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11.220 Quantitative Reasoning & Statistical Methods for Planners I
Spring 2009

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Quantitative Reasoning and Statistical Methods

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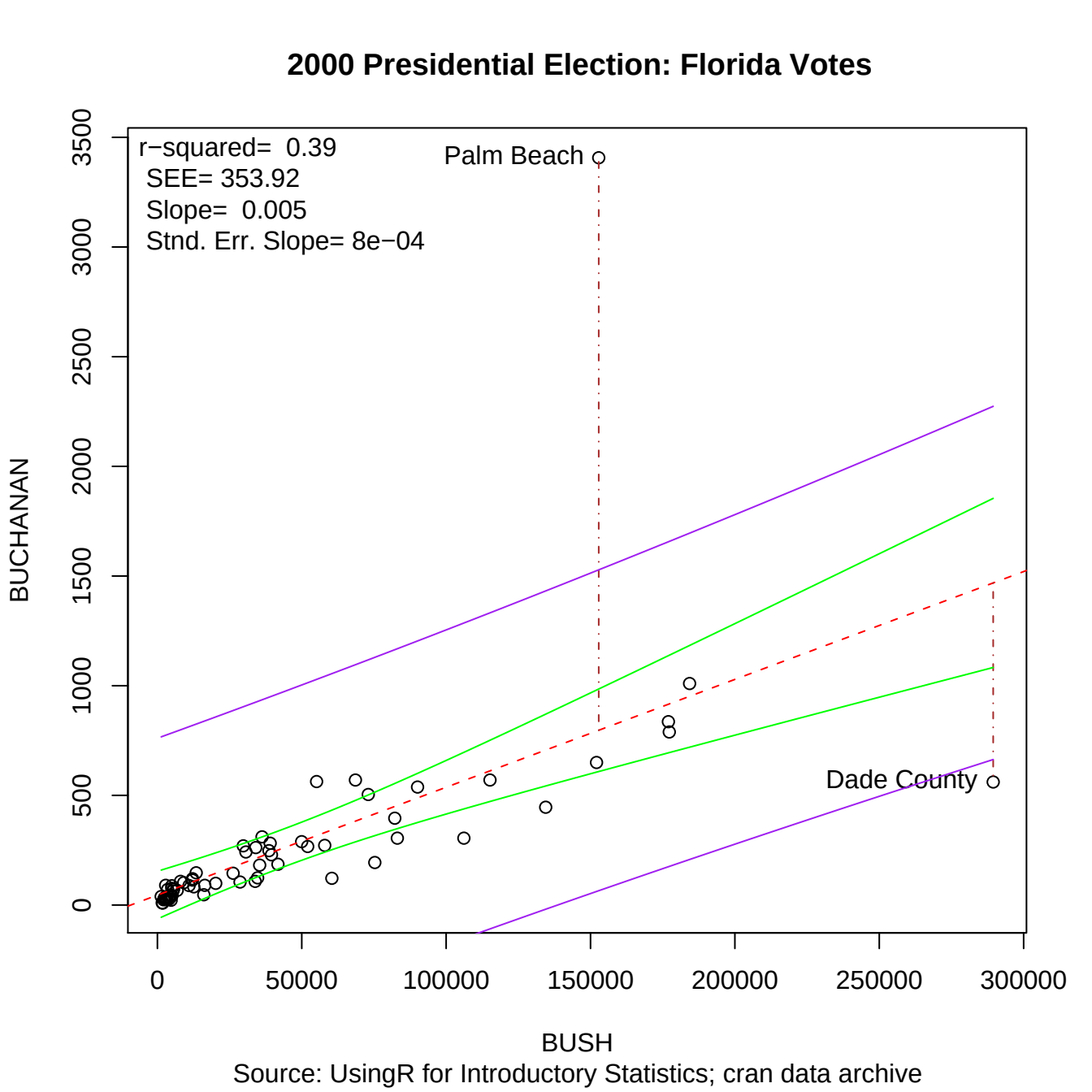
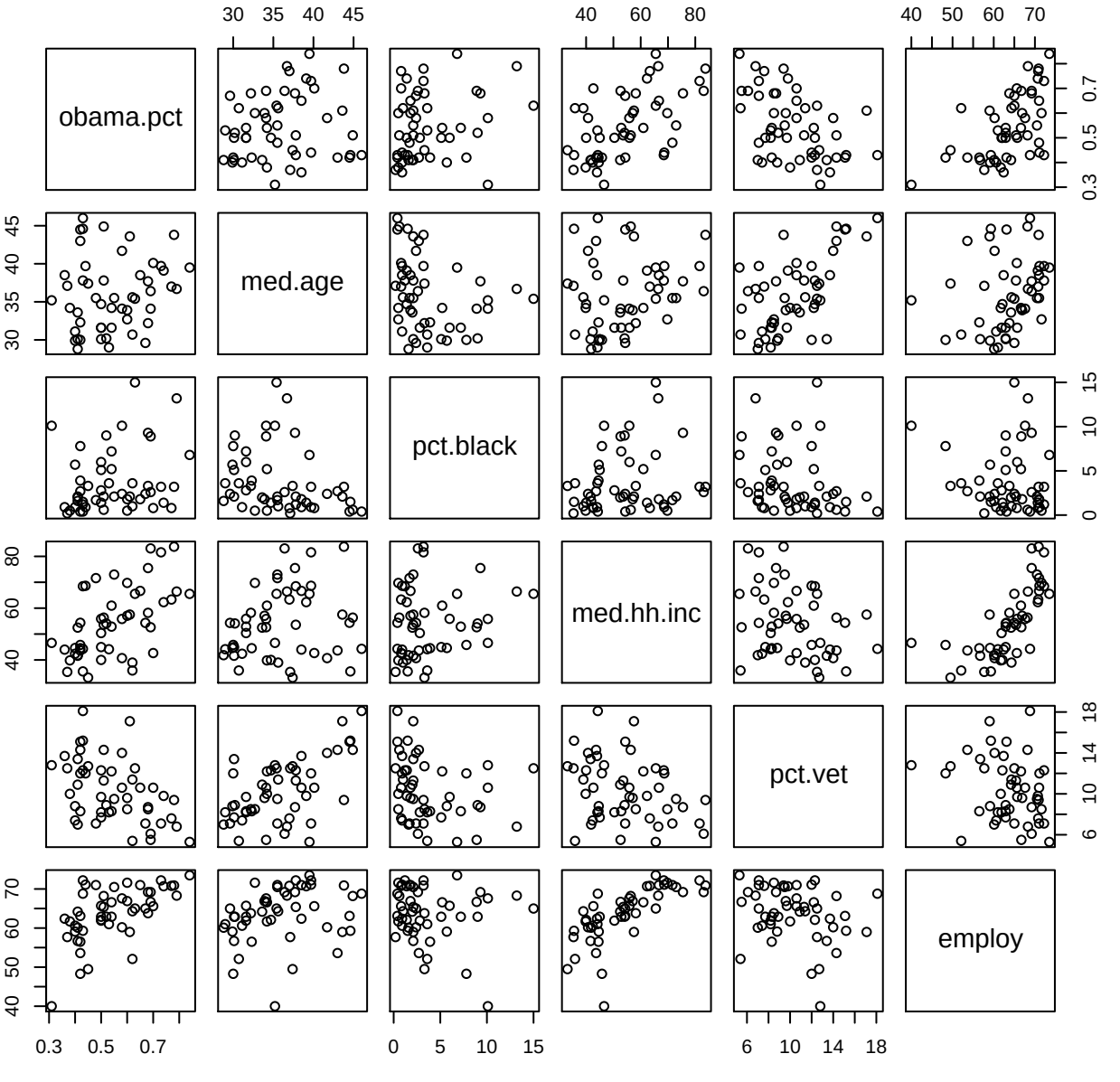
April 16, 2009

