\_E 0.8670 0.0978 0.0056 0.4310 0.0212 0.5730

Age 0.08895 -0.27441 -0.37226 1.00000 0.01855 -0.33863 0.17303

Age 0.5224 0.0446 0.0056 0.8941 0.0123 0.2108

Market -0.06943 -0.00529 -0.10941 0.01855 1.00000 -0.16539 -0.24324

Market 0.6179 0.9697 0.4310 0.8941 0.2320 0.0763

GDP -0.18136 0.17921 0.31308 -0.33863 -0.16539 1.00000 -0.48797

GDP 0.1894 0.1948 0.0212 0.0123 0.2320 0.0002

t\_rate 0.04055 -0.18589 -0.07842 0.17303 -0.24324 -0.48797 1.00000

t\_rate 0.7710 0.1784 0.5730 0.2108 0.0763 0.0002

Panel output 1 21:28 Wednesday, May 2, 2018 655

The REG Procedure

Model: MODEL1

Dependent Variable: D\_E D\_E

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 16 6.25625 0.39102 6.19 <.0001

Error 37 2.33888 0.06321

Corrected Total 53 8.59513

Root MSE 0.25142 R-Square 0.7279

Dependent Mean 0.33296 Adj R-Sq 0.6102

Coeff Var 75.51040

NOTE: Model is not full rank. Least-squares solutions for the parameters are not unique. Some

statistics will be misleading. A reported DF of 0 or B means that the estimate is biased.

NOTE: The following parameters have been set to 0, since the variables are a linear combination

of other variables as shown.

NF = 27.9221 \* Intercept + FirmAge - 7.8557 \* Market - 0.00303 \* GDP + 272.82

\* t\_rate - 4.08976 \* twenty10 - 4.46162 \* twenty11 + 0.51648 \* twenty12

+ 1.74863 \* twenty13 - 2.096 \* twenty14 + 6 \* FB + 8 \* TW - 3 \* EB + SF

Parameter Estimates

Parameter Standard Variance

Variable Label DF Estimate Error t Value Pr > |t| Inflation

Intercept Intercept B 18.63813 4.59246 4.06 0.0002 0

firmagesq 1 0.00453 0.00179 2.53 0.0157 39.04989

FirmAge FirmAge B 0.69399 0.13440 5.16 <.0001 336.49404

Market Market B -9.83618 4.70294 -2.09 0.0434 176.38052

GDP GDP B -0.00231 0.00036933 -6.27 <.0001 87.27866

Margin Margin 1 0.15670 0.12581 1.25 0.2208 2.85290

t\_rate t\_rate B 354.23628 174.32793 2.03 0.0494 1042.10232

Tax\_Rate Tax\_Rate 1 0.04722 0.04019 1.17 0.2475 1.19942

twenty10 B -5.21781 2.64368 -1.97 0.0559 589.67449

twenty11 B -5.60837 2.66126 -2.11 0.0419 597.54244

twenty12 B 0.76892 0.48637 1.58 0.1224 19.95853

twenty13 B 2.29743 1.34436 1.71 0.0958 152.48486

twenty14 B -2.64181 1.19319 -2.21 0.0331 120.11992

FB B 4.80793 0.79443 6.05 <.0001 74.88040

TW B 6.64921 1.02315 6.50 <.0001 124.20445

Panel output 1 21:28 Wednesday, May 2, 2018 656

The REG Procedure

Model: MODEL1

Dependent Variable: D\_E D\_E

Parameter Estimates

Parameter Standard Variance

Variable Label DF Estimate Error t Value Pr > |t| Inflation

EB B -2.12052 0.31796 -6.67 <.0001 11.99506

SF B 1.16071 0.20708 5.61 <.0001 5.08786

NF 0 0 . . . .

Panel output 2 21:28 Wednesday, May 2, 2018 657

The REG Procedure

Model: MODEL1

Dependent Variable: D\_E D\_E

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 18 7.27145 0.40397 10.68 <.0001

Error 35 1.32368 0.03782

Corrected Total 53 8.59513

Root MSE 0.19447 R-Square 0.8460

Dependent Mean 0.33296 Adj R-Sq 0.7668

Coeff Var 58.40653

NOTE: Model is not full rank. Least-squares solutions for the parameters are not unique. Some

statistics will be misleading. A reported DF of 0 or B means that the estimate is biased.

NOTE: The following parameters have been set to 0, since the variables are a linear combination

of other variables as shown.

