ECG562 Project

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Introduction

The invention of TV changes the way information and knowledge spread in the world. TV delivers information with moving images, sound as well as text all over the world right after events occur. Compared to newspapers, people get information and learn knowledge faster in a more colorful way. On the other hand, since TV is invented, it has been a concern that as such an attractive media, it may distract people from their work or even get people addicted, especially for children. Though as technology is developing, TV may not be an issue any more when people transfer such concern to computer or internet, it is still useful to know that whether TV is doing good or bad. This may help us understand the effects of computer or internet better.

The objective of this paper is to address such a problem: is watching TV making people dumb or smart? By using data of 4726 children surveyed at ages 8-9, I try to see whether there is an effect of watching TV on the PIAT (Peabody Individual Achievement Test) score on reading.

Model and Variables

In this paper a GLS model with cross-section data is used.

The model:

cpiatrr = β_0 + β_1 chobby+ β_2 ctvwk+ β_3 ctvend+ β_4 cdistv+ β_5 cshwrit+ β_6 racenw

+ β_7 boy+ β_8 AFQT81+ β_9 mbthage+ β_{10} cbooksh+ β_{11} creadh+ β_{12} cpfml+ β_{13} cfamh

+ β_{14} cmsmh+ β_{15} cdouth+ β_{16} ceath+ β_{17} cstchch+ β_{18} *csheadh* + β_{19} cstchsh + β_{20} csafeh

+ β_{21} cspareh+ β_{22} csparph + β_{23} csmorah + β_{24} csordeh + β_{25} cstchcm + β_{26} csheadm

+ β_{27} cstchsm + β_{28} csafem+ β_{29} csparem + β_{30} csparpm + β_{31} cmoram + β_{32} csordem

+ β_{33} ckreadh

The Variables:

Dependent Variable:

cpiatrr PIAT Reading Score at age 8-9

The **explanatory variables** used in the model cover three aspects which may affect IQ of children:

Family life and parents education:

chobby family encourages hobbies: 1 for encourage, 0 for discourage

ctvwk hours watching TV per weekday at ages 8-9

ctvend hours watching TV per weekend day at ages 8-9

cdistv parents discuss TV programs with child: 1 for discuss, 0 for not

cshwrit hours/week a child spends on writing homework at ages 6-7

cbooksh child has 10 or more children books at home: 1 for 10 or more, 0 for less

creadh how often mom reads to child: at least 3 times a week: 1 for at least 3 times, 0 for less

cpfml how often child taken to performance: less than several times a year: 1 for less, 0 for not

cfamh how often family get with relatives/friends: at least 2-3 times/month: 1 for at least 2-3 times, 0 for less

cmsmh how often child taken to museum: at least several times a year: 1 for at least several times, 0 for not

cdouth how often child with dad outdoors: at least once a week: 1 for at least once, 0 for not

ceath how often child eats with mom & dad: at least once a day: 1 for at least once, 0 for not

ckreadh how often child reads for enjoyment: everyday: 1 for everyday, 0 for not

School environment and education:

cstchch mother's rating of teacher caring – high: 1 for high, 0 for not

csheadh mother's rating of principal as leader - high: 1 for high, 0 for not

cstchsh mother's rating of teacher skill - high: 1 for high, 0 for not

csafeh mother's rating of safety of school - high: 1 for high, 0 for not

cspareh mother's rating of school communicating with parents - high: 1 for high, 0 for not

csparph mother's rating of parents participating with school - high: 1 for high, 0 for not

csmorah mother's rating of school teaching right and wrong - high: 1 for high, 0 for not

csordeh mother's rating of school maintaining order - high: 1 for high, 0 for not

cstchcm mother's rating of teacher caring – middle: 1 for middle, 0 for not

csheadm mother's rating of principal as leader - middle: 1 for middle, 0 for not

cstchsm mother's rating of teacher skill - middle: 1 for middle, 0 for not

csafem mother's rating of safety of school - middle: 1 for middle, 0 for not

csparem mother's rating of school communicating with parents - middle: 1 for middle, 0 for not

csparpm mother's rating of parents participating with school - middle: 1 for middle, 0 for not

csmoram mother's rating of school teaching right and wrong - middle: 1 for middle, 0 for not

csordem mother's rating of school maintaining order - middle: 1 for middle, 0 for not

Biographical information and genes:

racenw race of child: Black or Hispanic: 1 for Black or Hispanic, 0 for not

boy sex of child: boy: 1 for boy, 0 for not

AFQT81	mother's AFQT score taken in 1981(AFQT is the abbreviation for Armed Forces Qualification Tests. The AFQT is not a single test; rather, it is a composite of four core tests that measure knowledge in a group of typical high school level academic disciplines. The four core tests give one overall score. Here it is used as a measurement of mother's IQ)
mbthage	mother's age at child

Data

The data are extracted from the publicly available NLSY79 Child data over 1986-1998 for children surveyed at least three times at ages 4-5, 6-7, and 8-9. There are 4726 observations.

The reason I choose the data at ages 8-9 is that the older the children are, the more likely they would be influenced by TV.

The data also include a PIAT math score which I do not use since in my eyes TV is more likely to have influence on people's IQ in the aspect of language ability.

The descriptive analysis of selected data from SAS is as following (Figure1):

Figure1 Descriptive Analysis of Original Data

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The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C0000100	C0000100	4726	548567.70	327817.13	301.0000000	1266703.00
CPIATRR	CPIATRR	4426	103.1972436	14.6682085	65.0000000	135.0000000
CHOBBY	CHOBBY	4537	0.9052237	0.2929380	0	1.0000000
CTVWK	CTVWK	3913	4.9062101	6.2810899	0	95.0000000
CTVEND	CTVEND	3927	4.9551821	4.5639764	0	95.0000000
CDISTV	CDISTV	4435	0.8101466	0.3922293	0	1.0000000
CSHWRIT	CSHWRIT	1465	5.1249147	17.8008515	0	95.0000000
RACENW	RACENW	4726	0.5452814	0.4979981	0	1.0000000
BOY	BOY	4726	0.5090986	0.4999701	0	1.0000000
AFQT81	AFQT81	4543	34.1653093	26.8529143	1.0000000	99.0000000
MBTHAGE	MBTHAGE	4725	23.3879365	3.6077204	14.0000000	33.0000000
CBOOKSH	CBOOKSH	4549	0.8157837	0.3877031	0	1.0000000
CREADH	CREADH	4550	0.5503297	0.4975152	0	1.0000000
CPFML	CPFML	4529	0.4014131	0.4902384	0	1.0000000
CFAMH	CFAMH	4537	0.5865109	0.4925133	0	1.0000000
CMSMH	CMSMH	4542	0.4009247	0.4901398	0	1.0000000
CDOUTH	CDOUTH	4283	0.4562223	0.4981380	0	1.0000000
CEATH	CEATH	4299	0.5636194	0.4959937	0	1.0000000
CSTCHCH	CSTCHCH	1507	0.5759788	0.4943576	0	1.0000000
CSHEADH	CSHEADH	1503	0.4976713	0.5001610	0	1.0000000
CSTCHSH	CSTCHSH	1499	0.5196798	0.4997793	0	1.0000000
CSAFEH	CSAFEH	1506	0.6175299	0.4861519	0	1.0000000
CSPAREH	CSPAREH	1505	0.5654485	0.4958628	0	1.0000000
CSPARPH	CSPARPH	1504	0.3257979	0.4688281	0	1.0000000
CSMORAH	CSMORAH	1508	0.5497347	0.4976853	0	1.0000000
CSORDEH	CSORDEH	1508	0.5623342	0.4962638	0	1.0000000
CSTCHCM	CSTCHCM	1507	0.3092236	0.4623270	0	1.0000000
CSHEADM	CSHEADM	1503	0.3280106	0.4696450	0	1.0000000
CSTCHSM	CSTCHSM	1499	0.3742495	0.4840900	0	1.0000000
CSAFEM	CSAFEM	1506	0.2881806	0.4530661	0	1.0000000
CSPAREM	CSPAREM	1505	0.2970100	0.4570928	0	1.0000000
CSPARPM	CSPARPM	1504	0.3543883	0.4784866	0	1.0000000
CSMORAM	CSMORAM	1508	0.3216180	0.4672522	0	1.0000000
CSORDEM	CSORDEM	1508	0.3116711	0.4633299	0	1.0000000
CKREADH	CKREADH	4545	0.3170517	0.4653790	0	1.0000000

As we can see, the maximum values of ctvwk (hours watching TV per weekday at ages 8-9), ctvend (hours watching TV per weekend day at ages 8-9) and cshwrit (hours/week a child spends on writing homework at ages 8-9) are all 95, which is impossible. So I delete all the data with ctvwk>12, ctvend>12 or cshwrit>56. The descriptive analysis of new data is as following (Figure2):