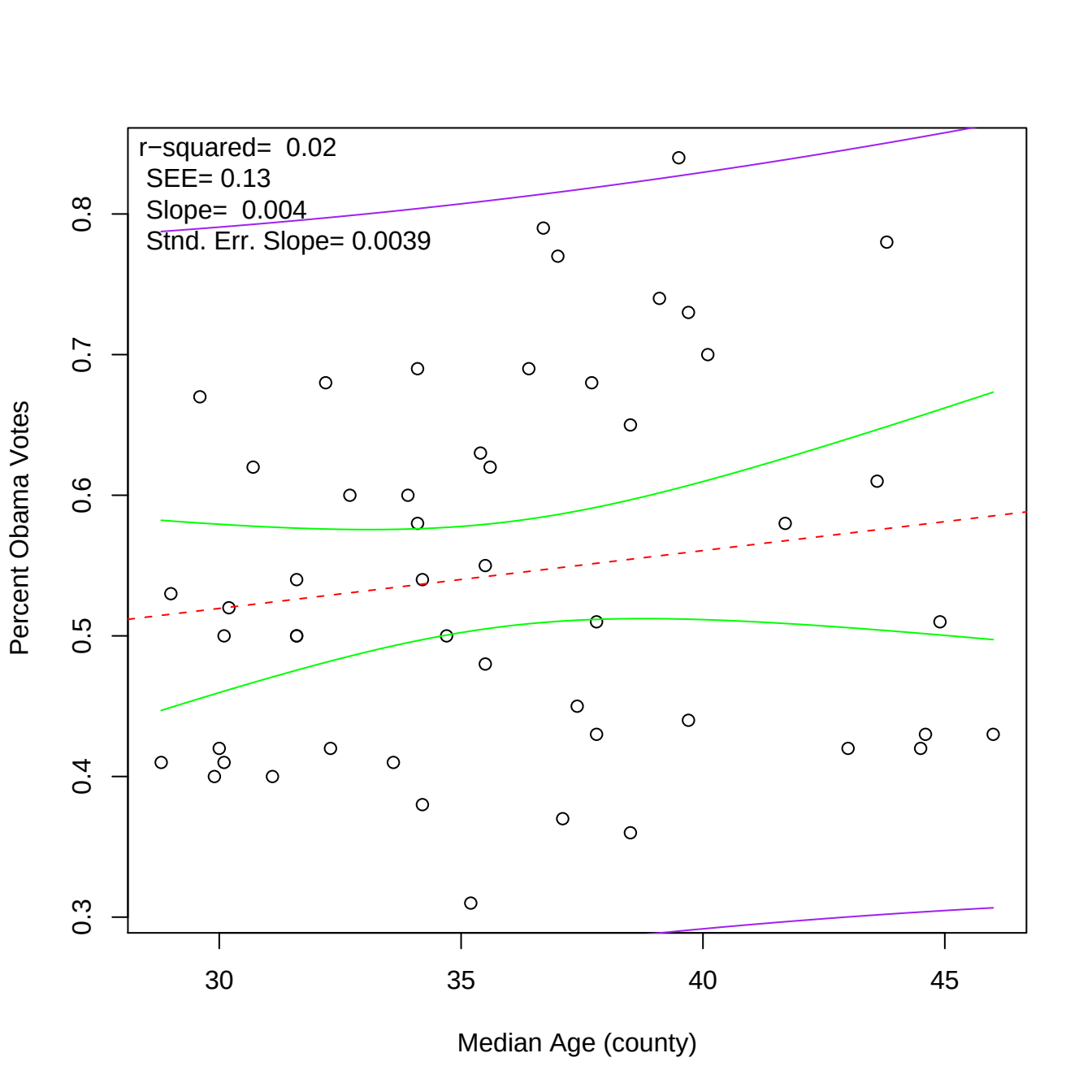

2000 Presidential Election: Florida Votes
r−squared= 0.39
SEE= 353.92
Slope= 0.005
Stnd. Err. Slope= 8e−04
Palm Beach
Dade County
BUCHANAN
BUSH
0
500
1000
1500
2000
2500
3000
3500
0
50000
100000
150000
200000
250000
300000
Source: UsingR for Introductory Statistics; cran data archive

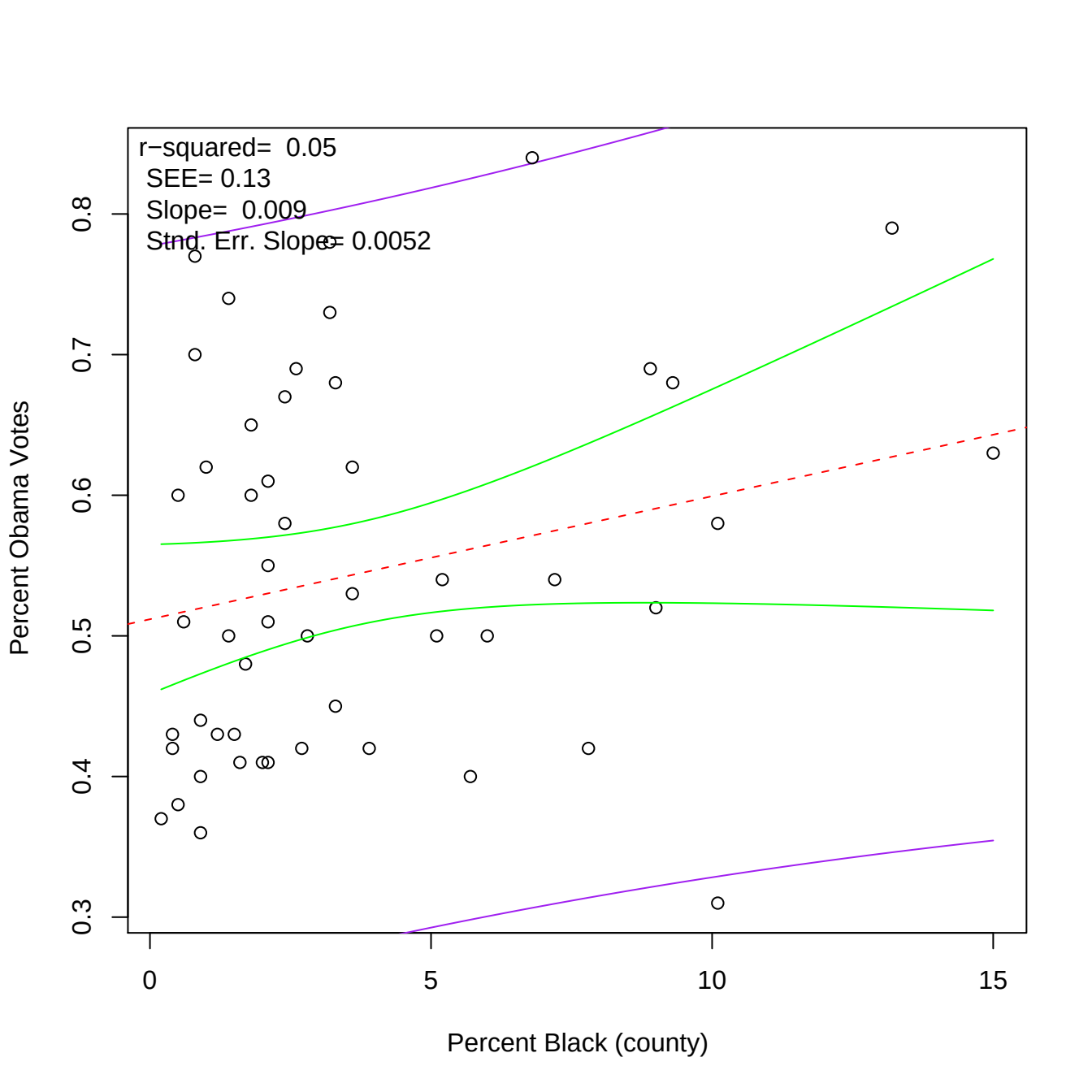
lm(formula = BUCHANAN ~ BUSH)

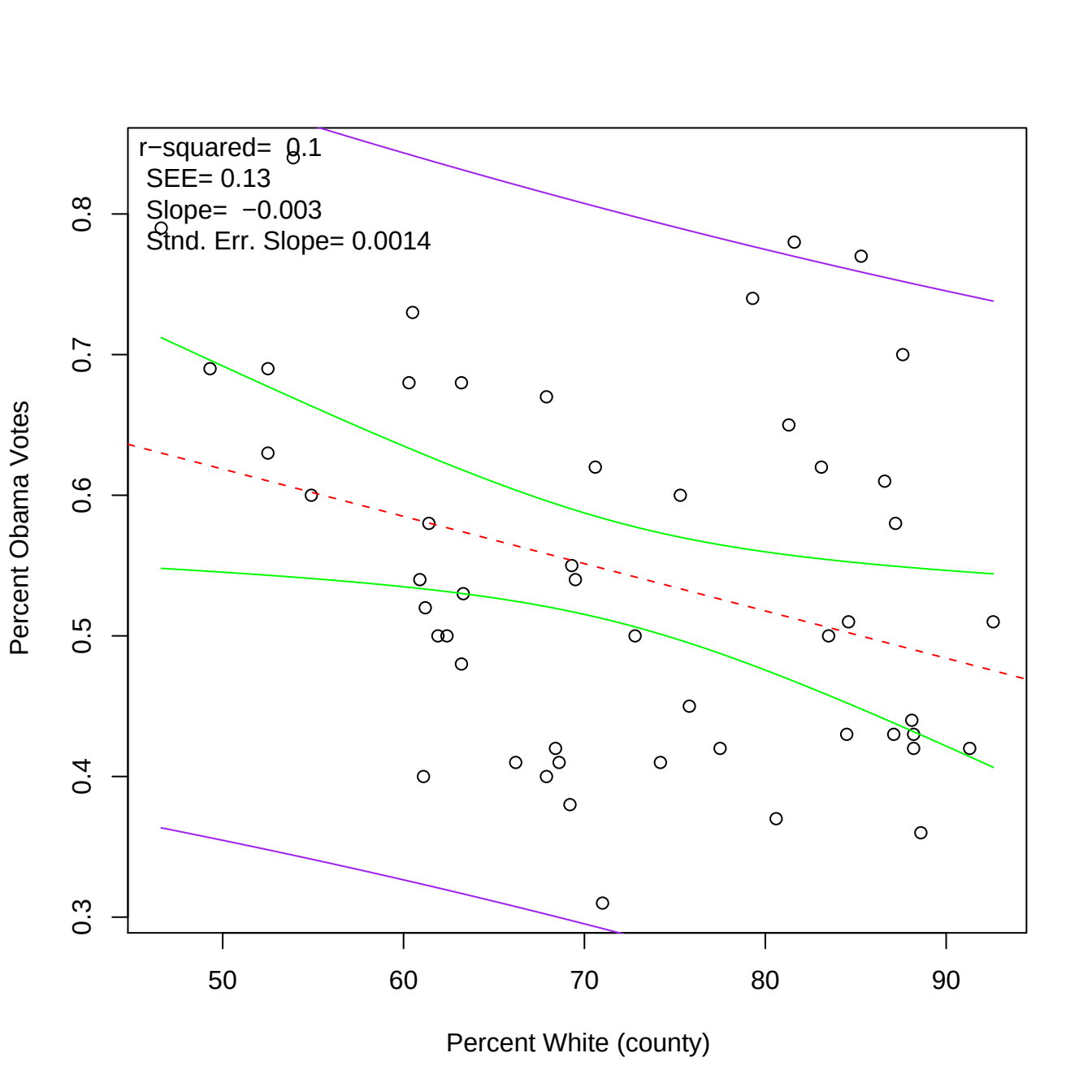
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	45.2899	54.4794	0.83	0.4088
BUSH	0.0049	0.0008	6.43	0.0000

