

The Econometric Model: A flexible value added education production function

- Test Score = $f(S, F, TS_{t-1})$
- S = School characteristics
- F = Family characteristics
- TS_{t-1} = Past Test Score
- Define X as the matrix of conditioning variables
- Test Score = $a + bX + 1/2 X'CX + u$

The Variables

- Achievement test scores in moment t are a function of:
 - Years of education of the father
 - Years of education of the mother
 - Achievement test scores in moment $t-1$
 - Age of the child
 - Family income in moment t
 - Other variables (Working mother, Children in FU, Students per class)
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Empirical Methodology:

- A flexible value added model is estimated by OLS with White's consistent variance-covariance matrix estimator.
 - An elasticity function of the test score with respect to every conditioning variable is obtained to be evaluated at any point.
 - Elasticities are the % change in the expected test score when a conditioning variable changes in one % . The elasticities are evaluated at the data means per every age in the sample.
 - The estimated elasticities together with their two standard deviations are plotted as a function of age.
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Preliminary Results (i)

- If IQ is fixed at approximately age 8 we should observe in slides 8 and 14 that the elasticity of Score with respect to Lagged Score at age 13 is not significantly different than 1.
 - At age 13 the elasticity of Applied-Problems score with respect to the past score is around 0.5 and significantly lower than 1. That is, at age 13, a 1% increase in the past score may lead to a 0.5% increase in the present score.
 - At age 13 the elasticity of Letter-Word score with respect to the past score is around 0.25 and also significantly lower than 1.
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Preliminary Results (ii)

- In slide 9 we can observe that the Applied-Problem score-father's education elasticity is insignificant up to age 9 but becomes significant and increasing, taking values from 0.1 to 0.25, from age 10 to 17.
 - Meanwhile in slide 15 we can observe that Letter-Word score-father's education elasticity is basically insignificant everywhere.
 - The two correspondent elasticities with respect to mother's education are significant basically everywhere, with values around 0.2 for APP and 0.1 for LW scores.
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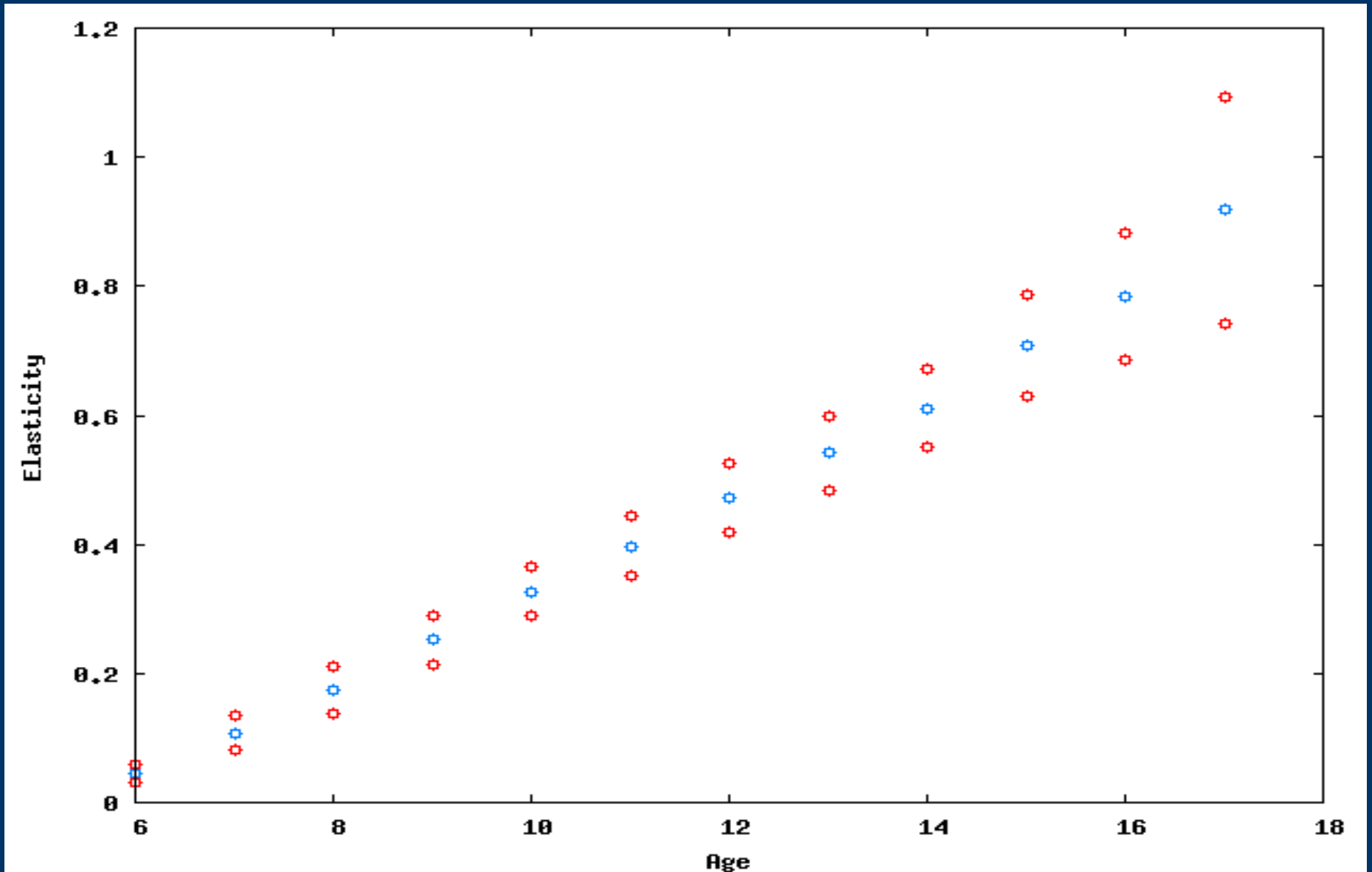
The results present evidence that:

- Measured ability is malleable, not fixed at age 8.
 - Years of education of the parents are very significant on explaining the improvements on the measured ability of children.
 - Years of education of the father are significant when measuring math abilities but insignificant when measuring verbal abilities.
 - Years of education of the mother are always significant.
 - Income is significant but very small.
 - Other variables are not significant.
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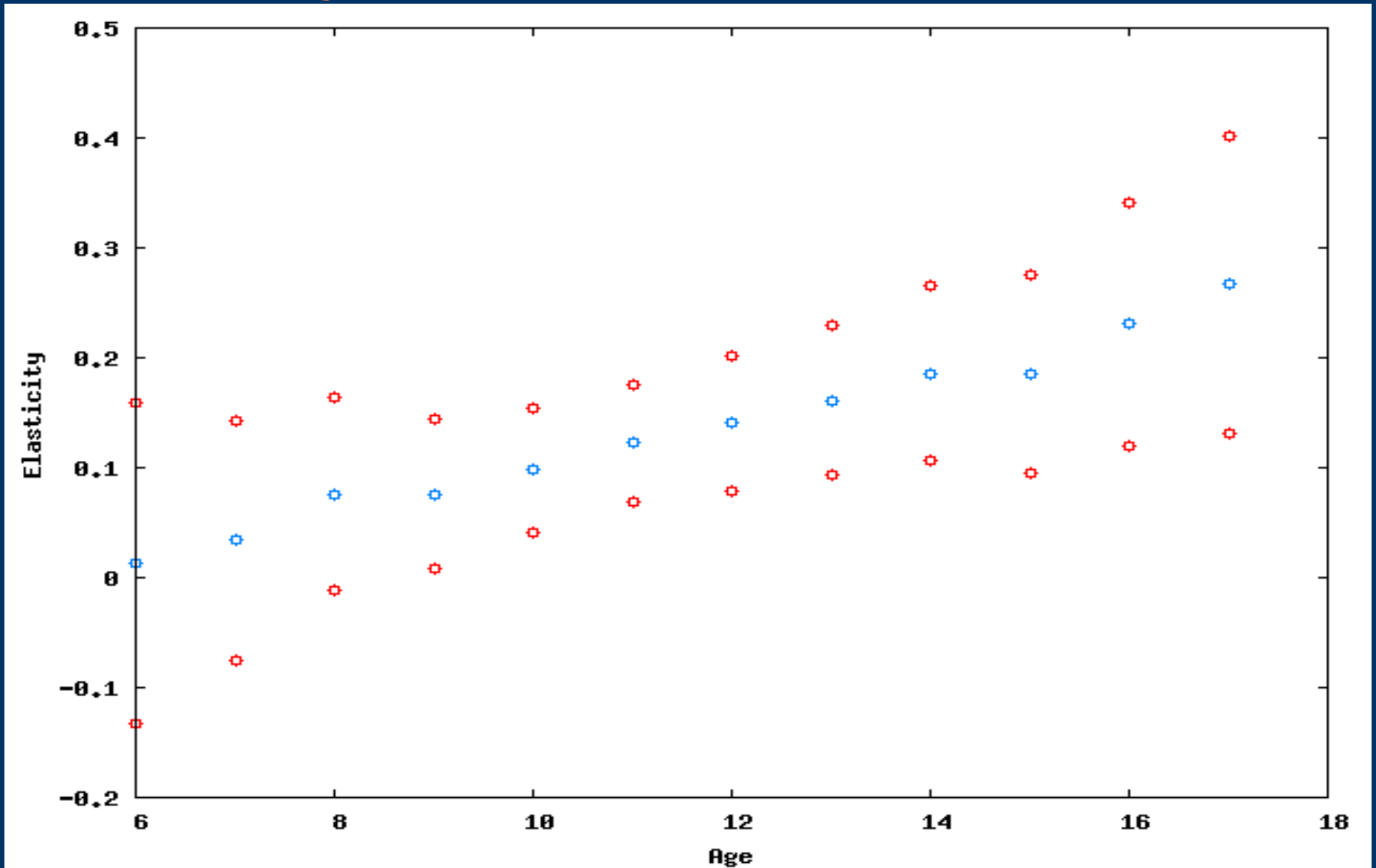
Math-Logic Ability