NF = 27.9221 \* Intercept + 51E-14 \* firmagesq + FirmAge - 158E-12 \* new + 189E-13

\* newage - 593E-15 \* newagesq - 7.8557 \* Market - 0.00303 \* GDP + 272.82

\* t\_rate - 4.08976 \* twenty10 - 4.46162 \* twenty11 + 0.51648 \* twenty12

+ 1.74863 \* twenty13 - 2.096 \* twenty14 + 6 \* FB + 8 \* TW - 3 \* EB + SF

Parameter Estimates

Parameter Standard Variance

Variable Label DF Estimate Error t Value Pr > |t| Inflation

Intercept Intercept B 27.74773 4.04849 6.85 <.0001 0

firmagesq B 0.02931 0.00731 4.01 0.0003 1090.92535

FirmAge FirmAge B -0.08974 0.28942 -0.31 0.7584 2607.98409

new B -7.00498 2.16362 -3.24 0.0026 1671.01068

newage B 0.96837 0.26200 3.70 0.0007 2581.04723

newagesq B -0.03297 0.00865 -3.81 0.0005 397.46128

Market Market B -9.38458 3.63021 -2.59 0.0141 175.65738

GDP GDP B -0.00245 0.00030568 -8.01 <.0001 99.92884

Margin Margin 1 0.09326 0.09898 0.94 0.3526 2.95172

t\_rate t\_rate B 310.72743 134.08212 2.32 0.0265 1030.40708

twenty10 B -4.63247 2.03202 -2.28 0.0288 582.28913

twenty11 B -5.07226 2.04924 -2.48 0.0183 592.20259

twenty12 B 0.66491 0.37362 1.78 0.0838 19.68564

twenty13 B 2.13397 1.03655 2.06 0.0470 151.51914

Panel output 2 21:28 Wednesday, May 2, 2018 658

The REG Procedure

Model: MODEL1

Dependent Variable: D\_E D\_E

Parameter Estimates

Parameter Standard Variance

Variable Label DF Estimate Error t Value Pr > |t| Inflation

twenty14 B -2.27133 0.91772 -2.47 0.0183 118.76844

FB B 4.82726 0.65215 7.40 <.0001 84.34211

TW B 6.69660 0.84434 7.93 <.0001 141.37663

EB B -2.26197 0.25701 -8.80 <.0001 13.09885

SF B 1.12864 0.16771 6.73 <.0001 5.57815

NF 0 0 . . . .

Park test logfirmage 21:28 Wednesday, May 2, 2018 659

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 10.36268 10.36268 2.69 0.1068

Error 52 200.04692 3.84706

Corrected Total 53 210.40960

Root MSE 1.96139 R-Square 0.0493

Dependent Mean -4.27408 Adj R-Sq 0.0310

Coeff Var -45.89041

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -7.13972 1.76631 -4.04 0.0002

logfirmage 1 1.10947 0.67599 1.64 0.1068

park test logfirmagesq 21:28 Wednesday, May 2, 2018 660

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 9.61220 9.61220 2.49 0.1207

Error 52 200.79740 3.86149

Corrected Total 53 210.40960

Root MSE 1.96507 R-Square 0.0457

Dependent Mean -4.27408 Adj R-Sq 0.0273

Coeff Var -45.97641

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -6.66742 1.54034 -4.33 <.0001

logfirmagesq 1 0.47951 0.30392 1.58 0.1207

park test logmarket 21:28 Wednesday, May 2, 2018 661

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 1.42952 1.42952 0.36 0.5535

Error 52 208.98008 4.01885

Corrected Total 53 210.40960

Root MSE 2.00471 R-Square 0.0068

Dependent Mean -4.27408 Adj R-Sq -0.0123

Coeff Var -46.90385

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -3.92716 0.64248 -6.11 <.0001

logmarket 1 0.15644 0.26231 0.60 0.5535

park test logGDP 21:28 Wednesday, May 2, 2018 662

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 0.67449 0.67449 0.17 0.6843

Error 52 209.73511 4.03337

Corrected Total 53 210.40960

Root MSE 2.00832 R-Square 0.0032

Dependent Mean -4.27408 Adj R-Sq -0.0160

Coeff Var -46.98850

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -23.90444 48.00449 -0.50 0.6206

logGDP 1 2.03187 4.96870 0.41 0.6843

park test t rate 21:28 Wednesday, May 2, 2018 663

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 6.69281 6.69281 1.71 0.1969