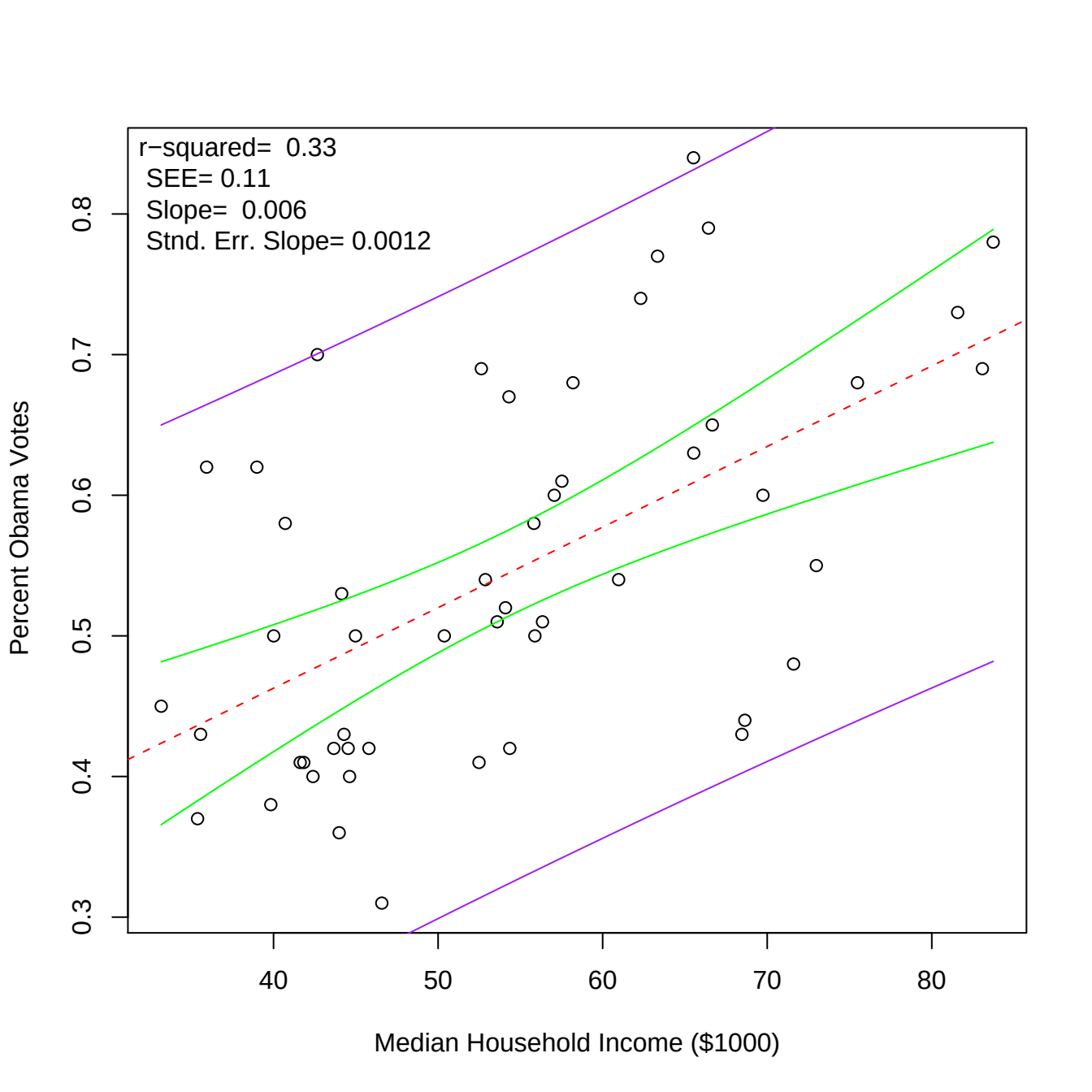
Scatterplot Matrix of California County Data

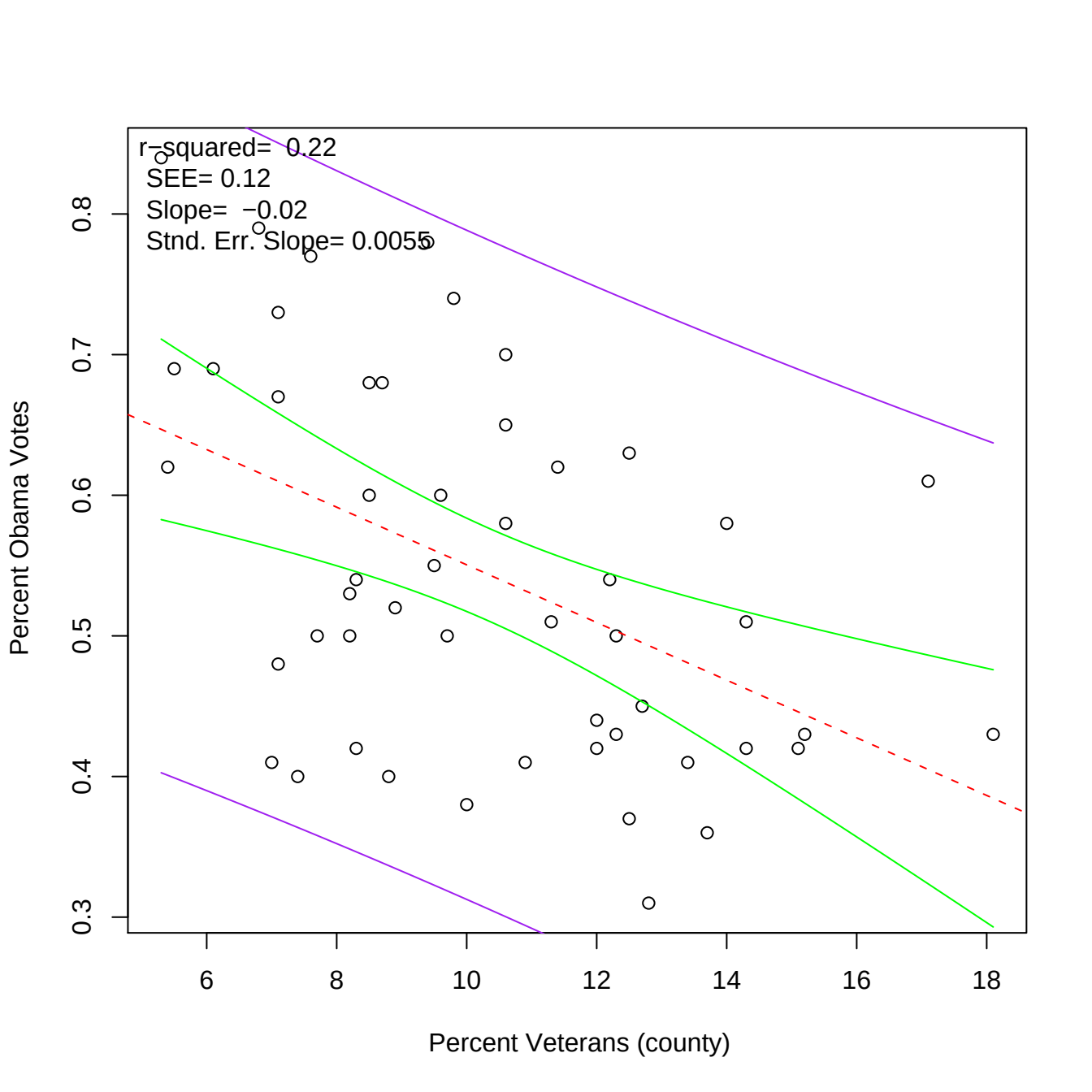


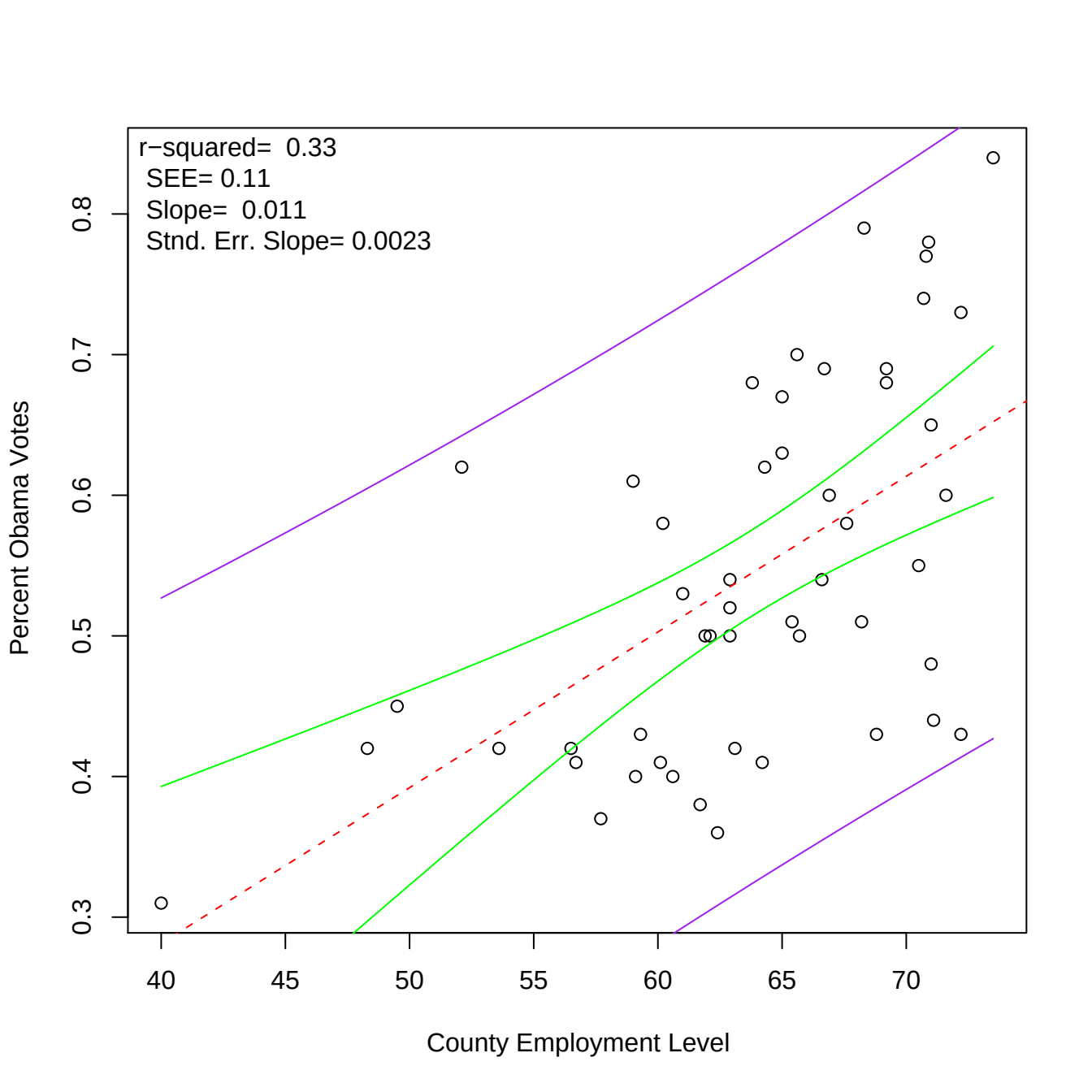

r−squared= 0.02
SEE= 0.13
Slope= 0.004
Stnd. Err. Slope= 0.0039
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
30
35
40
45
Median Age (county)