Figure2 Descriptive Analysis of Data after Deleting Wrong Values

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The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C0000100	C0000100	4341	547020.59	327127.66	301.0000000	1256603.00
CPIATRR	CPIATRR	4061	103.5437084	14.5990712	65.0000000	135.0000000
CHOBBY	CHOBBY	4154	0.9053924	0.2927074	0	1.0000000
CTVWK	CTVWK	3534	3.4895303	2.4755306	0	12.0000000
CTVEND	CTVEND	3547	4.2810826	2.5858503	0	12.0000000
CDISTV	CDISTV	4053	0.8147052	0.3885845	0	1.0000000
CSHWRIT	CSHWRIT	1300	1.6800000	2.8252790	0	50.0000000
RACENW	RACENW	4341	0.5337480	0.4989172	0	1.0000000
BOY	BOY	4341	0.5061046	0.5000203	0	1.0000000
AFQT81	AFQT81	4177	35.1577687	27.1667770	1.0000000	99.0000000
MBTHAGE	MBTHAGE	4340	23.3400922	3.6441135	14.0000000	33.0000000
CBOOKSH	CBOOKSH	4167	0.8212143	0.3832188	0	1.0000000
CREADH	CREADH	4167	0.5466763	0.4978763	0	1.0000000
CPFML	CPFML	4146	0.3953208	0.4889785	0	1.0000000
CFAMH	CFAMH	4155	0.5886883	0.4921307	0	1.0000000
CMSMH	CMSMH	4159	0.4015388	0.4902685	0	1.0000000
CDOUTH	CDOUTH	3920	0.4576531	0.4982671	0	1.0000000
CEATH	CEATH	3935	0.5689962	0.4952796	0	1.0000000
CSTCHCH	CSTCHCH	1337	0.5781601	0.4940380	0	1.0000000
CSHEADH	CSHEADH	1333	0.5056264	0.5001560	0	1.0000000
CSTCHSH	CSTCHSH	1333	0.5168792	0.4999026	0	1.0000000
CSAFEH	CSAFEH	1336	0.6250000	0.4843042	0	1.0000000
CSPAREH	CSPAREH	1337	0.5661930	0.4957846	0	1.0000000
CSPARPH	CSPARPH	1335	0.3205993	0.4668818	0	1.0000000
CSMORAH	CSMORAH	1338	0.5470852	0.4979642	0	1.0000000
CSORDEH	CSORDEH	1339	0.5675878	0.4955959	0	1.0000000
CSTCHCM	CSTCHCM	1337	0.3089005	0.4622129	0	1.0000000
CSHEADM	CSHEADM	1333	0.3263316	0.4690462	0	1.0000000
CSTCHSM	CSTCHSM	1333	0.3773443	0.4849041	0	1.0000000
CSAFEM	CSAFEM	1336	0.2851796	0.4516690	0	1.0000000
CSPAREM	CSPAREM	1337	0.2976814	0.4574097	0	1.0000000
CSPARPM	CSPARPM	1335	0.3610487	0.4804846	0	1.0000000
CSMORAM	CSMORAM	1338	0.3281016	0.4696976	0	1.0000000
CSORDEM	CSORDEM	1339	0.3114264	0.4632497	0	1.0000000
CKREADH	CKREADH	4162	0.3202787	0.4666397	0	1.0000000

Before running estimation, an endogeneity problem of the explanatory variable cshwrit should be a concern since this might be the case that the more time you spend on writing exercise, the higher you may score in PIAT Reading; also the higher you score in the test, the more time you may spend on the writing exercise since you find it interesting (or less since you find it too simple). So I choose cshwrity (hours/week a child spends on writing homework at ages 6-7) as the instrumental variable of cshwrit. It is obvious that you cannot increase/decrease your time on

writing homework at ages 6-7 after you take the test at ages 8-9. And after running the regression between cshwrit and cshwrity (see Figure3) we can see they are correlated at 0.05 significance level.

Figure3 Regression of cshwrity on cshwrit

The REG Procedure
Model: MODEL1
Dependent Variable: CSHWRIT CSHWRIT

Number of Observations Read	4120
Number of Observations Used	339
Number of Observations with Missing Values	3781

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	483.68637	14.65716	1.39	0.0809
Error	305	3212.60271	10.53312		
Corrected Total	338	3696.28909			

Root MSE	3.24548	R-Square	0.1309
Dependent Mean	2.12979	Adj R-Sq	0.0368
Coeff Var	152.38460		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	-1.59122	2.79039	-0.57	0.5689
CSHWRITY	CSHWRITY	1	0.22208	0.10878	2.04	0.0421
CHOBBY	CHOBBY	1	0.84082	0.80398	1.05	0.2965
CTVWK	CTVWK	1	0.16350	0.09255	1.77	0.0783
CTVEND	CTVEND	1	0.03633	0.09841	0.37	0.7122
CDISTV	CDISTV	1	-0.34218	0.55142	-0.62	0.5354
RACENW	RACENW	1	-0.27489	0.48138	-0.57	0.5684
BOY	BOY	1	-0.15798	0.39137	-0.40	0.6867
AFQT81	AFQT81	1	-0.02195	0.00902	-2.43	0.0155
MBTHAGE	MBTHAGE	1	0.05822	0.08906	0.65	0.5138
CBOOKSH	CBOOKSH	1	1.06925	0.66587	1.61	0.1094
CREADH	CREADH	1	0.06727	0.43669	0.15	0.8777
CPFML	CPFML	1	-0.36528	0.44953	-0.81	0.4171
CFAMH	CFAMH	1	-0.37524	0.39799	-0.94	0.3465

Note: some explanatory variables are omitted here. See Appendix for complete SAS output.

After running the test for endogeneity no such problem is found (P-value for reswrit—residuals of regression between cshwrit and cshwrity is 0.8158>0.05). That suggests the OLS is safe to estimate the parameters (see Figure4 for test for endogeneity).

Figure4 Test for Endogeneity

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The REG Procedure
Model: MODEL1
Dependent Variable: CPIATRR CPIATRR

Number of Observations Read	4120
Number of Observations Used	318
Number of Observations with Missing Values	3802

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	34	23807	700.19549	4.11	<.0001
Error	283	48191	170.28730		
Corrected Total	317	71998			

Root MSE	13.04942	R-Square	0.3307
Dependent Mean	105.63208	Adj R-Sq	0.2502
Coeff Var	12.35365		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	83.47641	11.18706	7.46	<.0001
reswrit	Residual	1	-0.49236	2.11146	-0.23	0.8158
CHOBBY	CHOBBY	1	5.93456	3.77603	1.57	0.1172
CTVWK	CTVWK	1	0.24099	0.52875	0.46	0.6489
CTVEND	CTVEND	1	-0.75575	0.42678	-1.77	0.0777
CDISTV	CDISTV	1	1.86024	2.39498	0.78	0.4380
CSHWRIT	CSHWRIT	1	0.54112	2.10014	0.26	0.7969
RACENW	RACENW	1	1.06276	2.03745	0.52	0.6023
BOY	BOY	1	-0.52663	1.66596	-0.32	0.7522
AFQT81	AFQT81	1	0.13697	0.05773	2.37	0.0183
MBTHAGE	MBTHAGE	1	0.25574	0.36781	0.70	0.4874
CBOOKSH	CBOOKSH	1	3.77766	3.45130	1.09	0.2746

Note: some explanatory variables are omitted here. See Appendix for complete SAS output.

Estimation Results

Another issue may be taken care of before running OLS, which is Heteroskedasticity. Starting from plotting suspicious variables which we care the most in analysis like ctvwk, ctvend, cshwrit and AFQT81 against residuals. The Figure5-8 suggest that all of those have more or less Heteroskedasticity problem.

After running a formal test for Heteroskedasticity (Figure9), another two variables, csparph (mother's rating of parents participating with school – high) and csmorah (mother's rating of school teaching right and wrong – high) also has such problem.