Error 52 203.71679 3.91763

Corrected Total 53 210.40960

Root MSE 1.97930 R-Square 0.0318

Dependent Mean -4.27408 Adj R-Sq 0.0132

Coeff Var -46.30943

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -9.74529 4.19458 -2.32 0.0241

logt\_rate 1 -1.47637 1.12954 -1.31 0.1969

park test tax rate 21:28 Wednesday, May 2, 2018 664

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 0.37298 0.37298 0.09 0.7624

Error 52 210.03662 4.03917

Corrected Total 53 210.40960

Root MSE 2.00977 R-Square 0.0018

Dependent Mean -4.27408 Adj R-Sq -0.0174

Coeff Var -47.02226

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -5.70263 4.70904 -1.21 0.2314

logtax\_rate 1 0.61868 2.03595 0.30 0.7624

park test margin 21:28 Wednesday, May 2, 2018 665

The REG Procedure

Model: MODEL1

Dependent Variable: logressq

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 0.92063 0.92063 0.23 0.6346

Error 52 209.48897 4.02863

Corrected Total 53 210.40960

Root MSE 2.00715 R-Square 0.0044

Dependent Mean -4.27408 Adj R-Sq -0.0148

Coeff Var -46.96092

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -10.43201 12.88454 -0.81 0.4218

logmargin 1 2.65325 5.55027 0.48 0.6346

resid tests for serial corr 21:28 Wednesday, May 2, 2018 666

Plot of logressq\*FirmAge. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

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‚ A

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‚ A

-2 ˆ A A A A

‚ A

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‚ A A

‚ A A

‚ A A A

‚ A A A A A A A

-4 ˆ A A B A A

‚ B A

‚ A B

‚ A

‚ A A A A A A

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-6 ˆ A

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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

FirmAge

resid tests for serial corr 21:28 Wednesday, May 2, 2018 667

Plot of logressq\*firmagesq. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

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-2 ˆ A A A A

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‚ A A

‚ A A

‚ A A A

‚ A A A A A A A

-4 ˆ A A B A A

‚ B A

‚ A B

‚ A

‚ A A A A A A

‚ A

‚ AA

-6 ˆ A

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0 100 200 300 400 500

firmagesq

resid tests for serial corr 21:28 Wednesday, May 2, 2018 668

Plot of logressq\*Margin. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

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‚ A

‚ A

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-2 ˆ A A A A

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‚ A A A

‚ A A

‚ A A

‚ A A A

‚ A C B A

-4 ˆ A A AAA A

‚ A A A

‚ A B

‚ A

‚ A A AA A A

‚ A

‚ A A

-6 ˆ A

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-2.5 -2 -1.5 -1 -0.5 0 0.5 1

Margin

resid tests for serial corr 21:28 Wednesday, May 2, 2018 669

Plot of logressq\*Market. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

‚

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‚ A

‚ A

‚ A

-2 ˆ A A A A

‚ A

‚ A A A

‚ B

‚ A A

‚ A A A

‚ A B C A

-4 ˆ A B A A A

‚ A A A

‚ A A A

‚ A

‚ A A B A A

‚ A

‚ A A

-6 ˆ A

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‚ A

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‚ A A A

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0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

Market

resid tests for serial corr 21:28 Wednesday, May 2, 2018 670

Plot of logressq\*GDP. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

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‚ A

‚ A

‚ A

-2 ˆ A A A A

‚ A

‚ A A A

‚ B

‚ A A

‚ A A A

‚ A B A C

-4 ˆ B A A A A

‚ A A A

‚ A A A

‚ A

‚ B A A A A

‚ A

‚ A A

-6 ˆ A

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‚ A

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‚ A A A

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-8 ˆ

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-12 ˆ A

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14000 14500 15000 15500 16000 16500 17000 17500

GDP

resid tests for serial corr 21:28 Wednesday, May 2, 2018 671

Plot of logressq\*t\_rate. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

‚

‚

‚

‚ A

‚ A

‚ A

-2 ˆ AA A A

‚ A

‚ A A A

‚ B

‚ A A

‚ A A A

‚ A C A B

-4 ˆ AA A A B

‚ A A A

‚ A A A

‚ A

‚ AA A A B

‚ A

‚ A A

-6 ˆ A

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‚ A

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‚ A A A

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-8 ˆ

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-10 ˆ

‚ A

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-12 ˆ A

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0.0175 0.02 0.0225 0.025 0.0275 0.03 0.0325 0.035 0.0375

t\_rate

resid tests for serial corr 21:28 Wednesday, May 2, 2018 672

Plot of logressq\*Tax\_Rate. Legend: A = 1 obs, B = 2 obs, etc.