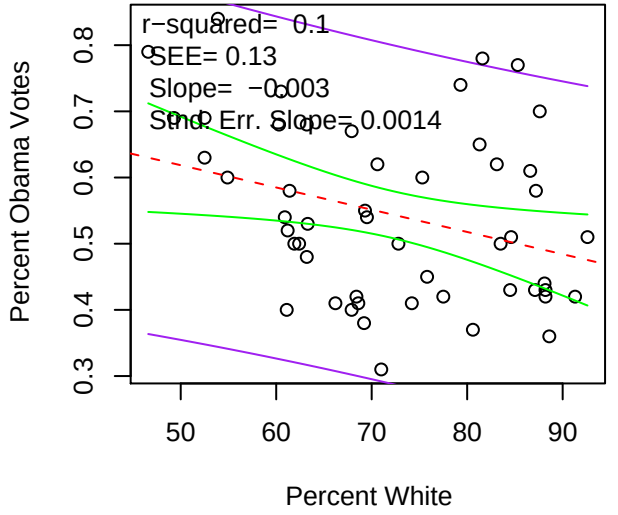

r−squared= 0.05
SEE= 0.13
Slope= 0.009
Stnd. Err. Slope= 0.0052
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
0
5
10
15
Percent Black (county)

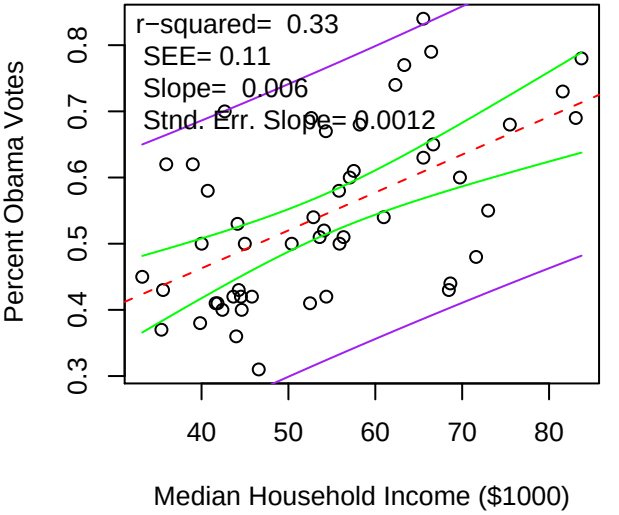

r−squared= 0.1
SEE= 0.13
Slope= −0.003
Stnd. Err. Slope= 0.0014
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
50
60
70
80
90
Percent White (county)

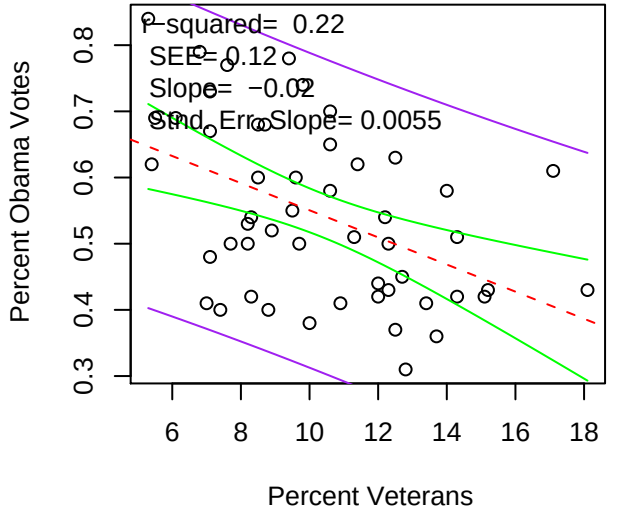

r−squared= 0.33
SEE= 0.11
Slope= 0.006
Stnd. Err. Slope= 0.0012
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
40
50
60
70
80
Median Household Income ($1000)


r−squared= 0.22
SEE= 0.12
Slope= −0.02
Stnd. Err. Slope= 0.0055
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
6
8
10
12
14
16
18
Percent Veterans (county)

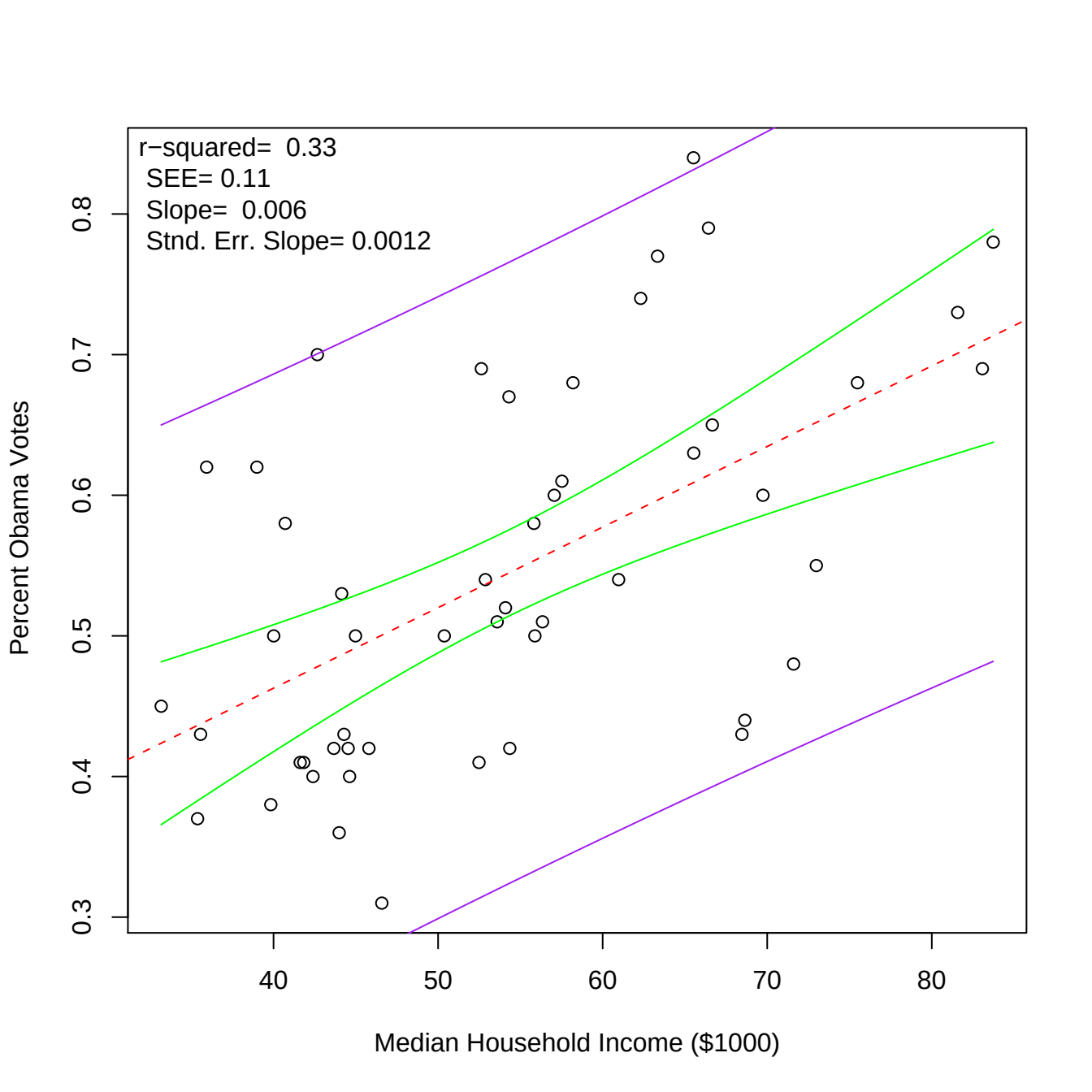

r−squared= 0.33
SEE= 0.11
Slope= 0.011
Stnd. Err. Slope= 0.0023
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
40
45
50
55
60
65
70
County Employment Level