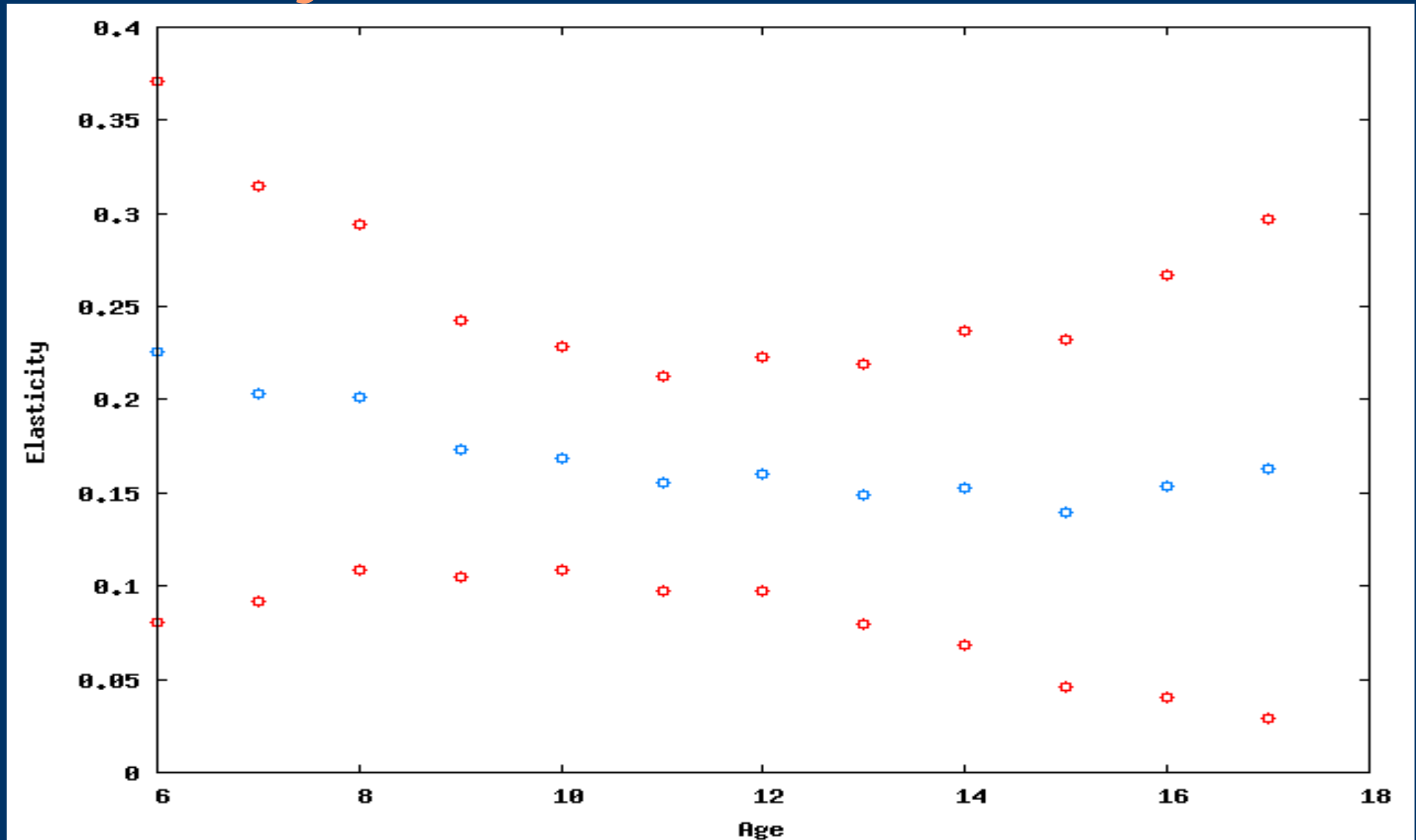
APP-APP lagged score elasticity



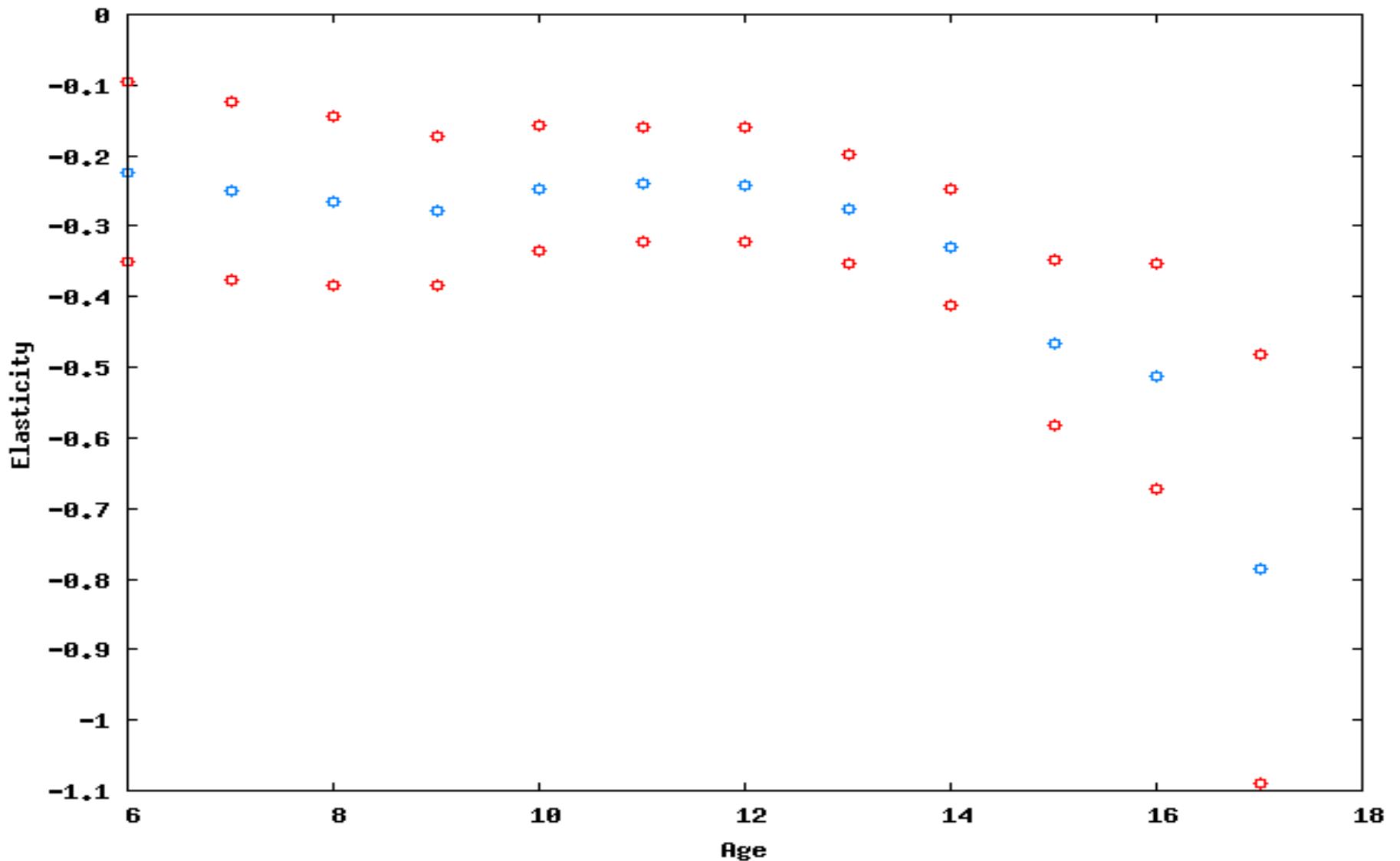