Figure5 Plots ctvwk against residuals

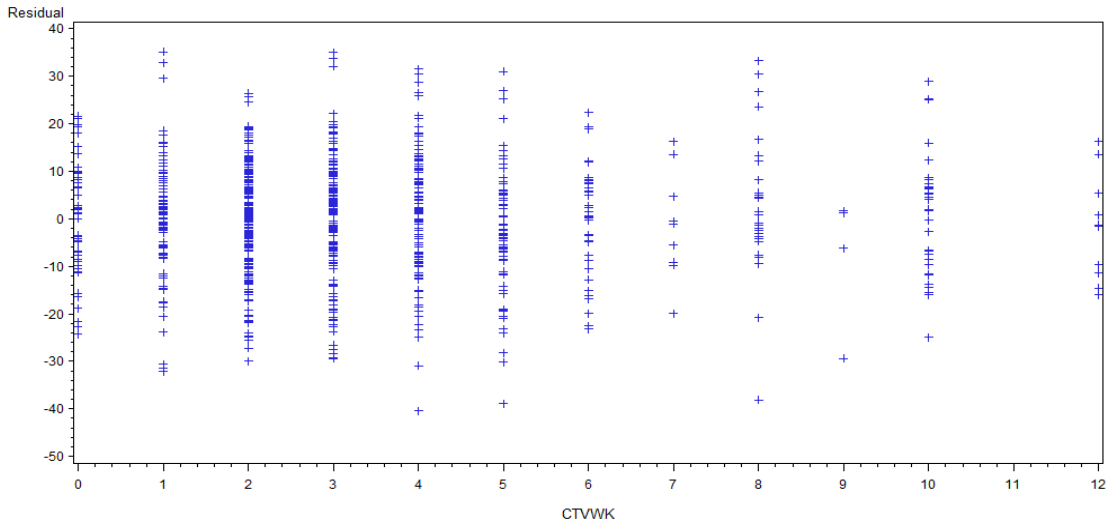

Figure6 Plots ctvend against residuals

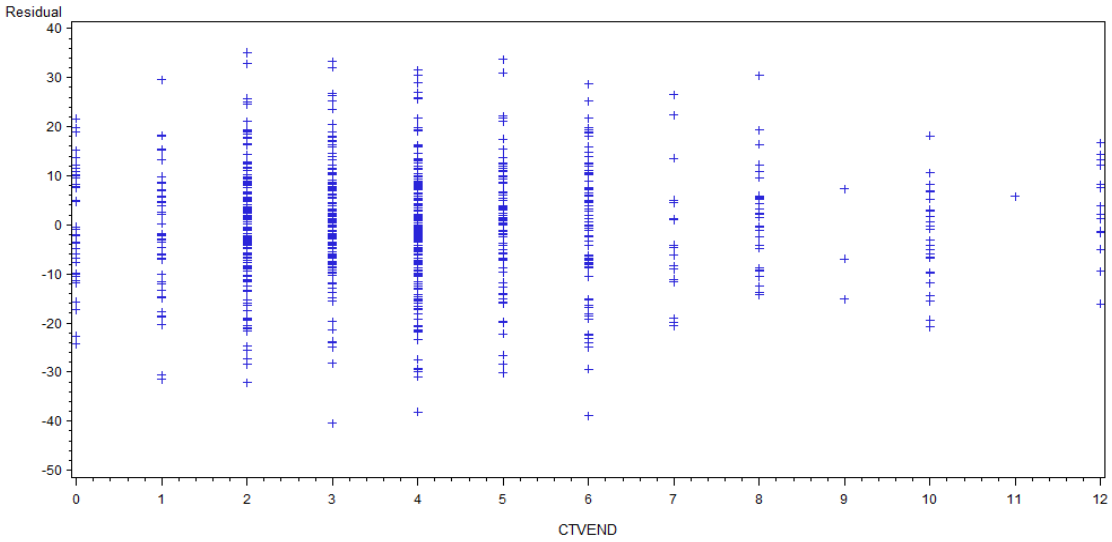

Figure7 Plots cshwrit against residuals

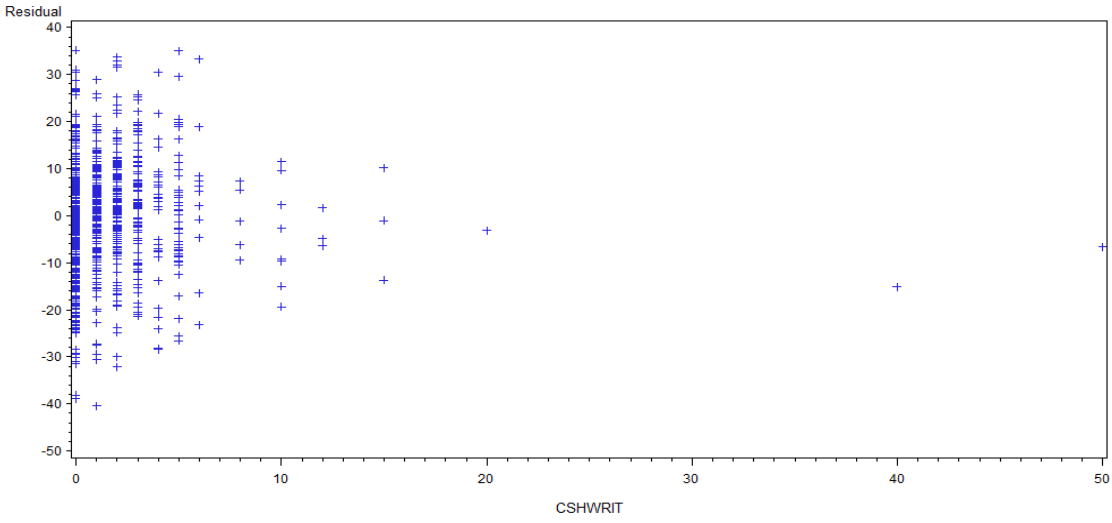

Figure8 Plots AFQT81 against residuals

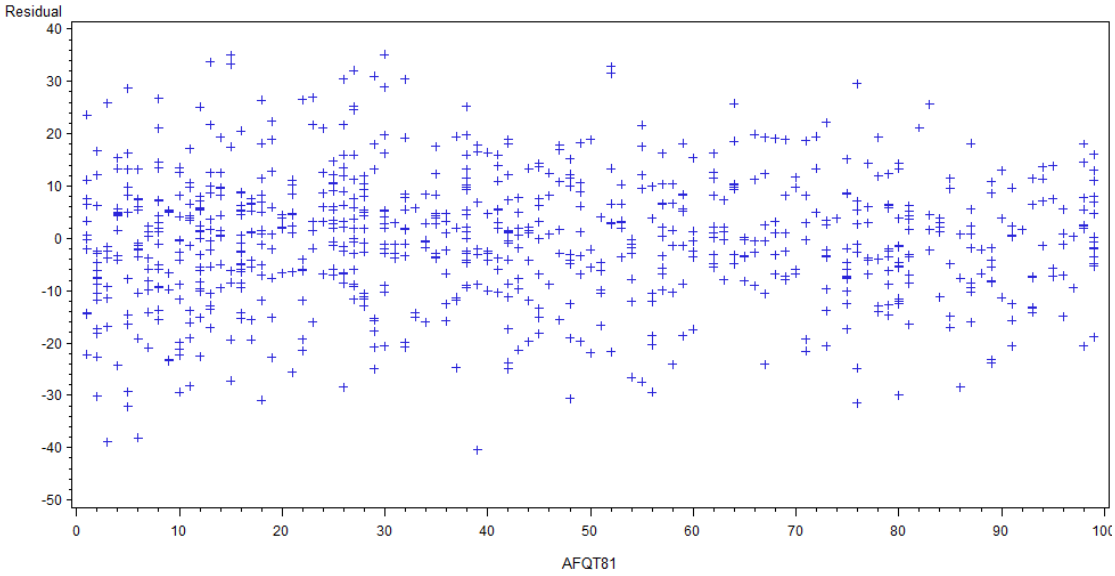

Figure9 Test for Heterodasketicity

The REG Procedure
Model: MODEL1
Dependent Variable: uhat2

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	2464072	74669	1.46	0.0466
Error	783	39982087	51063		
Corrected Total	816	42446159			

Root MSE	225.97055	R-Square	0.0581
Dependent Mean	149.14224	Adj R-Sq	0.0184
Coeff Var	151.51345		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	172.41312	112.31770	1.54	0.1252
CHOBBY	CHOBBY	1	-49.73830	34.27734	-1.45	0.1472
CTVWK	CTVWK	1	6.68256	3.92415	1.70	0.0890
CTVEND	CTVEND	1	-9.60369	3.87497	-2.48	0.0134
CDISTV	CDISTV	1	-11.41127	24.82076	-0.46	0.6458
CSHWRIT	CSHWRIT	1	-1.28043	2.63691	-0.49	0.6274
RACENW	RACENW	1	-3.56692	20.54081	-0.17	0.8622
BOY	BOY	1	4.74241	16.78431	0.28	0.7776
AFQT81	AFQT81	1	-0.74715	0.39348	-1.90	0.0580
MBTHAGE	MBTHAGE	1	4.57159	3.62670	1.26	0.2079
CBOOKSH	CBOOKSH	1	18.19519	28.43842	0.64	0.5225
CREADH	CREADH	1	10.42199	17.68077	0.59	0.5557
CPFML	CPFML	1	12.71584	19.90381	0.64	0.5231
CFAMH	CFAMH	1	-13.92341	16.71646	-0.83	0.4051
CMSMH	CMSMH	1	-14.31389	17.32223	-0.83	0.4089
CDOUTH	CDOUTH	1	3.59041	17.07663	0.21	0.8335
CEATH	CEATH	1	-10.00846	17.40375	-0.58	0.5654
CSTCHCH	CSTCHCH	1	12.91577	43.80106	0.29	0.7682
CSHEADH	CSHEADH	1	-31.29456	29.97655	-1.04	0.2968
CSTCHSH	CSTCHSH	1	-38.60809	47.12830	-0.82	0.4129
CSAFEH	CSAFEH	1	-13.40705	36.80943	-0.36	0.7158
CSPAREH	CSPAREH	1	18.60779	34.02807	0.55	0.5846
CSPARPH	CSPARPH	1	-59.12744	26.43544	-2.24	0.0256
CSMORAH	CSMORAH	1	84.51340	39.32776	2.15	0.0319

Note: some explanatory variables are omitted here. See Appendix for complete SAS

output.