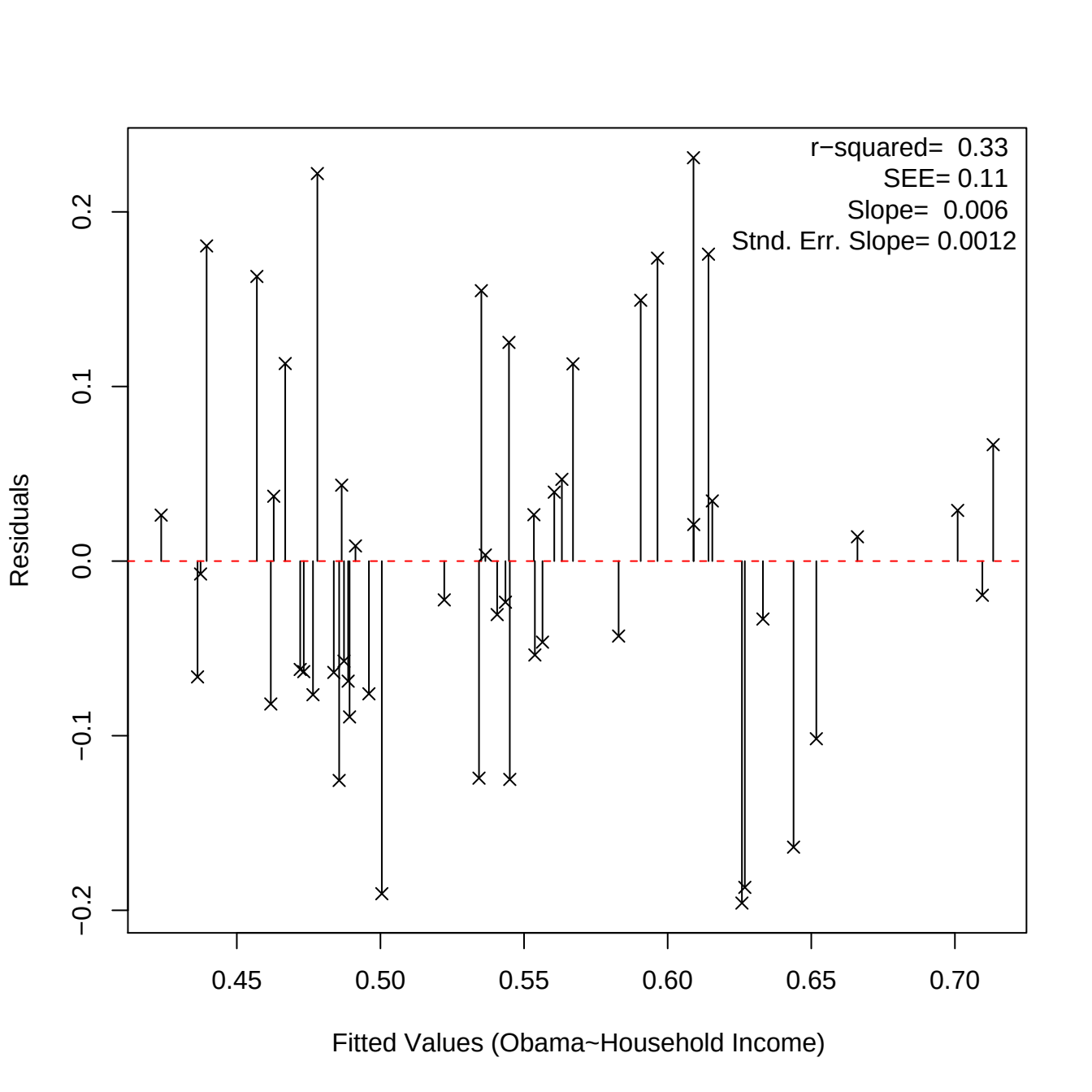

r−squared= 0.1
SEE= 0.13
Slope= −0.003
Stnd. Err. Slope= 0.0014
Percent Obama Votes
Percent White


r−squared= 0.33
SEE= 0.11
Slope= 0.006
Stnd. Err. Slope= 0.0012
Percent Obama Votes
Median Household Income ($1000)


r−squared= 0.22
SEE= 0.12
Slope= −0.02
Stnd. Err. Slope= 0.0055
Percent Obama Votes
Percent Veterans

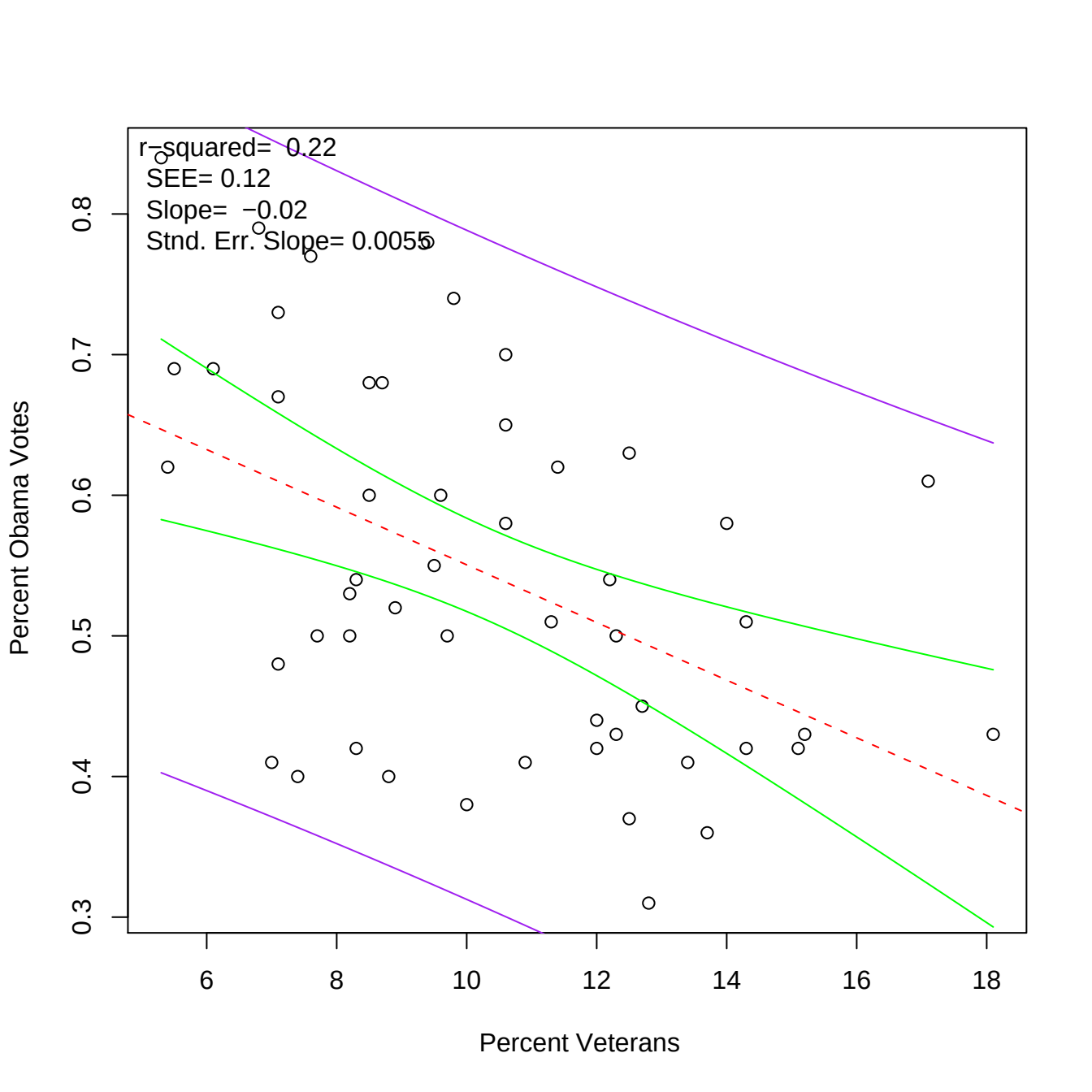
r−squared= 0.33
SEE= 0.11
Slope= 0.011
Stnd. Err. Slope= 0.0023
Percent Obama Votes
County Employment Level

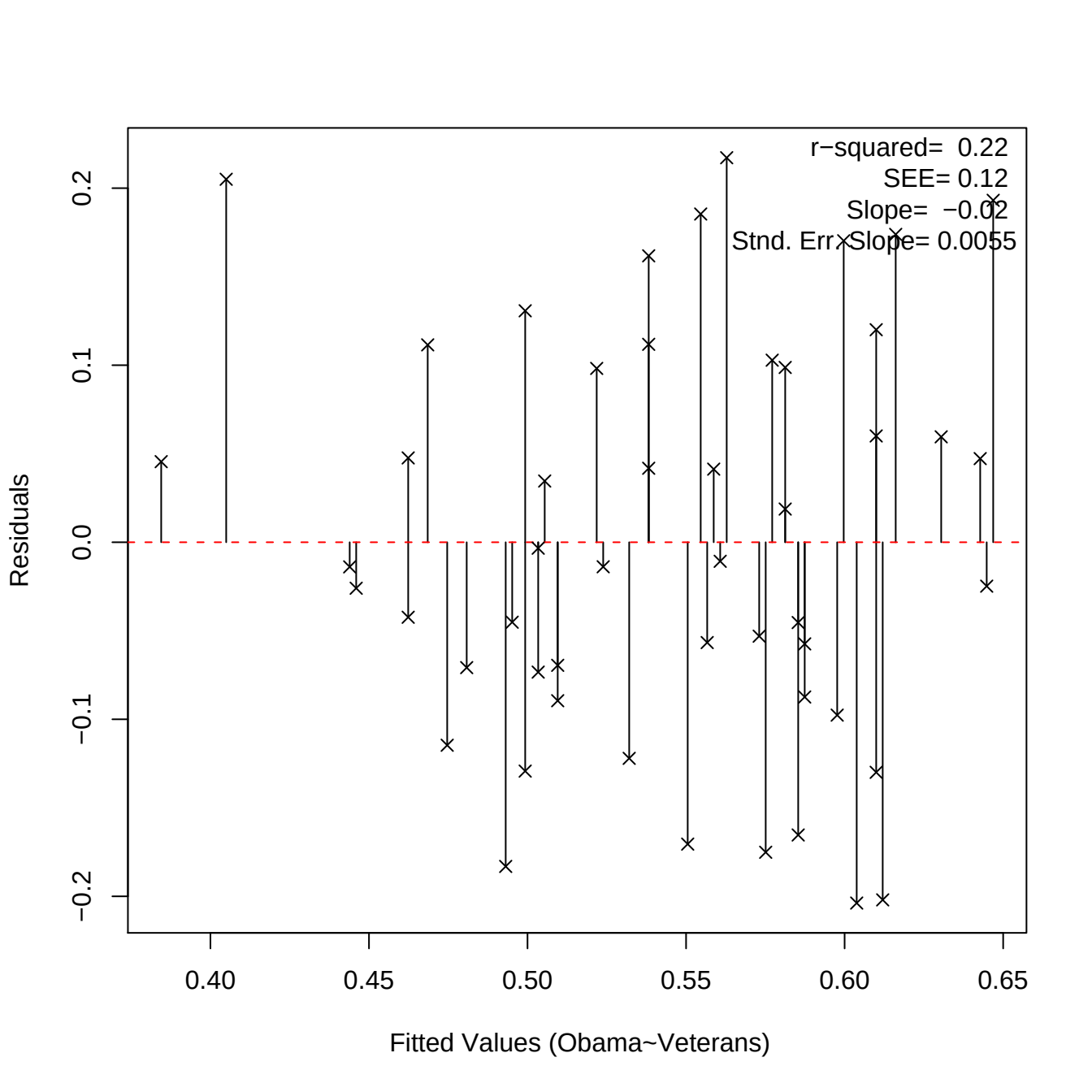

r−squared= 0.33
SEE= 0.11
Slope= 0.006
Stnd. Err. Slope= 0.0012
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
40
50
60
70
80
Median Household Income ($1000)


r−squared= 0.33
SEE= 0.11
Slope= 0.006
Stnd. Err. Slope= 0.0012
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.45
0.50
0.55
0.60
0.65
0.70
Fitted Values (Obama~Household Income)

lm(formula = obama.pct ~ med.hh.inc)