APP score-father's education elasticity



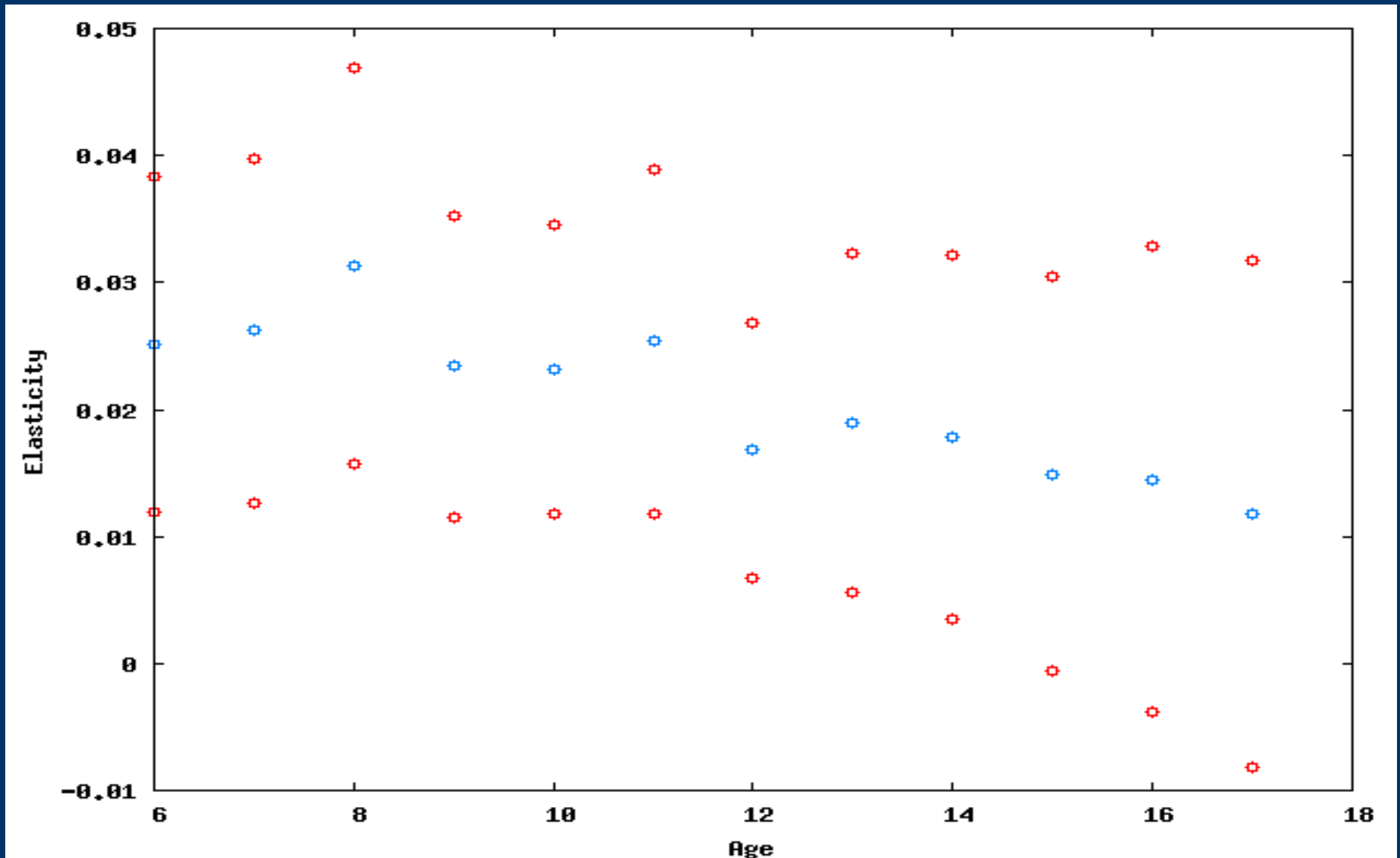
APP score-mother's education elasticity