After taking care of all the Heteroskedasticity problems by assuming $Var(u_i) = \sigma^2 h(x_{1i},...,x_{Ki}) = \sigma^2 h(x_i)$ where $h(x_i) = \exp(\alpha_1 x_{1i} + ... + \alpha_K x_{Ki})$ as usual, the FGLS estimates are as following (Figure10):

Figure10 OLS Estimation

The REG Procedure
Model: MODEL1
Dependent Variable: CPIATRR CPIATRR

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Weight: oneoverh

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	1312.19670	39.76354	9.89	<.0001
Error	783	3149.20295	4.02197		
Corrected Total	816	4461.39965			

Root MSE	2.00549	R-Square	0.2941
Dependent Mean	106.39937	Adj R-Sq	0.2644
Coeff Var	1.88487		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	80.62184	6.10087	13.21	<.0001
CHOBBY	CHOBBY	1	3.24229	1.83123	1.77	0.0770
CTVWK	CTVWK	1	-0.21715	0.23316	-0.93	0.3520
CTVEND	CTVEND	1	0.09463	0.20720	0.46	0.6480
CDISTV	CDISTV	1	2.52435	1.35926	1.86	0.0637
CSHWRIT	CSHWRIT	1	0.15213	0.17028	0.89	0.3719
RACENW	RACENW	1	0.75622	1.11750	0.68	0.4988
BOY	BOY	1	0.32878	0.90611	0.36	0.7168
AFQT81	AFQT81	1	0.15161	0.02111	7.18	<.0001
MBTHAGE	MBTHAGE	1	0.27300	0.19703	1.39	0.1663
CBOOKSH	CBOOKSH	1	2.70374	1.57572	1.72	0.0866
CREADH	CREADH	1	-5.39994	0.94544	-5.71	<.0001
CPFML	CPFML	1	-2.44443	1.08316	-2.26	0.0243
CFAMH	CFAMH	1	0.75391	0.89817	0.84	0.4015
CMSMH	CMSMH	1	-0.56350	0.93522	-0.60	0.5470
CDOUTH	CDOUTH	1	-2.73641	0.92067	-2.97	0.0030
CEATH	CEATH	1	0.26829	0.93736	0.29	0.7748
CSTCHCH	CSTCHCH	1	2.51863	2.30275	1.09	0.2744
CSHEADH	CSHEADH	1	-0.49313	1.62427	-0.30	0.7615
CSTCHSH	CSTCHSH	1	-3.73032	2.46807	-1.51	0.1311
CSAFEH	CSAFEH	1	3.20528	2.00013	1.60	0.1094
CSPAREH	CSPAREH	1	3.95454	1.78127	2.22	0.0267
CSPARPH	CSPARPH	1	-1.34868	1.44103	-0.94	0.3496
CSMORAH	CSMORAH	1	0.31071	2.10282	0.15	0.8826
CSORDEH	CSORDEH	1	1.88822	2.22467	0.85	0.3963
CSTCHCM	CSTCHCM	1	-0.38018	2.17539	-0.17	0.8613
CSHEADM	CSHEADM	1	1.82299	1.53367	1.19	0.2349
CSTCHSM	CSTCHSM	1	-2.92614	2.22838	-1.31	0.1895
CSAFEM	CSAFEM	1	3.18210	1.94988	1.63	0.1031
CSPAREM	CSPAREM	1	2.66279	1.66202	1.60	0.1095
CSPARPM	CSPARPM	1	-0.38386	1.19992	-0.32	0.7491
CSMORAM	CSMORAM	1	1.72563	1.88164	0.92	0.3594
CSORDEM	CSORDEM	1	1.26592	2.06476	0.61	0.5400
CKREADH	CKREADH	1	6.03721	0.95248	6.34	<.0001

The final model:

cpiatrr = 80.62+3.242chobby-0.2172ctvwk+0.09463ctvend+2.524cdistv

(6.101) (1.831) (0.2332) (0.2072) (1.359)

+0.1521cshwrit+0.7562racenw+0.3288boy+0.1516AFQT81+0.2730mbthage

(0.1703) (1.118) (0.9061) (0.02111) (0.1970)

+2.704cbooksh-5.400creadh-2.444cpfml+0.7539cfamh-0.5635cmsmh-2.736cdouth

(1.576) (0.9454) (1.083) (0.8982) (0.9352) (0.9207)

+0.2683ceath+2.519cstchch-0.4931csheadh-3.730cstchsh+3.205csafeh

(0.9374) (2.303) (1.624) (2.468) (2.000)

+3.955cspareh-1.349csparph+0.3107csmorah+1.888csordeh-0.3802cstchcm

(1.781) (1.441) (2.103) (2.225) (2.175)

+1.823csheadm-2.926cstchsm+3.182cssafem+2.663csparem-0.3839csparpm

(1.534) (2.228) (1.950) (1.662) (1.200)

+1.726csmoram+1.266csordem+6.037ckreadh

(1.882) (2.065) (0.9525)

N=817 R^2 =0.2941

Partial Effects (Policy Analysis)

All the signs of variables significant at 0.05 level are expected except for creadh and cdouth. This may due to missing of important variables which are correlated with these two. Luckily they are not the objectives of the analysis.

As suggested by the output, increasing one hour watching TV per weekday reduces

PIAT Reading score by 0.22 point; increasing one hour watching TV per weekend day raises PIAT Reading score by 0.09 point; children with parents discussing TV programs with them have a higher PIAT Reading score than those without by 2.52 points. However neither of them is statistically significant. The variable cdistv is nearly statistically significant (P-value=0.0637) and economically significant (ß=2.52), but whether the effect is due to TV or due to communication between parents and children is doubtful. From my point of view the latter is more likely to be true since a discussion is beneficial to language skills which may improve ability in reading.

According to the estimation results, the factors which have **statistically significant** (at 0.05 level) influence on children's IQ in Reading are:

AFQT81: mother's AFQT score taken in 1981, which indicates mother's IQ

creadh: how often mom reads to child: at least 3 times a week

cpfml: how often child taken to performance: less than several times a year

cdouth: how often child with dad outdoors: at least once a week

cspareh: mother's rating of school communicating with parents – high

ckreadh: how often child reads for enjoyment: everyday

The factors which have **economically significant** (larger than 1 point) influence on children's IQ in Reading are:

chobby: family encourages hobbies

cdistv: parents discuss TV programs with child

cbooksh: child has 10 or more children books at home

creadh: how often mom reads to child: at least 3 times a week

cpfml: how often child taken to performance: less than several times a year

cdouth: how often child with dad outdoors: at least once a week

cstchch: mother's rating of teacher caring - high

cstchsh: mother's rating of teacher skill - high

csafeh: mother's rating of safety of school – high

cspareh: mother's rating of school communicating with parents – high

csparph: mother's rating of parents participating with school - high

csordeh: mother's rating of school maintaining order – high

csheadm: mother's rating of principal as leader – middle

cstchsm: mother's rating of teacher skill – middle

csafem: mother's rating of safety of school - middle

csparem: mother's rating of school communicating with parents – middle

csmoram: mother's rating of school teaching right and wrong - middle

csordem: mother's rating of school maintaining order – middle

ckreadh: how often child reads for enjoyment: everyday

As we can see, since watching TV has neither statistically nor economically significant influence on children's PIAT Reading score, we conclude that watching TV has no important effect on people's IQ.

Appendix1 SAS Code

SAS Code for Descriptive Analysis

```
proc means data=tv;
var c0000100 cpiatrr chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;
run;

data tv;
set tv;
if ctvwk>12 then delete;
if ctvend>12 then delete;
if cshwrit>56 then delete;
if cshwrity>56 then delete;
run;
proc means data=tv;
var c0000100 cpiatrr chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;
run;
```

SAS Code for Plotting Suspicious Variables against Residuals

```
proc gplot data=resdat;
plot uhat*ctvwk;
plot uhat*ctvend;
plot uhat*cshwrit;
plot uhat*AFQT81;
run;
```

SAS Code for Test for Endogeneity

```
Proc reg data=tv;
model cshwrit=cshwrity chobby ctvwk ctvend cdistv racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;
output out=tvendo r=reswrit;
run;
proc reg data=tvendo;
model cpiatrr=reswrit chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;
run;
```

SAS Code for Test for Heteroskedasticity

```
proc reg data=tv;
model cpiatrr=chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh /acov;
output out=resdat residual=uhat predicted=yhat;
run;

data resdat;
set resdat;
uhat2=uhat**2;
run;
proc reg data=resdat;
model uhat2=chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;
run;
```