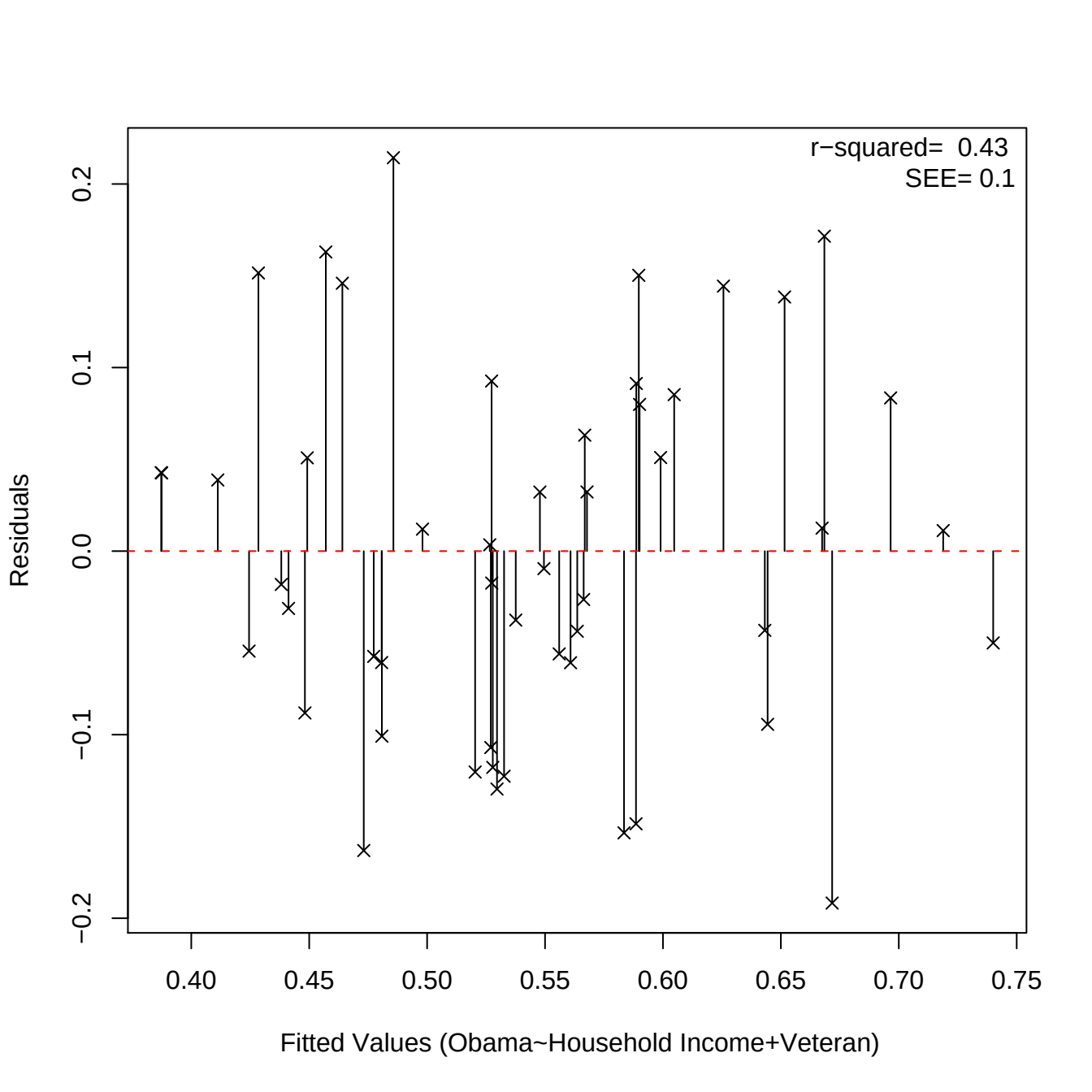
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.2336	0.0649	3.60	0.0007
med.hh.inc	0.0057	0.0012	4.92	0.0000


r−squared= 0.22
SEE= 0.12
Slope= −0.02
Stnd. Err. Slope= 0.0055
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
6
8
10
12
14
16
18
Percent Veterans


r−squared= 0.22
SEE= 0.12
Slope= −0.02
Stnd. Err Slope= 0.0055
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.40
0.45
0.50
0.55
0.60
0.65
Fitted Values (Obama~Veterans)

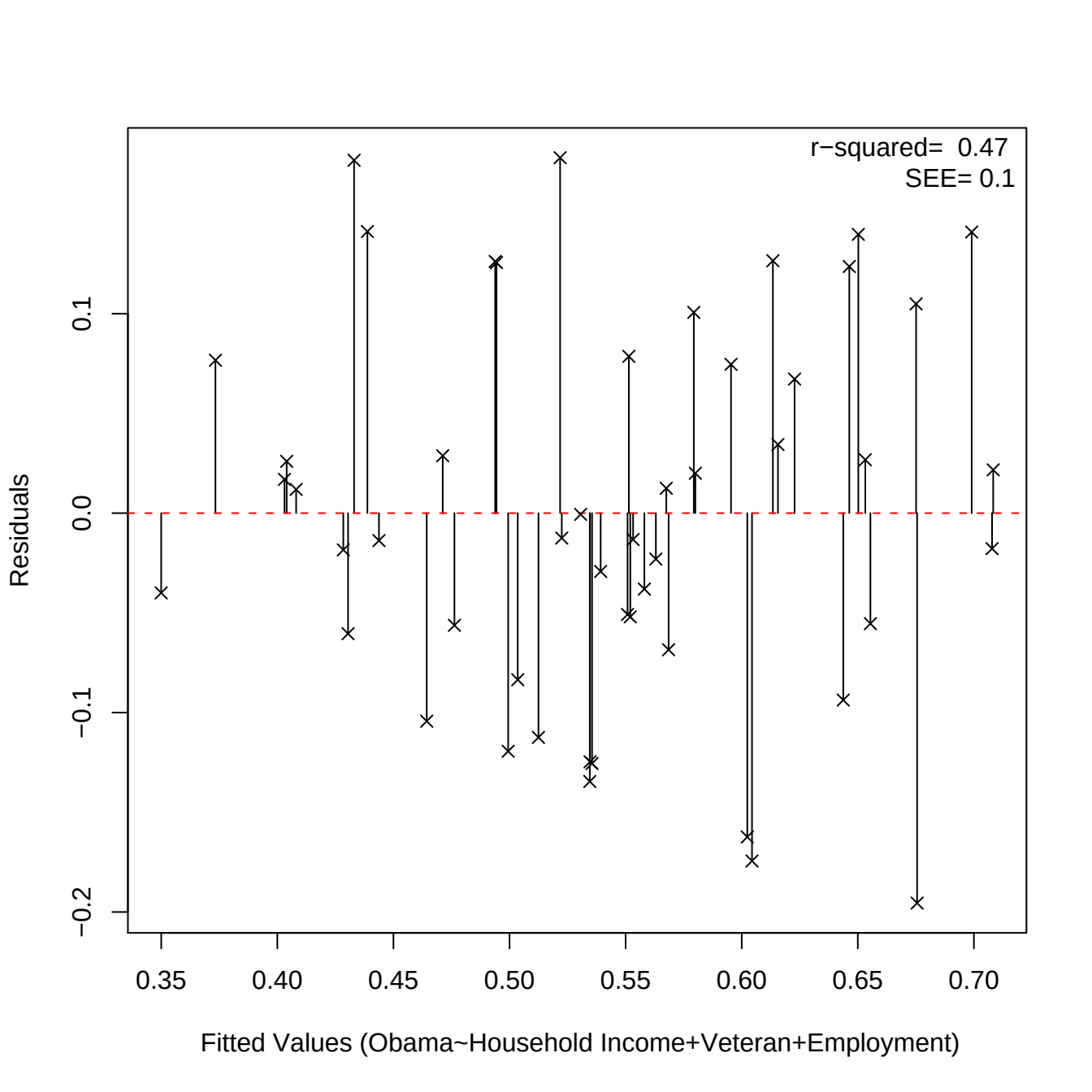
lm(formula = obama.pct ~ pct.vet)

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.7555	0.0587	12.88	0.0000
pct.vet	-0.0205	0.0055	-3.76	0.0005


r−squared= 0.43
SEE= 0.1
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.40
0.45
0.50
0.55
0.60
0.65
0.70
0.75
Fitted Values (Obama~Household Income+Veteran)