APP score-age elasticity



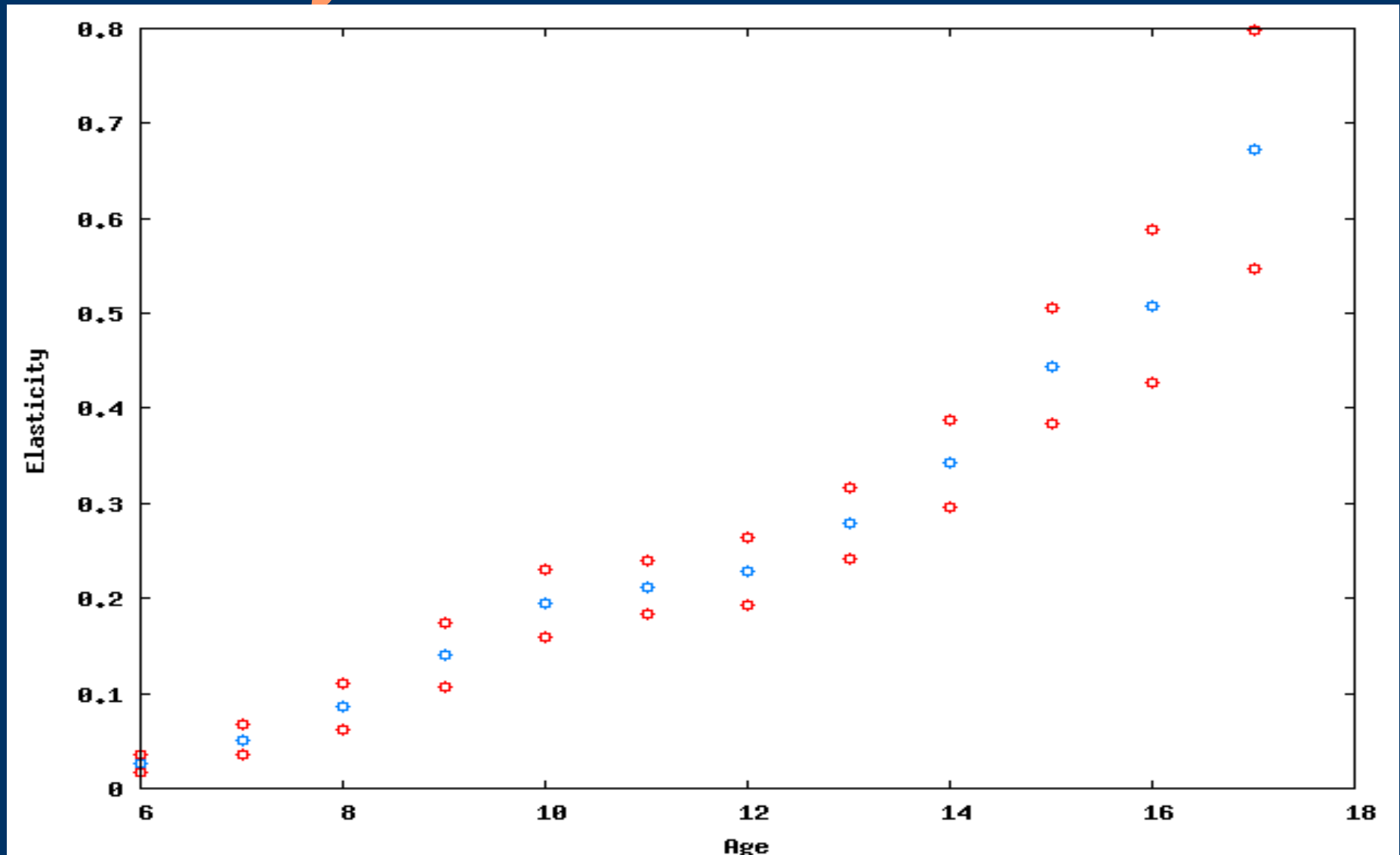
APP score-income elasticity



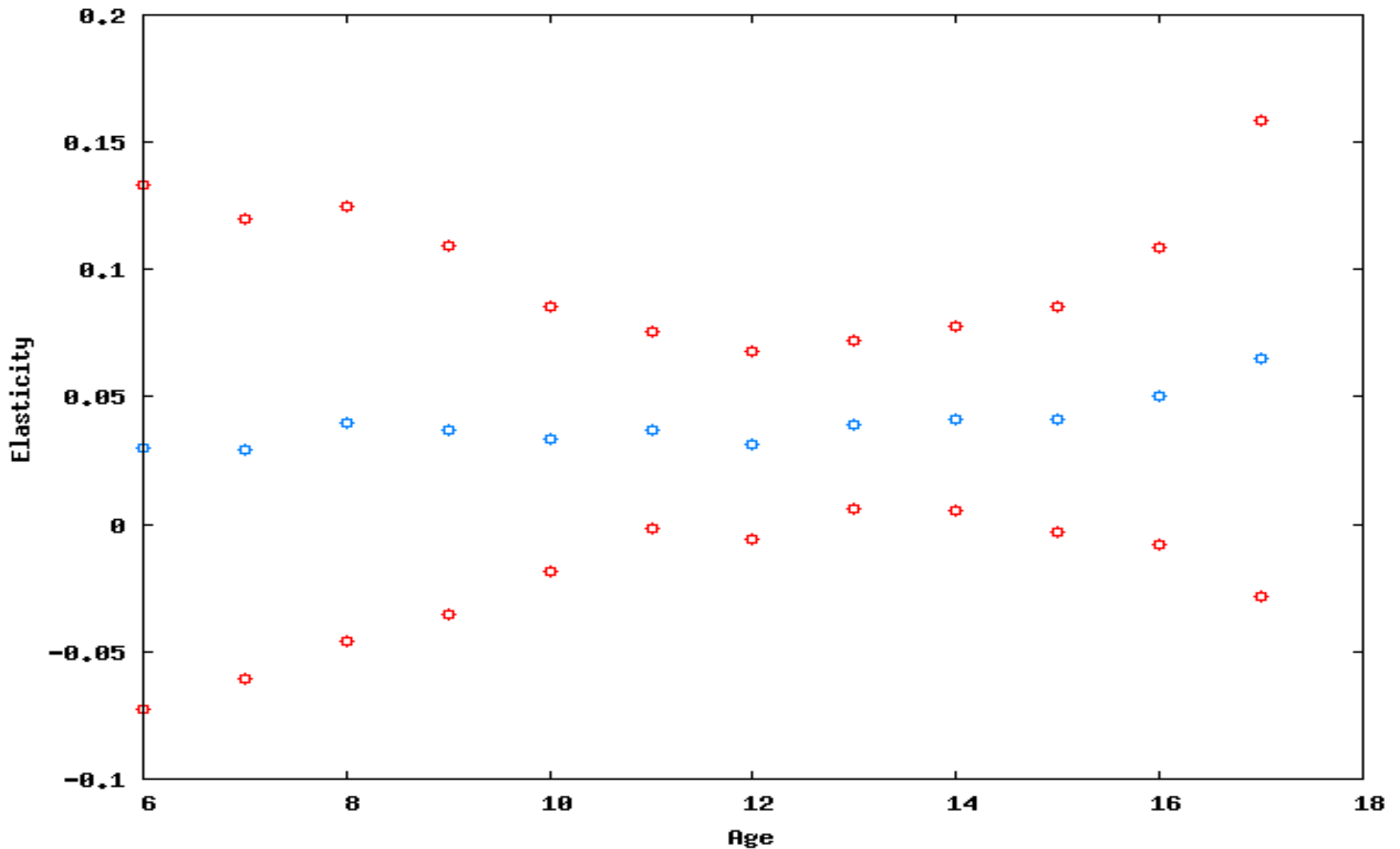