SAS Code for FGLS Estimation

```
data resdat;

set resdat;

lres2=log(uhat2);

run;

proc reg data=resdat;

model lres2=cshwrit ctvwk ctvend AFQT81 csparph csmorah;

output out=resvar predicted=lhhat;

run;

data resvar;

set resvar;

hhat=exp(lhhat);

oneoverh=1/hhat;

run;

proc reg data=resvar;

model cpiatrr= chobby ctvwk ctvend cdistv cshwrit racenw boy AFQT81 mbthage cbooksh creadh cpfml cfamh cmsmh cdouth ceath cstchch csheadh cstchsh csafeh cspareh csparph csmorah csordeh cstchcm csheadm cstchsm csafem csparem csparpm csmoram csordem ckreadh;

weight oneoverh;

run;
```

Appendix2 SAS output

SAS output for Descriptive Analysis of Original Data

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The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C0000100	C0000100	4726	548567.70	327817.13	301.0000000	1266703.00
CPIATRR	CPIATRR	4426	103.1972436	14.6682085	65.0000000	135.0000000
CHOBBY	CHOBBY	4537	0.9052237	0.2929380	0	1.0000000
CTVWK	CTVWK	3913	4.9062101	6.2810899	0	95.0000000
CTVEND	CTVEND	3927	4.9551821	4.5639764	0	95.0000000
CDISTV	CDISTV	4435	0.8101466	0.3922293	0	1.0000000
CSHWRIT	CSHWRIT	1465	5.1249147	17.8008515	0	95.0000000
RACENW	RACENW	4726	0.5452814	0.4979981	0	1.0000000
BOY	BOY	4726	0.5090986	0.4999701	0	1.0000000
AFQT81	AFQT81	4543	34.1653093	26.8529143	1.0000000	99.0000000
MBTHAGE	MBTHAGE	4725	23.3879365	3.6077204	14.0000000	33.0000000
CBOOKSH	CBOOKSH	4549	0.8157837	0.3877031	0	1.0000000
CREADH	CREADH	4550	0.5503297	0.4975152	0	1.0000000
CPFML	CPFML	4529	0.4014131	0.4902384	0	1.0000000
CFAMH	CFAMH	4537	0.5865109	0.4925133	0	1.0000000
CMSMH	CMSMH	4542	0.4009247	0.4901398	0	1.0000000
CDOUTH	CDOUTH	4283	0.4562223	0.4981380	0	1.0000000
CEATH	CEATH	4299	0.5636194	0.4959937	0	1.0000000
CSTCHCH	CSTCHCH	1507	0.5759788	0.4943576	0	1.0000000
CSHEADH	CSHEADH	1503	0.4976713	0.5001610	0	1.0000000
CSTCHSH	CSTCHSH	1499	0.5196798	0.4997793	0	1.0000000
CSAFEH	CSAFEH	1506	0.6175299	0.4861519	0	1.0000000
CSPAREH	CSPAREH	1505	0.5654485	0.4958628	0	1.0000000
CSPARPH	CSPARPH	1504	0.3257979	0.4688281	0	1.0000000
CSMORAH	CSMORAH	1508	0.5497347	0.4976853	0	1.0000000
CSORDEH	CSORDEH	1508	0.5623342	0.4962638	0	1.0000000
CSTCHCM	CSTCHCM	1507	0.3092236	0.4623270	0	1.0000000
CSHEADM	CSHEADM	1503	0.3280106	0.4696450	0	1.0000000
CSTCHSM	CSTCHSM	1499	0.3742495	0.4840900	0	1.0000000
CSAFEM	CSAFEM	1506	0.2881806	0.4530661	0	1.0000000
CSPAREM	CSPAREM	1505	0.2970100	0.4570928	0	1.0000000
CSPARPM	CSPARPM	1504	0.3543883	0.4784866	0	1.0000000
CSMORAM	CSMORAM	1508	0.3216180	0.4672522	0	1.0000000
CSORDEM	CSORDEM	1508	0.3116711	0.4633299	0	1.0000000
CKREADH	CKREADH	4545	0.3170517	0.4653790	0	1.0000000

SAS output for Descriptive Analysis After Deleting Wrong Data

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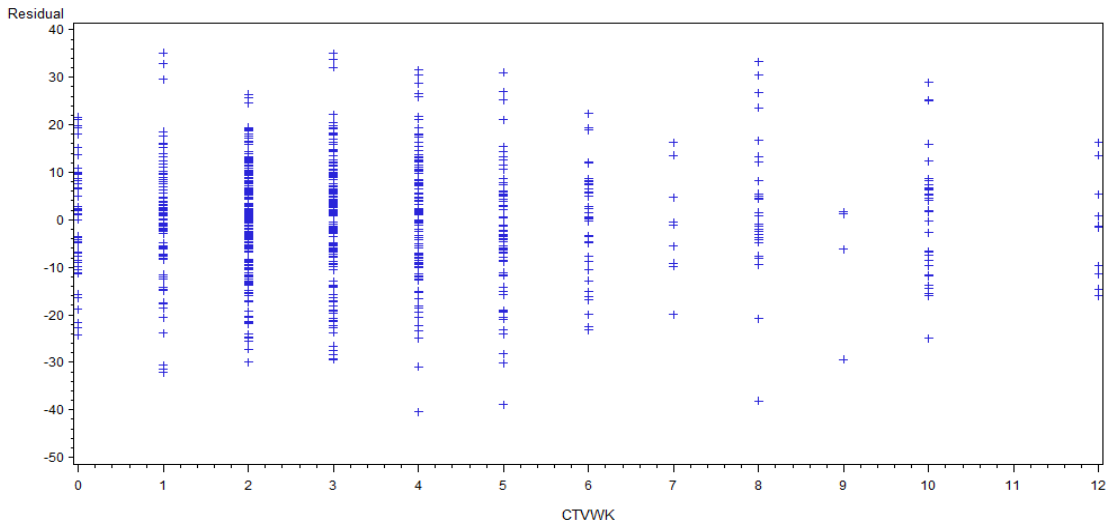
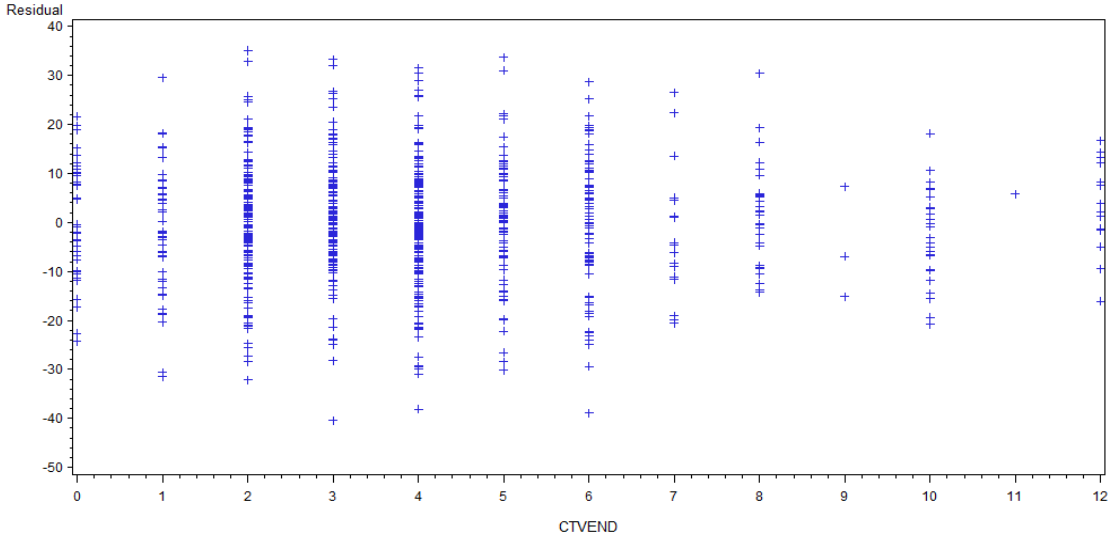
The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C0000100	C0000100	4341	547020.59	327127.66	301.0000000	1256603.00
CPIATRR	CPIATRR	4061	103.5437084	14.5990712	65.0000000	135.0000000
CHOBBY	CHOBBY	4154	0.9053924	0.2927074	0	1.0000000
CTVWK	CTVWK	3534	3.4895303	2.4755306	0	12.0000000
CTVEND	CTVEND	3547	4.2810826	2.5858503	0	12.0000000
CDISTV	CDISTV	4053	0.8147052	0.3885845	0	1.0000000
CSHWRIT	CSHWRIT	1300	1.6800000	2.8252790	0	50.0000000
RACENW	RACENW	4341	0.5337480	0.4989172	0	1.0000000
BOY	BOY	4341	0.5061046	0.5000203	0	1.0000000
AFQT81	AFQT81	4177	35.1577687	27.1667770	1.0000000	99.0000000
MBTHAGE	MBTHAGE	4340	23.3400922	3.6441135	14.0000000	33.0000000
CBOOKSH	CBOOKSH	4167	0.8212143	0.3832188	0	1.0000000
CREADH	CREADH	4167	0.5466763	0.4978763	0	1.0000000
CPFML	CPFML	4146	0.3953208	0.4889785	0	1.0000000
CFAMH	CFAMH	4155	0.5886883	0.4921307	0	1.0000000
CMSMH	CMSMH	4159	0.4015388	0.4902685	0	1.0000000
CDOUTH	CDOUTH	3920	0.4576531	0.4982671	0	1.0000000
CEATH	CEATH	3935	0.5689962	0.4952796	0	1.0000000
CSTCHCH	CSTCHCH	1337	0.5781601	0.4940380	0	1.0000000
CSHEADH	CSHEADH	1333	0.5056264	0.5001560	0	1.0000000
CSTCHSH	CSTCHSH	1333	0.5168792	0.4999026	0	1.0000000
CSAFEH	CSAFEH	1336	0.6250000	0.4843042	0	1.0000000
CSPAREH	CSPAREH	1337	0.5661930	0.4957846	0	1.0000000
CSPARPH	CSPARPH	1335	0.3205993	0.4668818	0	1.0000000
CSMORAH	CSMORAH	1338	0.5470852	0.4979642	0	1.0000000
CSORDEH	CSORDEH	1339	0.5675878	0.4955959	0	1.0000000
CSTCHCM	CSTCHCM	1337	0.3089005	0.4622129	0	1.0000000
CSHEADM	CSHEADM	1333	0.3263316	0.4690462	0	1.0000000
CSTCHSM	CSTCHSM	1333	0.3773443	0.4849041	0	1.0000000
CSAFEM	CSAFEM	1336	0.2851796	0.4516690	0	1.0000000
CSPAREM	CSPAREM	1337	0.2976814	0.4574097	0	1.0000000
CSPARPM	CSPARPM	1335	0.3610487	0.4804846	0	1.0000000
CSMORAM	CSMORAM	1338	0.3281016	0.4696976	0	1.0000000
CSORDEM	CSORDEM	1339	0.3114264	0.4632497	0	1.0000000
CKREADH	CKREADH	4162	0.3202787	0.4666397	0	1.0000000