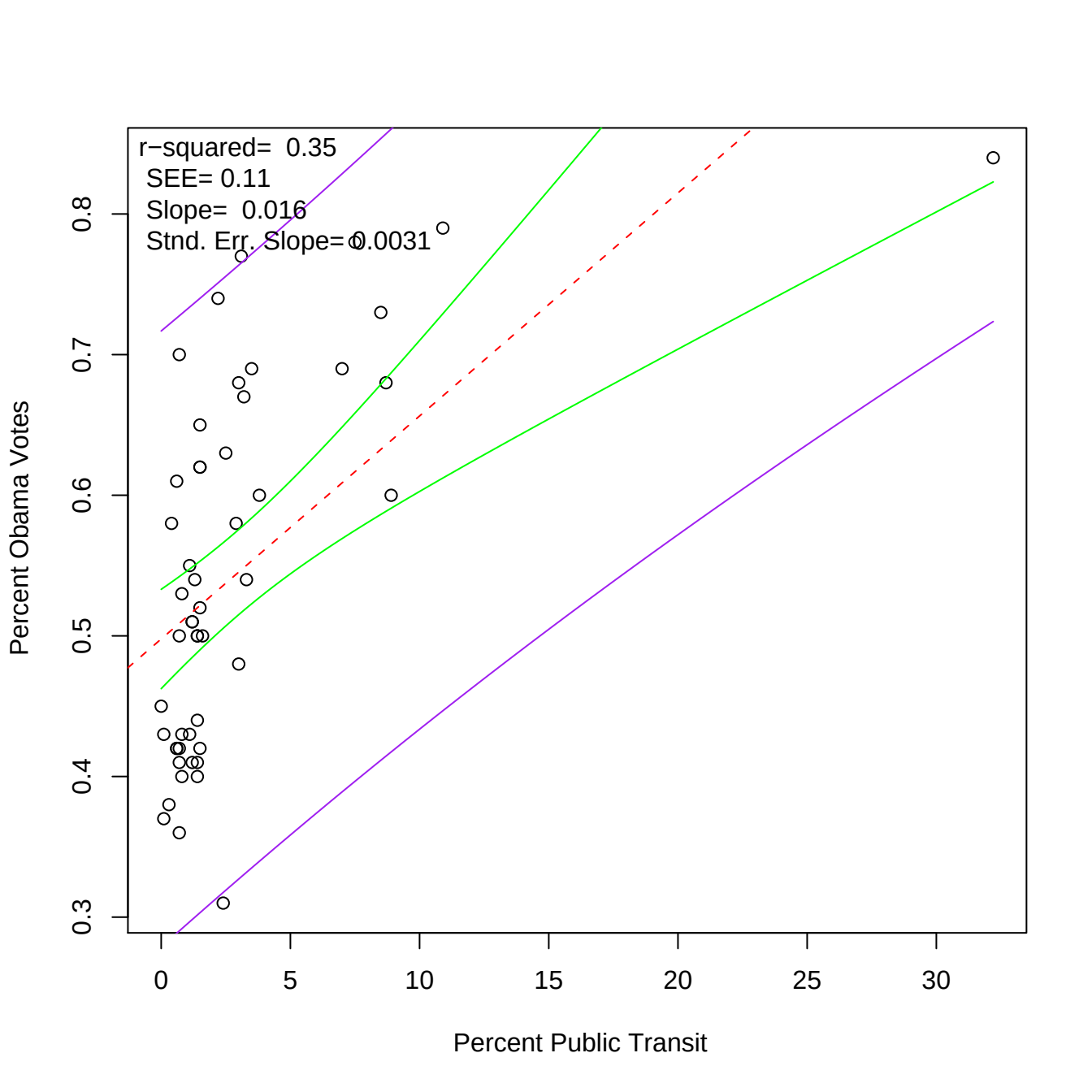
lm(formula = obama.pct ~ med.hh.inc + pct.vet)

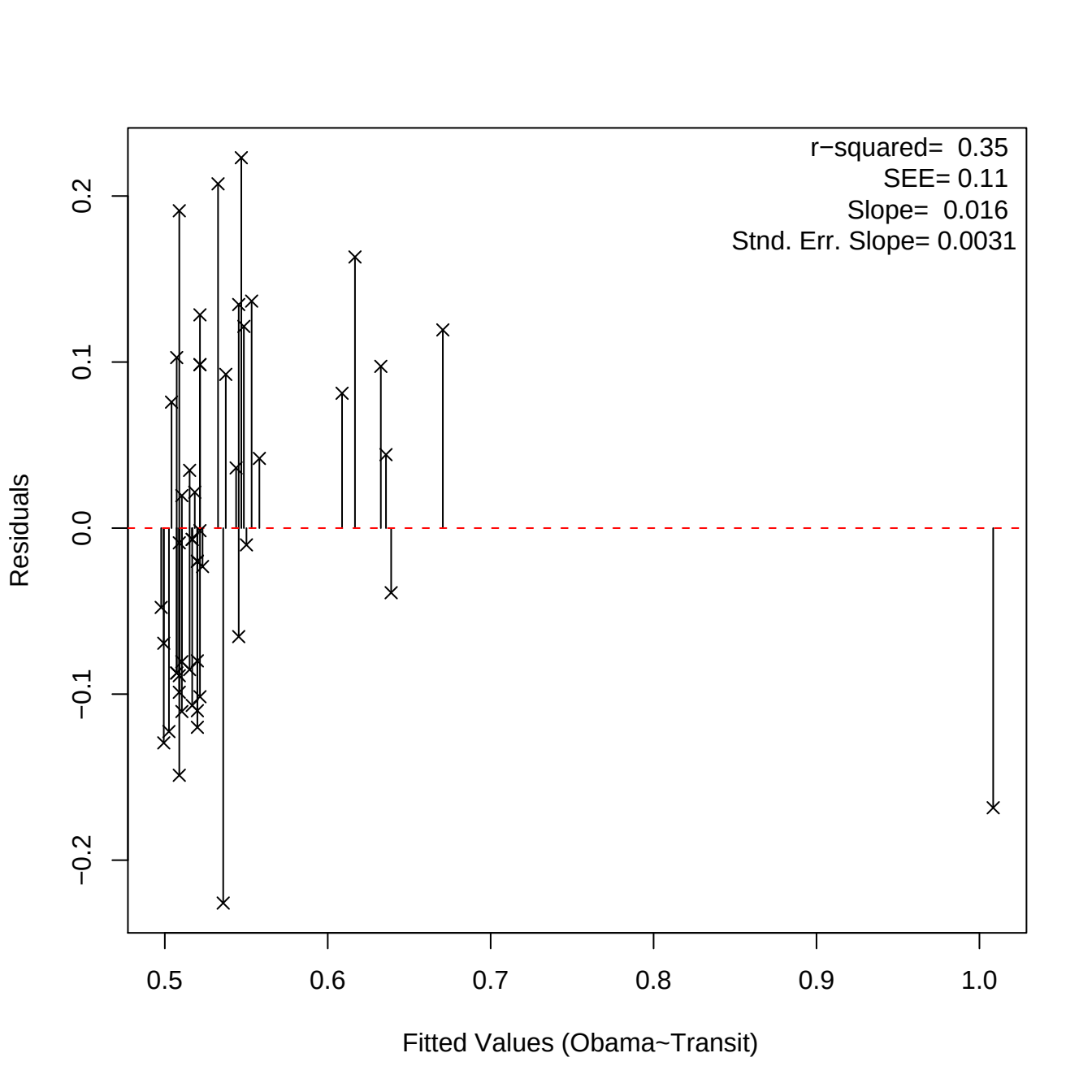
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.4340	0.0932	4.66	0.0000
med.hh.inc	0.0047	0.0011	4.12	0.0001
pct.vet	-0.0141	0.0050	-2.83	0.0067

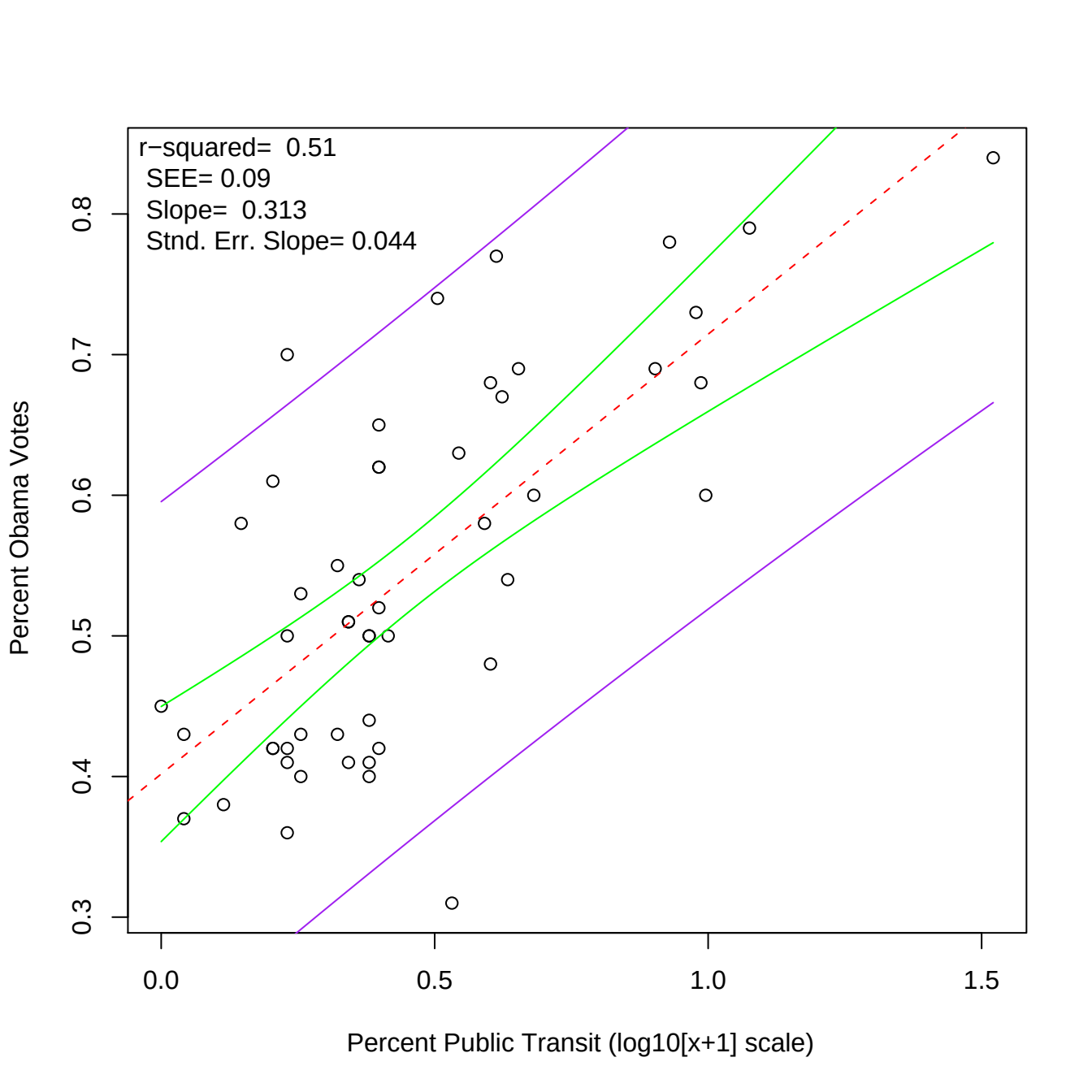

r−squared= 0.47
SEE= 0.1
Residuals
0.1
0.0
−0.1
−0.2
0.35
0.40
0.45
0.50
0.55
0.60
0.65
0.70
Fitted Values (Obama~Household Income+Veteran+Employment)