Verbal Ability



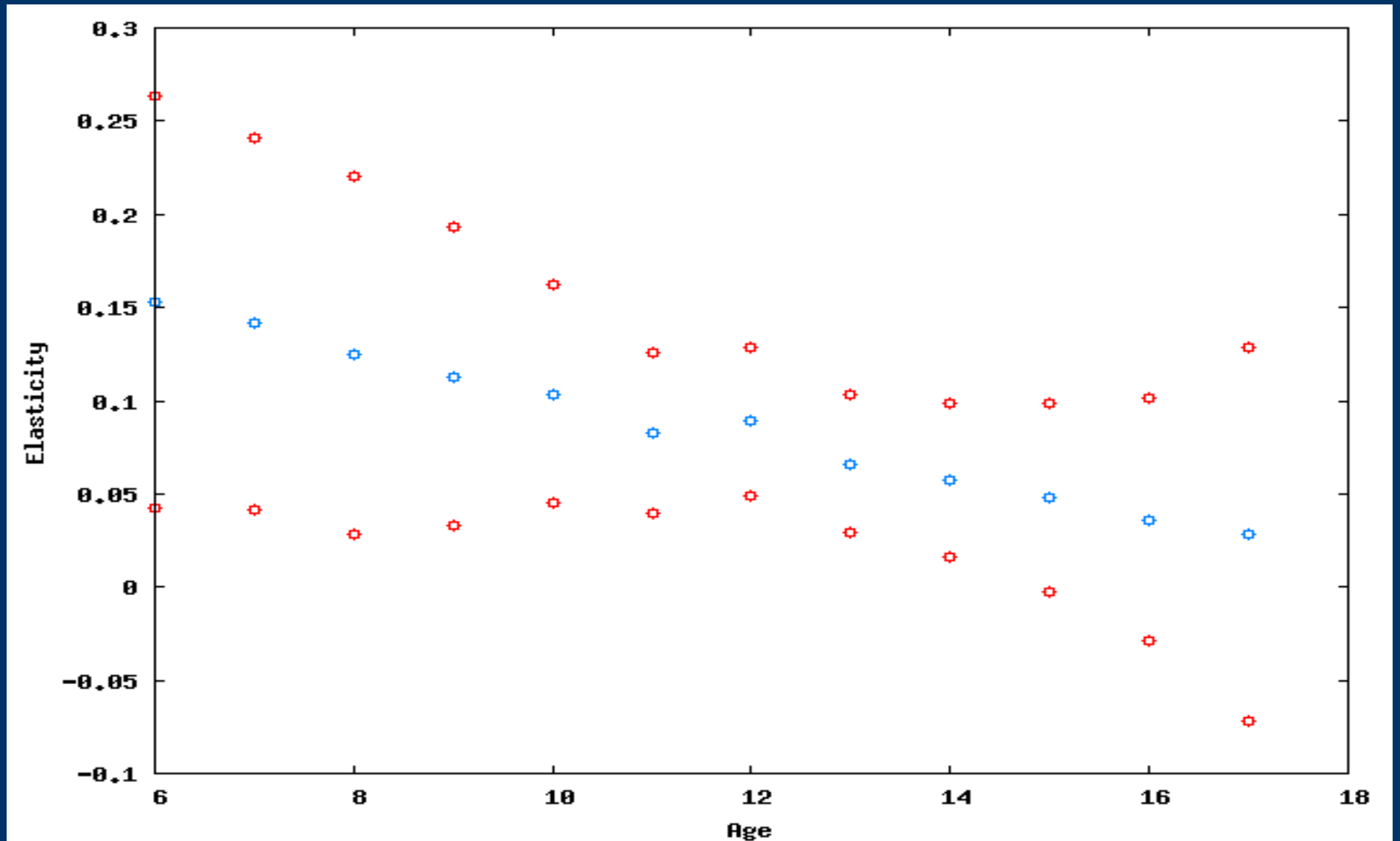
LW score-LW lagged score elasticity