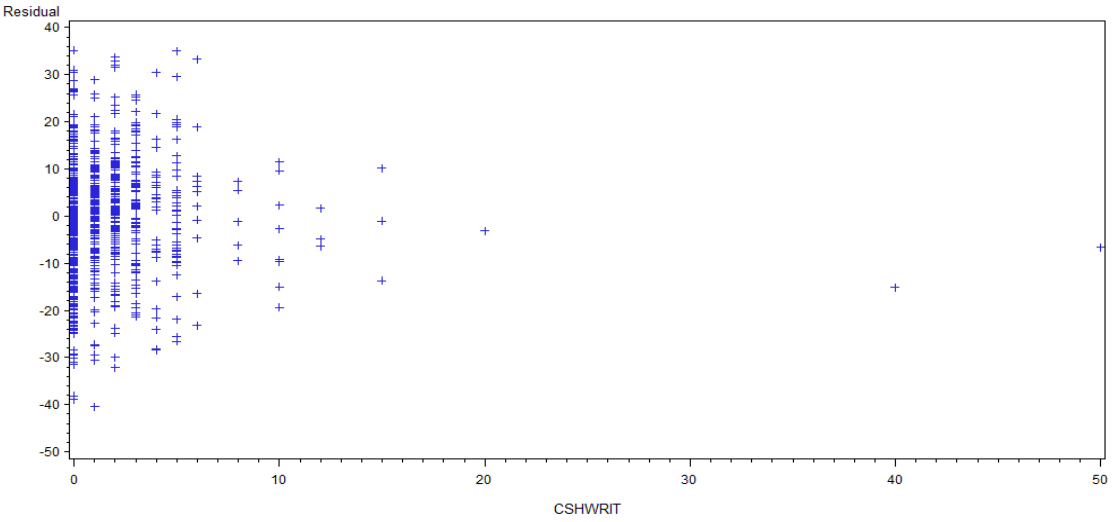
SAS output for Plots ctvwk against Residuals



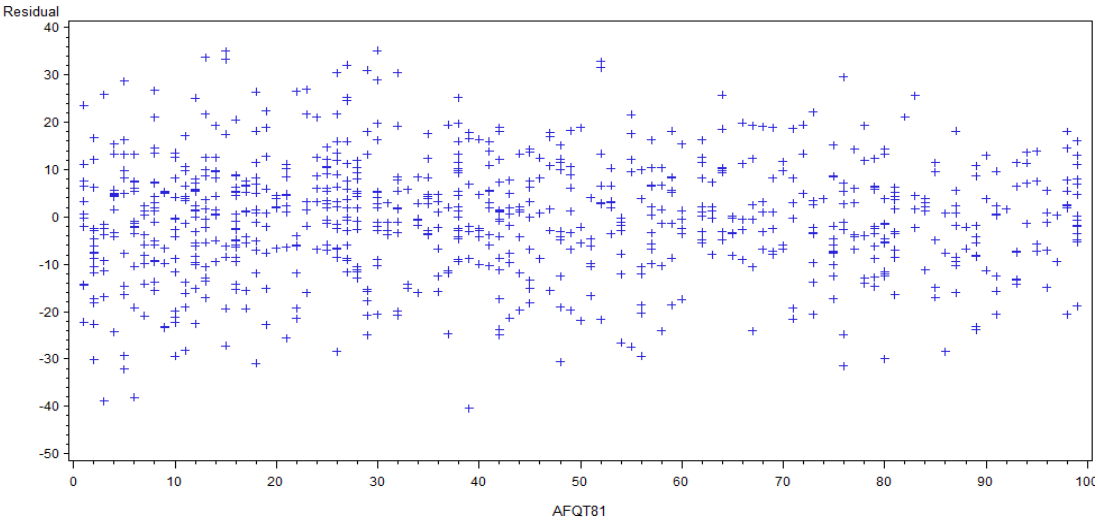
SAS output for Plots ctvend against Residuals



SAS output for Plots cshwrit against Residuals



SAS output for Plots AFQT81 against Residuals



SAS output for Test for Endogeneity

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The REG Procedure
Model: MODEL1
Dependent Variable: CSHWRIT CSHWRIT

Number of Observations Read	4120
Number of Observations Used	339
Number of Observations with Missing Values	3781

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	483.68637	14.65716	1.39	0.0809
Error	305	3212.60271	10.53312		
Corrected Total	338	3696.28909			

Root MSE	3.24548	R-Square	0.1309
Dependent Mean	2.12979	Adj R-Sq	0.0368
Coeff Var	152.38460		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	-1.59122	2.79039	-0.57	0.5689
CSHWRITY	CSHWRITY	1	0.22208	0.10878	2.04	0.0421
CHOBBY	CHOBBY	1	0.84082	0.80398	1.05	0.2965
CTVWK	CTVWK	1	0.16350	0.09255	1.77	0.0783
CTVEND	CTVEND	1	0.03633	0.09841	0.37	0.7122
CDISTV	CDISTV	1	-0.34218	0.55142	-0.62	0.5354
RACENW	RACENW	1	-0.27489	0.48138	-0.57	0.5684
BOY	BOY	1	-0.15798	0.39137	-0.40	0.6867
AFQT81	AFQT81	1	-0.02195	0.00902	-2.43	0.0155
MBTHAGE	MBTHAGE	1	0.05822	0.08906	0.65	0.5138
CBOOKSH	CBOOKSH	1	1.06925	0.66587	1.61	0.1094
CREADH	CREADH	1	0.06727	0.43669	0.15	0.8777
CREADH	CREADH	1	0.06727	0.43669	0.15	0.8777
CPFML	CPFML	1	-0.36528	0.44953	-0.81	0.4171
CFAMH	CFAMH	1	-0.37524	0.39799	-0.94	0.3465
CMSMH	CMSMH	1	0.79021	0.39331	2.01	0.0454
CDOUTH	CDOUTH	1	0.71541	0.40614	1.76	0.0792
CEATH	CEATH	1	-0.21095	0.41439	-0.51	0.6111
CSTCHCH	CSTCHCH	1	0.45605	1.17580	0.39	0.6984
CSHEADH	CSHEADH	1	0.51953	0.70882	0.73	0.4642
CSTCHSH	CSTCHSH	1	0.11174	1.18889	0.09	0.9252
CSAFEH	CSAFEH	1	-0.31059	0.80767	-0.38	0.7008
CSPAREH	CSPAREH	1	0.37363	0.83568	0.45	0.6551
CSPARPH	CSPARPH	1	-1.17883	0.61522	-1.92	0.0563
CSMORAH	CSMORAH	1	0.59989	0.95160	0.63	0.5289
CSORDEH	CSORDEH	1	-0.49743	1.04542	-0.48	0.6345
CSTCHCM	CSTCHCM	1	0.17934	1.11526	0.16	0.8724
CSHEADM	CSHEADM	1	0.80480	0.68042	1.18	0.2378
CSTCHSM	CSTCHSM	1	0.20450	1.10706	0.18	0.8536
CSAFEM	CSAFEM	1	-1.01877	0.80191	-1.27	0.2049
CSPAREM	CSPAREM	1	0.00447	0.78965	0.01	0.9955
CSPARPM	CSPARPM	1	-0.59892	0.49542	-1.21	0.2276
CSMORAM	CSMORAM	1	0.49880	0.80599	0.62	0.5365
CSORDEM	CSORDEM	1	-0.10977	0.89049	-0.12	0.9020
CKREADH	CKREADH	1	0.59052	0.40064	1.47	0.1415