logressq ‚

0 ˆ

‚

‚

‚

‚ A

‚ A

‚ A

-2 ˆ A AA A

‚ A

‚ A A A

‚ A A

‚ A A

‚ A A A

‚ A EA

-4 ˆ A ABA A

‚ A B

‚ A AA

‚ A

‚ D A A

‚ A

‚ AA

-6 ˆ A

‚

‚ A

‚

‚

‚ AA A

‚

-8 ˆ

‚

‚

‚

‚

‚

‚

-10 ˆ

‚ A

‚

‚

‚

‚

‚

-12 ˆ A

‚

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-7 -6 -5 -4 -3 -2 -1 0 1 2

Tax\_Rate

resid plots for hetero model 2 673

21:28 Wednesday, May 2, 2018

Plot of Residp2\*FirmAge. Legend: A = 1 obs, B = 2 obs, etc.

‚

‚

0.6 ˆ

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‚

‚ A

‚

0.4 ˆ A

‚ A

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‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A A A

u ‚ A A A

a ‚ A A B A

l ‚ A A A A A

0.0 ˆ A A A A A

‚ A A A

‚ A A A A B B A A

‚ A

‚ A A A A A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

FirmAge

resid plots for hetero model 2 674

21:28 Wednesday, May 2, 2018

Plot of Residp2\*firmagesq. Legend: A = 1 obs, B = 2 obs, etc.

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0.6 ˆ

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‚

‚ A

‚

0.4 ˆ A

‚ A

‚

‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A A A

u ‚ A A A

a ‚ A A B A

l ‚ A A A A A

0.0 ˆ A A A A A

‚ A A A

‚ A AA A B B A A

‚ A

‚ A A A A A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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0 100 200 300 400 500

firmagesq

resid plots for hetero model 2 675

21:28 Wednesday, May 2, 2018

Plot of Residp2\*Tax\_Rate. Legend: A = 1 obs, B = 2 obs, etc.

‚

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0.6 ˆ

‚

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‚

‚ A

‚

0.4 ˆ A

‚ A

‚

‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A A A

u ‚ AA A

a ‚ BAB

l ‚ ABA A

0.0 ˆ A AAA A

‚ A B

‚ E E

‚ A

‚ A AA A A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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-7 -6 -5 -4 -3 -2 -1 0 1 2

Tax\_Rate

resid plots for hetero model 2 676

21:28 Wednesday, May 2, 2018

Plot of Residp2\*Market. Legend: A = 1 obs, B = 2 obs, etc.

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0.6 ˆ

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‚

‚ A

‚

0.4 ˆ A

‚ A

‚

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‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ B A

u ‚ A A A

a ‚ A A A A A

l ‚ B A A A

0.0 ˆ A A B A

‚ A B

‚ A A B A B A A A

‚ A

‚ A B B

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

Market

resid plots for hetero model 2 677

21:28 Wednesday, May 2, 2018

Plot of Residp2\*GDP. Legend: A = 1 obs, B = 2 obs, etc.

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0.6 ˆ

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‚

‚ A

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0.4 ˆ A

‚ A

‚

‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A B

u ‚ A A A

a ‚ A A A A A

l ‚ A A A B

0.0 ˆ B A A A

‚ B A

‚ A A A B A A B A

‚ A

‚ A B B

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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14000 14500 15000 15500 16000 16500 17000 17500

GDP

resid plots for hetero model 2 678

21:28 Wednesday, May 2, 2018

Plot of Residp2\*t\_rate. Legend: A = 1 obs, B = 2 obs, etc.

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‚

0.6 ˆ

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‚

‚ A

‚

0.4 ˆ A

‚ A

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‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ B A

u ‚ A A A

a ‚ A A A A A

l ‚ BA A A

0.0 ˆ A A A B

‚ A B

‚ AA B B A A A A

‚ A

‚ B B A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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0.0175 0.02 0.0225 0.025 0.0275 0.03 0.0325 0.035 0.0375

t\_rate

resid plots for hetero model 2 679

21:28 Wednesday, May 2, 2018

Plot of Residp2\*new. Legend: A = 1 obs, B = 2 obs, etc.