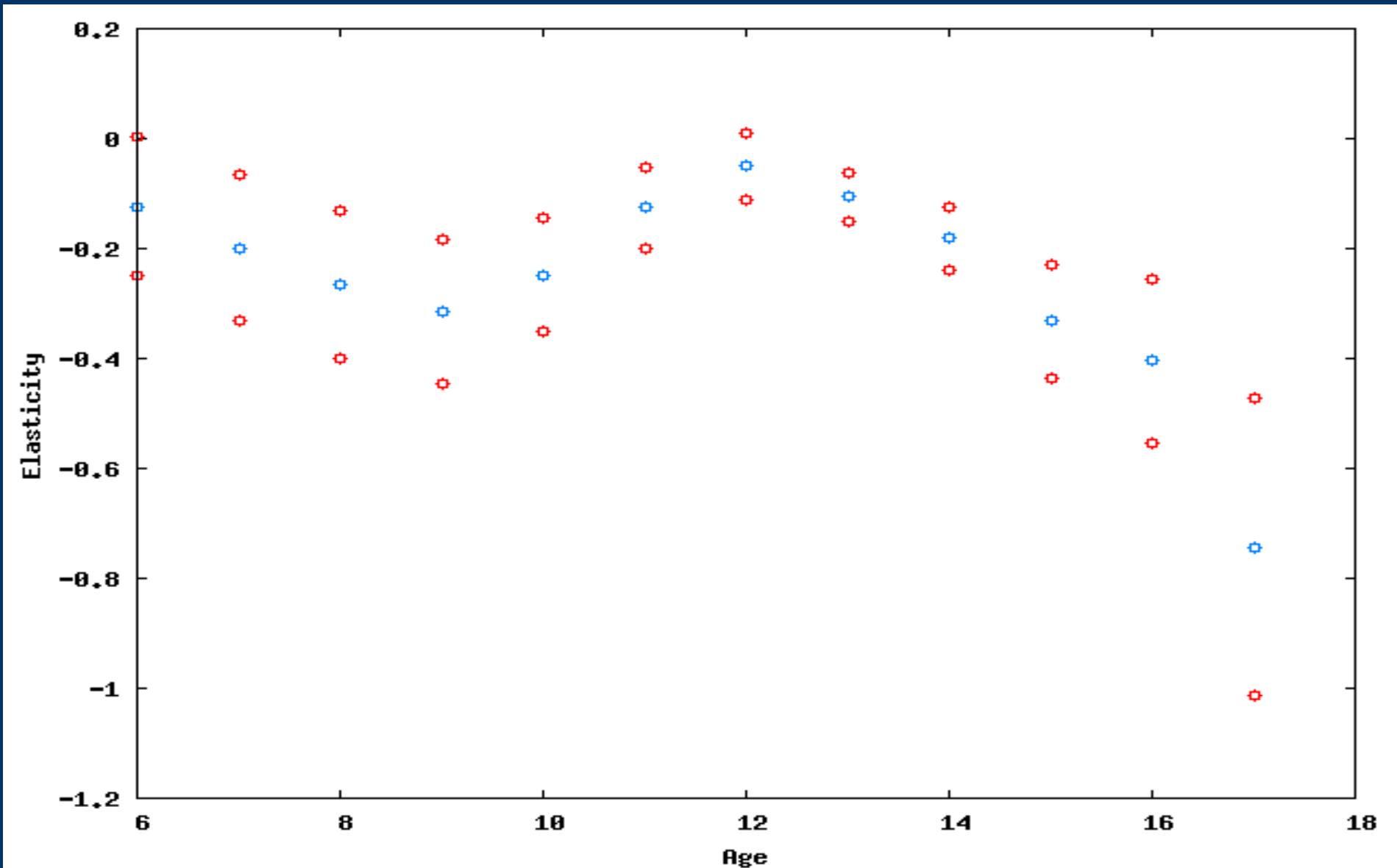
LW score-father's education elasticity



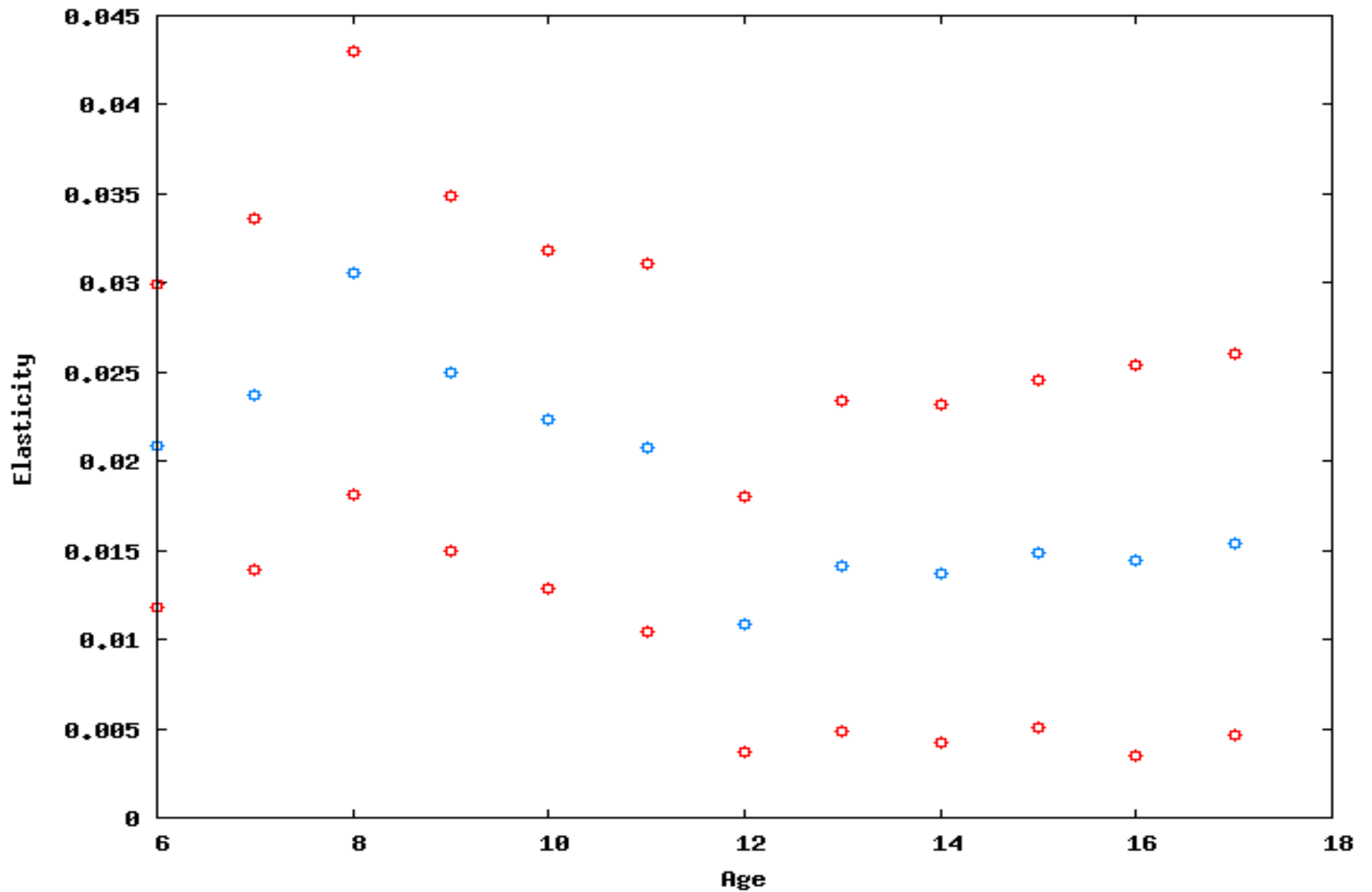