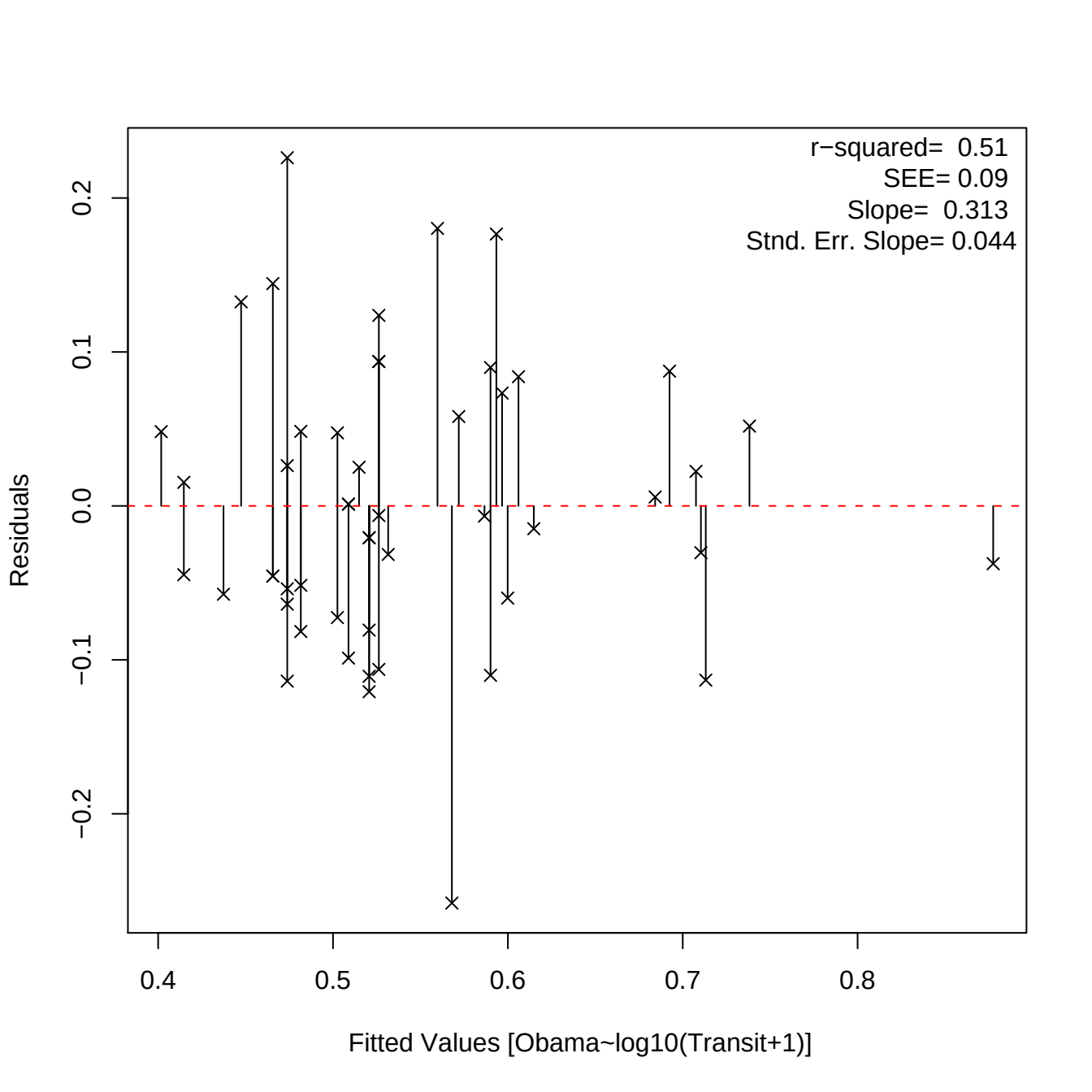
lm(formula = obama.pct ~ med.hh.inc + pct.vet + employ)

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.1651	0.1598	1.03	0.3067
med.hh.inc	0.0026	0.0015	1.68	0.0997
pct.vet	-0.0135	0.0048	-2.79	0.0076
employ	0.0059	0.0029	2.04	0.0471


r−squared= 0.35
SEE= 0.11
Slope= 0.016
Stnd. Err. Slope= 0.0031
Percent Obama Votes
Percent Public Transit
0.3
0.4
0.5
0.6
0.7
0.8
0
5
10
15
20
25
30

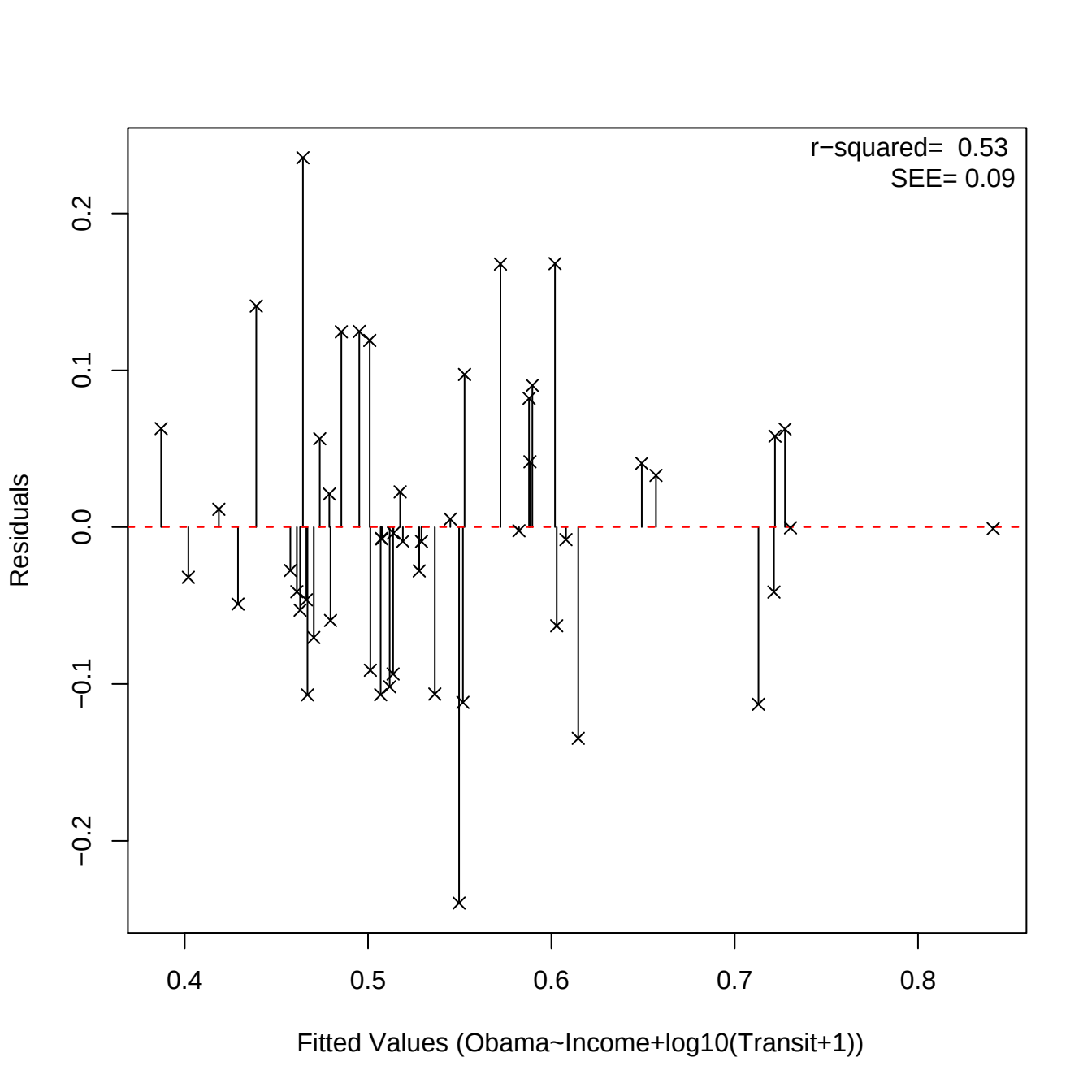

r−squared= 0.35
SEE= 0.11
Slope= 0.016
Stnd. Err. Slope= 0.0031
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.5
0.6
0.7
0.8
0.9
1.0
Fitted Values (Obama~Transit)


r−squared= 0.51
SEE= 0.09
Slope= 0.313
Stnd. Err. Slope= 0.044
Percent Obama Votes
0.3
0.4
0.5
0.6
0.7
0.8
0.0
0.5
1.0
1.5
Percent Public Transit (log10[x+1] scale)


r−squared= 0.51
SEE= 0.09
Slope= 0.313
Stnd. Err. Slope= 0.044
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.4
0.5
0.6
0.7
0.8
Fitted Values [Obama~log10(Transit+1)]

lm(formula = obama.pct ~ log.pub.trans)

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.4017	0.0239	16.81	0.0000
log.pub.trans	0.3128	0.0440	7.10	0.0000


r−squared= 0.53
SEE= 0.09
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.4
0.5
0.6
0.7
0.8
Fitted Values (Obama~Income+log10(Transit+1))

lm(formula = obama.pct ~ med.hh.inc + log.pub.trans)

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.3252	0.0588	5.53	0.0000
med.hh.inc	0.0019	0.0013	1.42	0.1612
log.pub.trans	0.2586	0.0579	4.47	0.0000