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0.6 ˆ

‚

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‚

‚ A

‚

0.4 ˆ A

‚ A

‚

‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A B

u ‚ A B

a ‚ B C

l ‚ C B

0.0 ˆ B C

‚ A B

‚ B H

‚ A

‚ D A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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0 1

new

resid plots for hetero model 2 680

21:28 Wednesday, May 2, 2018

Plot of Residp2\*newage. Legend: A = 1 obs, B = 2 obs, etc.

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‚

0.6 ˆ

‚

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‚

‚ A

‚

0.4 ˆ A

‚ A

‚

‚

‚

‚ A

R ‚ A

e 0.2 ˆ

s ‚ A

i ‚ A

d ‚ A A A

u ‚ A A A

a ‚ B A A A

l ‚ C A A

0.0 ˆ B A A A

‚ A A A

‚ B A A A A B B

‚ A

‚ D A

‚ A

‚ A

-0.2 ˆ A

‚

‚ A

‚ A

‚ A

‚

‚ A

-0.4 ˆ

‚

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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

newage

resid plots for hetero model 2 681

21:28 Wednesday, May 2, 2018

Plot of Residp2\*newagesq. Legend: A = 1 obs, B = 2 obs, etc.

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0.6 ˆ

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‚

‚A

‚

0.4 ˆ A

‚A

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‚

‚

‚A

R ‚A

e 0.2 ˆ

s ‚A

i ‚ A

d ‚A A A

u ‚A A A

a ‚B A A A

l ‚C A A

0.0 ˆB A A A

‚A A A

‚B A A A A B B

‚A

‚D A

‚A

‚A

-0.2 ˆ A

‚

‚A

‚A

‚ A

‚

‚A

-0.4 ˆ

‚

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0 25 50 75 100 125 150 175 200

newagesq

park test lognew 21:28 Wednesday, May 2, 2018 682

The REG Procedure

Model: MODEL1

Dependent Variable: logressq2

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 13.31254 13.31254 2.94 0.0924

Error 52 235.50382 4.52892

Corrected Total 53 248.81637

Root MSE 2.12813 R-Square 0.0535

Dependent Mean -5.31883 Adj R-Sq 0.0353

Coeff Var -40.01114

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -4.82232 0.40956 -11.77 <.0001

lognew 1 -1.43264 0.83561 -1.71 0.0924

park test lognewage 21:28 Wednesday, May 2, 2018 683

The REG Procedure

Model: MODEL1

Dependent Variable: logressq2

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 13.18142 13.18142 2.91 0.0941

Error 52 235.63495 4.53144

Corrected Total 53 248.81637

Root MSE 2.12872 R-Square 0.0530

Dependent Mean -5.31883 Adj R-Sq 0.0348

Coeff Var -40.02228

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -4.83546 0.40526 -11.93 <.0001

lognewage 1 -0.42341 0.24825 -1.71 0.0941

park test log newagesq 21:28 Wednesday, May 2, 2018 684

The REG Procedure

Model: MODEL1

Dependent Variable: logressq2

Number of Observations Read 54

Number of Observations Used 54

Analysis of Variance

Sum of Mean

Source DF Squares Square F Value Pr > F

Model 1 12.98365 12.98365 2.86 0.0966

Error 52 235.83272 4.53524

Corrected Total 53 248.81637

Root MSE 2.12961 R-Square 0.0522

Dependent Mean -5.31883 Adj R-Sq 0.0340

Coeff Var -40.03907

Parameter Estimates

Parameter Standard

Variable DF Estimate Error t Value Pr > |t|

Intercept 1 -4.84292 0.40386 -11.99 <.0001

lognewagesq 1 -0.21868 0.12924 -1.69 0.0966

resid tests for serial corr 21:28 Wednesday, May 2, 2018 685

Plot of logressq2\*new. Legend: A = 1 obs, B = 2 obs, etc.

logressq2 ‚

0 ˆ

‚

‚

‚

‚

‚

‚ A

-2 ˆ B A

‚ A

‚ A

‚ B

‚ A A

‚ A

‚ A

-4 ˆ A C

‚ C A

‚ B

‚ A A

‚ A A

‚ A C

‚ A C

-6 ˆ A D

‚ A A

‚ A

‚ A

‚ A A

‚ B

‚ B

-8 ˆ

‚

‚

‚ A

‚

‚ B

‚

-10 ˆ A

‚

‚

‚

‚

‚ A

‚

-12 ˆ

‚

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0 1

new

resid tests for serial corr 21:28 Wednesday, May 2, 2018 686

Plot of logressq2\*newage. Legend: A = 1 obs, B = 2 obs, etc.