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The REG Procedure
Model: MODEL1
Dependent Variable: CPlATRR CPlATRR

Number of Observations Read	4120
Number of Observations Used	318
Number of Observations with Missing Values	3802

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	34	23807	700.19549	4.11	<.0001
Error	283	48191	170.28730		
Corrected Total	317	71998			

Root MSE	13.04942	R-Square	0.3307
Dependent Mean	105.63208	Adj R-Sq	0.2502
Coeff Var	12.35365		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	83.47641	11.18706	7.46	<.0001
reswrit	Residual	1	-0.49236	2.11146	-0.23	0.8158
CHOBBY	CHOBBY	1	5.93456	3.77603	1.57	0.1172
CTVWK	CTVWK	1	0.24099	0.52875	0.46	0.6489
CTVEND	CTVEND	1	-0.75575	0.42678	-1.77	0.0777
CDISTV	CDISTV	1	1.86024	2.39498	0.78	0.4380
CSHWRIT	CSHWRIT	1	0.54112	2.10014	0.26	0.7969
RACENW	RACENW	1	1.06276	2.03745	0.52	0.6023
BOY	BOY	1	-0.52663	1.66596	-0.32	0.7522
AFQT81	AFQT81	1	0.13697	0.05773	2.37	0.0183
MBTHAGE	MBTHAGE	1	0.25574	0.36781	0.70	0.4874
CBOOKSH	CBOOKSH	1	3.77766	3.45130	1.09	0.2746
CREADH	CREADH	1	-8.31222	1.83892	-4.52	<.0001
CPFML	CPFML	1	-4.30632	2.08827	-2.06	0.0401
CFAMH	CFAMH	1	0.00232	1.87218	0.00	0.9990
CMSMH	CMSMH	1	-2.55418	2.37465	-1.08	0.2830
CDOUTH	CDOUTH	1	-2.08305	2.32425	-0.90	0.3709
CEATH	CEATH	1	0.92770	1.78789	0.52	0.6042
CSTCHCH	CSTCHCH	1	1.84692	5.21429	0.35	0.7234
CSHEADH	CSHEADH	1	-4.41478	3.13304	-1.41	0.1599
CSTCHSH	CSTCHSH	1	0.46362	5.36014	0.09	0.9311
CSAFEH	CSAFEH	1	3.86024	3.39607	1.14	0.2566
CSPAREH	CSPAREH	1	1.42669	3.53895	0.40	0.6871
CSPARPH	CSPARPH	1	-4.52659	3.70886	-1.22	0.2233
CSMORAH	CSMORAH	1	2.85861	4.23669	0.67	0.5004
CSORDEH	CSORDEH	1	4.10583	4.51020	0.91	0.3634
CSTCHCM	CSTCHCM	1	0.03195	4.82941	0.01	0.9947
CSHEADM	CSHEADM	1	-1.98018	3.20710	-0.62	0.5374
CSTCHSM	CSTCHSM	1	0.52120	4.95384	0.11	0.9163
CSAFEM	CSAFEM	1	1.37964	3.88799	0.35	0.7230
CSPAREM	CSPAREM	1	-0.35197	3.33154	-0.11	0.9159
CSPARPM	CSPARPM	1	-1.39760	2.41171	-0.58	0.5627
CSMORAM	CSMORAM	1	3.29404	3.57743	0.92	0.3579
CSORDEM	CSORDEM	1	1.87647	3.65990	0.51	0.6086
CKREADH	CKREADH	1	6.17292	2.06747	2.99	0.0031

SAS output for Test for Heteroskedasticity

The SAS System 01:58 Sunday, November 28, 2010 7

The REG Procedure
Model: MODEL1
Dependent Variable: CPIATRR CPIATRR

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	48605	1472.88642	9.46	<.0001
Error	783	121849	155.61840		
Corrected Total	816	170454			

Root MSE	12.47471	R-Square	0.2852
Dependent Mean	105.81640	Adj R-Sq	0.2550
Coeff Var	11.78901		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	78.89037	6.20050	12.72	<.0001
CHOBBY	CHOBBY	1	3.92953	1.89228	2.08	0.0382
CTVWK	CTVWK	1	-0.13594	0.21663	-0.63	0.5305
CTVEND	CTVEND	1	0.01668	0.21392	0.08	0.9379
CDISTV	CDISTV	1	2.95214	1.37023	2.15	0.0315
CSHWRIT	CSHWRIT	1	0.11706	0.14557	0.80	0.4216
RACENW	RACENW	1	0.53009	1.13396	0.47	0.6403
BOY	BOY	1	0.47601	0.92658	0.51	0.6076
AFQT81	AFQT81	1	0.15302	0.02172	7.04	<.0001
MBTHAGE	MBTHAGE	1	0.31088	0.20021	1.55	0.1209
CBOOKSH	CBOOKSH	1	3.09588	1.56994	1.97	0.0490
CREADH	CREADH	1	-5.30320	0.97607	-5.43	<.0001
CPFML	CPFML	1	-2.23794	1.09879	-2.04	0.0420
CFAMH	CFAMH	1	1.05296	0.92283	1.14	0.2542
CMSMH	CMSMH	1	-0.78141	0.95627	-0.82	0.4141
CDOUTH	CDOUTH	1	-2.67748	0.94272	-2.84	0.0046
CEATH	CEATH	1	0.00027934	0.96077	0.00	0.9998
CSTCHCH	CSTCHCH	1	1.99540	2.41804	0.83	0.4095
CSHEADH	CSHEADH	1	-0.03748	1.65486	-0.02	0.9819
CSTCHSH	CSTCHSH	1	-4.46913	2.60172	-1.72	0.0862
CSAFEH	CSAFEH	1	3.56285	2.03207	1.75	0.0799
CSPAREH	CSPAREH	1	3.46424	1.87852	1.84	0.0655
CSPARPH	CSPARPH	1	-0.94513	1.45937	-0.65	0.5174
CSMORAH	CSMORAH	1	0.49644	2.17109	0.23	0.8192
CSORDEH	CSORDEH	1	1.79405	2.29134	0.78	0.4339
CSTCHCM	CSTCHCM	1	-1.05550	2.28864	-0.46	0.6448
CSHEADM	CSHEADM	1	1.87764	1.57632	1.19	0.2340
CSTCHSM	CSTCHSM	1	-3.81772	2.35757	-1.62	0.1058
CSAFEM	CSAFEM	1	3.66756	1.98118	1.85	0.0645
CSPAREM	CSPAREM	1	2.26900	1.76205	1.29	0.1982
CSPARPM	CSPARPM	1	-0.01753	1.23471	-0.01	0.9887
CSMORAM	CSMORAM	1	2.34758	1.98345	1.18	0.2369
CSORDEM	CSORDEM	1	1.32515	2.13907	0.62	0.5358
CKREADH	CKREADH	1	5.63252	0.96919	5.81	<.0001

Parameter Estimates

Variable	Label	DF	---Heteroscedasticity Consistent-- Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	6.14967	12.83	<.0001
CHOBBY	CHOBBY	1	2.15389	1.82	0.0685
CTVWK	CTVWK	1	0.21730	-0.63	0.5318
CTVEND	CTVEND	1	0.20234	0.08	0.9343
CDISTV	CDISTV	1	1.39570	2.12	0.0347
CSHWRIT	CSHWRIT	1	0.12997	0.90	0.3680
RACENW	RACENW	1	1.11489	0.48	0.6346
BOY	BOY	1	0.90735	0.52	0.6000
AFQT81	AFQT81	1	0.02033	7.53	<.0001
MBTHAGE	MBTHAGE	1	0.19342	1.61	0.1084
CBOOKSH	CBOOKSH	1	1.56530	1.98	0.0483
CREADH	CREADH	1	0.93843	-5.65	<.0001
CPFML	CPFML	1	1.09056	-2.05	0.0405
CFAMH	CFAMH	1	0.91310	1.15	0.2492
CMSMH	CMSMH	1	0.92990	-0.84	0.4010
CDOUTH	CDOUTH	1	0.93380	-2.87	0.0043