logressq2 ‚

0 ˆ

‚

‚

‚

‚

‚

‚ A

-2 ˆ B A

‚ A

‚ A

‚ B

‚ A A

‚ A

‚ A

-4 ˆ A B A

‚ C A

‚ B

‚ A A

‚ A A

‚ A A A A

‚ A A B

-6 ˆ A A B A

‚ A A

‚ A

‚ A

‚ A A

‚ B

‚ A A

-8 ˆ

‚

‚

‚ A

‚

‚ B

‚

-10 ˆ A

‚

‚

‚

‚

‚ A

‚

-12 ˆ

‚

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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

newage

resid tests for serial corr 21:28 Wednesday, May 2, 2018 687

Plot of logressq2\*newagesq. Legend: A = 1 obs, B = 2 obs, etc.

logressq2 ‚

0 ˆ

‚

‚

‚

‚

‚

‚ A

-2 ˆ B A

‚ A

‚ A

‚ B

‚ A A

‚ A

‚ A

-4 ˆ A B A

‚ C A

‚ B

‚ A A

‚ A A

‚ A A A A

‚ A A B

-6 ˆ A A B A

‚ A A

‚ A

‚ A

‚ A A

‚ B

‚ A A

-8 ˆ

‚

‚

‚ A

‚

‚ B

‚

-10 ˆ A

‚

‚

‚

‚

‚ A

‚

-12 ˆ

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0 25 50 75 100 125 150 175 200

newagesq

Autoreg to correct serial corr 688

21:28 Wednesday, May 2, 2018

The AUTOREG Procedure

Dependent Variable Margin

Margin

Ordinary Least Squares Estimates

SSE 9.93913789 DFE 47

MSE 0.21147 Root MSE 0.45986

SBC 89.7730468 AIC 75.8501585

MAE 0.26025492 AICC 78.2849411

MAPE 657.056693 HQC 81.2196705

Durbin-Watson 0.9590 Regress R-Square 0.1277

Total R-Square 0.1277

Parameter Estimates

Standard Approx Variable

Variable DF Estimate Error t Value Pr > |t| Label

Intercept 1 0.2827 1.7532 0.16 0.8726

D\_E 1 0.1488 0.1749 0.85 0.3993 D\_E

Age 1 -0.1888 0.1398 -1.35 0.1834 Age

Tax\_Rate 1 0.0611 0.0694 0.88 0.3830 Tax\_Rate

Market 1 -0.0359 0.7160 -0.05 0.9602 Market

GDP 1 0.0000130 0.0000963 0.13 0.8934 GDP

t\_rate 1 -9.7966 12.3218 -0.80 0.4306 t\_rate

Estimates of Autocorrelations

Lag Covariance Correlation -1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1

0 0.1841 1.000000 | |\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*|

1 0.0937 0.509302 | |\*\*\*\*\*\*\*\*\*\* |

Preliminary MSE 0.1363

Autoreg to correct serial corr 689

21:28 Wednesday, May 2, 2018

The AUTOREG Procedure

Estimates of Autoregressive Parameters

Standard

Lag Coefficient Error t Value

1 -0.509302 0.126887 -4.01

Yule-Walker Estimates

SSE 7.02235411 DFE 46

MSE 0.15266 Root MSE 0.39072

SBC 75.3036932 AIC 59.3918208

MAE 0.21185713 AICC 62.5918208

MAPE 397.728771 HQC 65.528406

Durbin-Watson 1.8859 Regress R-Square 0.0699

Total R-Square 0.3837

Parameter Estimates

Standard Approx Variable

Variable DF Estimate Error t Value Pr > |t| Label

Intercept 1 1.1407 1.5299 0.75 0.4597

D\_E 1 0.1682 0.1780 0.94 0.3497 D\_E

Age 1 -0.1265 0.1740 -0.73 0.4711 Age

Tax\_Rate 1 0.003759 0.0497 0.08 0.9401 Tax\_Rate

Market 1 -0.2390 0.5584 -0.43 0.6707 Market

GDP 1 -0.000037 0.0000897 -0.41 0.6830 GDP

t\_rate 1 -12.2988 8.9430 -1.38 0.1757 t\_rate