The REG Procedure
Model: MODEL1
Dependent Variable: CPIATRR CPIATRR

Parameter Estimates

Variable	Label	DF	---Heteroscedasticity Consistent-- Standard Error	t Value	Pr > |t|
CEATH	CEATH	1	0.94371	0.00	0.9998
CSTCHCH	CSTCHCH	1	2.12543	0.94	0.3481
CSHEADH	CSHEADH	1	1.70387	-0.02	0.9825
CSTCHSH	CSTCHSH	1	2.59532	-1.72	0.0855
CSAFEH	CSAFEH	1	2.22971	1.60	0.1105
CSPAREH	CSPAREH	1	1.81969	1.90	0.0573
CSPARPH	CSPARPH	1	1.49661	-0.63	0.5279
CSMORAH	CSMORAH	1	2.05362	0.24	0.8090
CSORDEH	CSORDEH	1	2.34967	0.76	0.4454
CSTCHCM	CSTCHCM	1	1.99597	-0.53	0.5971
CSHEADM	CSHEADM	1	1.58632	1.18	0.2369
CSTCHSM	CSTCHSM	1	2.32304	-1.64	0.1007
CSAFEM	CSAFEM	1	2.19941	1.67	0.0958
CSPAREM	CSPAREM	1	1.70854	1.33	0.1846
CSPARPM	CSPARPM	1	1.22350	-0.01	0.9886
CSMORAM	CSMORAM	1	1.78199	1.32	0.1881
CSORDEM	CSORDEM	1	2.21272	0.60	0.5494
CKREADH	CKREADH	1	0.94489	5.96	<.0001

The REG Procedure
Model: MODEL1
Dependent Variable: uhat2

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	2464072	74669	1.46	0.0466
Error	783	39982087	51063		
Corrected Total	816	42446159			

Root MSE	225.97055	R-Square	0.0581
Dependent Mean	149.14224	Adj R-Sq	0.0184
Coeff Var	151.51345		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	172.41312	112.31770	1.54	0.1252
CHOBBY	CHOBBY	1	-49.73830	34.27734	-1.45	0.1472
CTVWK	CTVWK	1	6.68256	3.92415	1.70	0.0890
CTVEND	CTVEND	1	-9.60369	3.87497	-2.48	0.0134
CDISTV	CDISTV	1	-11.41127	24.82076	-0.46	0.6458
CSHWRIT	CSHWRIT	1	-1.28043	2.63691	-0.49	0.6274
RACENW	RACENW	1	-3.56692	20.54081	-0.17	0.8622
BOY	BOY	1	4.74241	16.78431	0.28	0.7776
AFQT81	AFQT81	1	-0.74715	0.39348	-1.90	0.0580
MBTHAGE	MBTHAGE	1	4.57159	3.62670	1.26	0.2079
CBOOKSH	CBOOKSH	1	18.19519	28.43842	0.64	0.5225
CREADH	CREADH	1	10.42199	17.68077	0.59	0.5557
CPFML	CPFML	1	12.71584	19.90381	0.64	0.5231
CFAMH	CFAMH	1	-13.92341	16.71646	-0.83	0.4051
CMSMH	CMSMH	1	-14.31389	17.32223	-0.83	0.4089
CDOUTH	CDOUTH	1	3.59041	17.07663	0.21	0.8335
CEATH	CEATH	1	-10.00846	17.40375	-0.58	0.5654
CSTCHCH	CSTCHCH	1	12.91577	43.80106	0.29	0.7682
CSHEADH	CSHEADH	1	-31.29456	29.97655	-1.04	0.2968
CSTCHSH	CSTCHSH	1	-38.60809	47.12830	-0.82	0.4129
CSAFEH	CSAFEH	1	-13.40705	36.80943	-0.36	0.7158
CSPAREH	CSPAREH	1	18.60779	34.02807	0.55	0.5846
CSPARPH	CSPARPH	1	-59.12744	26.43544	-2.24	0.0256
CSMORAH	CSMORAH	1	84.51340	39.32776	2.15	0.0319

The REG Procedure
Model: MODEL1
Dependent Variable: uhat2

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
CSORDEH	CSORDEH	1	-16.42398	41.50603	-0.40	0.6924
CSTCHCM	CSTCHCM	1	22.64263	41.45715	0.55	0.5851
CSHEADM	CSHEADM	1	-32.30677	28.55384	-1.13	0.2582
CSTCHSM	CSTCHSM	1	-72.34393	42.70571	-1.69	0.0907
CSAFEM	CSAFEM	1	-9.07764	35.88766	-0.25	0.8004
CSPAREM	CSPAREM	1	-21.84381	31.91820	-0.68	0.4939
CSPARPM	CSPARPM	1	-21.18160	22.36586	-0.95	0.3439
CSMORAM	CSMORAM	1	37.34374	35.92882	1.04	0.2989
CSORDEM	CSORDEM	1	0.23217	38.74767	0.01	0.9952
CKREADH	CKREADH	1	-9.37723	17.55627	-0.53	0.5934

SAS output for FGLS

The REG Procedure
Model: MODEL1
Dependent Variable: lres2

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	46.19204	7.69867	1.64	0.1328
Error	810	3800.06841	4.69144		
Corrected Total	816	3846.26045			

Root MSE	2.16597	R-Square	0.0120
Dependent Mean	3.63493	Adj R-Sq	0.0047
Coeff Var	59.58785		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	3.87395	0.25629	15.12	<.0001
CSHWRIT	CSHWRIT	1	0.01692	0.02474	0.68	0.4942
CTVWK	CTVWK	1	0.05115	0.03695	1.38	0.1667
CTVEND	CTVEND	1	-0.08624	0.03579	-2.41	0.0162
AFQT81	AFQT81	1	-0.00428	0.00294	-1.46	0.1455
CSPARPH	CSPARPH	1	-0.12938	0.18943	-0.68	0.4948
CSMORAH	CSMORAH	1	0.21948	0.17595	1.25	0.2126

The REG Procedure
Model: MODEL1
Dependent Variable: CPIATRR CPIATRR

Number of Observations Read	4120
Number of Observations Used	817
Number of Observations with Missing Values	3303

Weight: oneoverh

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	33	1312.19670	39.76354	9.89	<.0001
Error	783	3149.20295	4.02197		
Corrected Total	816	4461.39965			

Root MSE	2.00549	R-Square	0.2941
Dependent Mean	106.39937	Adj R-Sq	0.2644
Coeff Var	1.88487		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	80.62184	6.10087	13.21	<.0001
CHOBBY	CHOBBY	1	3.24229	1.83123	1.77	0.0770
CTVWK	CTVWK	1	-0.21715	0.23316	-0.93	0.3520
CTVEND	CTVEND	1	0.09463	0.20720	0.46	0.6480
CDISTV	CDISTV	1	2.52435	1.35926	1.86	0.0637
CSHWRIT	CSHWRIT	1	0.15213	0.17028	0.89	0.3719
RACENW	RACENW	1	0.75622	1.11750	0.68	0.4988
BOY	BOY	1	0.32878	0.90611	0.36	0.7168
AFQT81	AFQT81	1	0.15161	0.02111	7.18	<.0001
MBTHAGE	MBTHAGE	1	0.27300	0.19703	1.39	0.1663
CBOOKSH	CBOOKSH	1	2.70374	1.57572	1.72	0.0866
CBOOKSH	CBOOKSH	1	2.70374	1.57572	1.72	0.0866
CREADH	CREADH	1	-5.39994	0.94544	-5.71	<.0001
CPFML	CPFML	1	-2.44443	1.08316	-2.26	0.0243
CFAMH	CFAMH	1	0.75391	0.89817	0.84	0.4015
CMSMH	CMSMH	1	-0.56350	0.93522	-0.60	0.5470
CDOUTH	CDOUTH	1	-2.73641	0.92067	-2.97	0.0030
CEATH	CEATH	1	0.26829	0.93736	0.29	0.7748
CSTCHCH	CSTCHCH	1	2.51863	2.30275	1.09	0.2744
CSHEADH	CSHEADH	1	-0.49313	1.62427	-0.30	0.7615
CSTCHSH	CSTCHSH	1	-3.73032	2.46807	-1.51	0.1311
CSAFEH	CSAFEH	1	3.20528	2.00013	1.60	0.1094
CSPAREH	CSPAREH	1	3.95454	1.78127	2.22	0.0267
CSPARPH	CSPARPH	1	-1.34868	1.44103	-0.94	0.3496
CSMORAH	CSMORAH	1	0.31071	2.10282	0.15	0.8826
CSORDEH	CSORDEH	1	1.88822	2.22467	0.85	0.3963
CSTCHCM	CSTCHCM	1	-0.38018	2.17539	-0.17	0.8613
CSHEADM	CSHEADM	1	1.82299	1.53367	1.19	0.2349
CSTCHSM	CSTCHSM	1	-2.92614	2.22838	-1.31	0.1895
CSAFEM	CSAFEM	1	3.18210	1.94988	1.63	0.1031
CSPAREM	CSPAREM	1	2.66279	1.66202	1.60	0.1095
CSPARPM	CSPARPM	1	-0.38386	1.19992	-0.32	0.7491
CSMORAM	CSMORAM	1	1.72563	1.88164	0.92	0.3594
CSORDEM	CSORDEM	1	1.26592	2.06476	0.61	0.5400
CKREADH	CKREADH	1	6.03721	0.95248	6.34	<.0001