LW score-mother's education elasticity



LW score-age elasticity



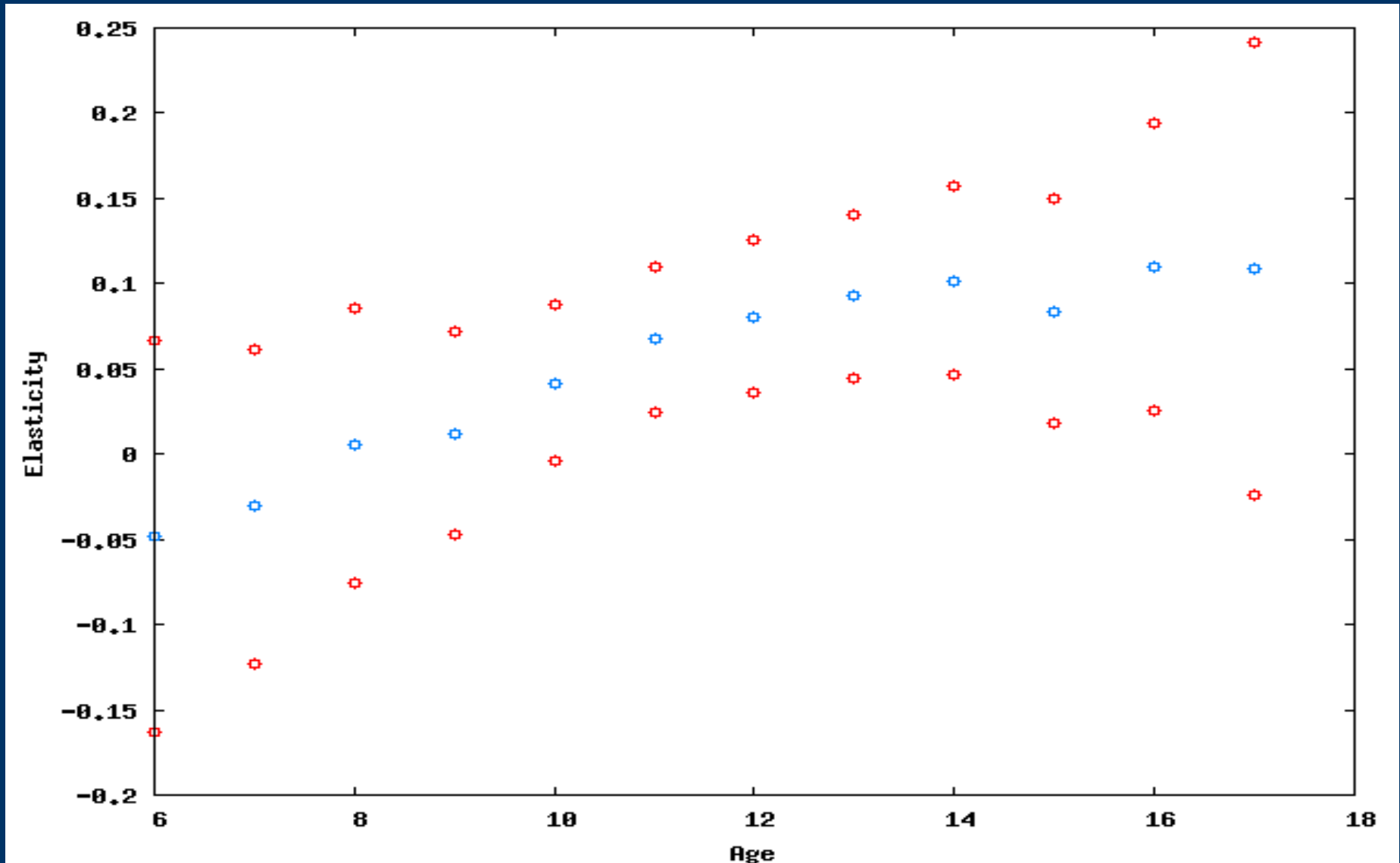
LW score-income elasticity



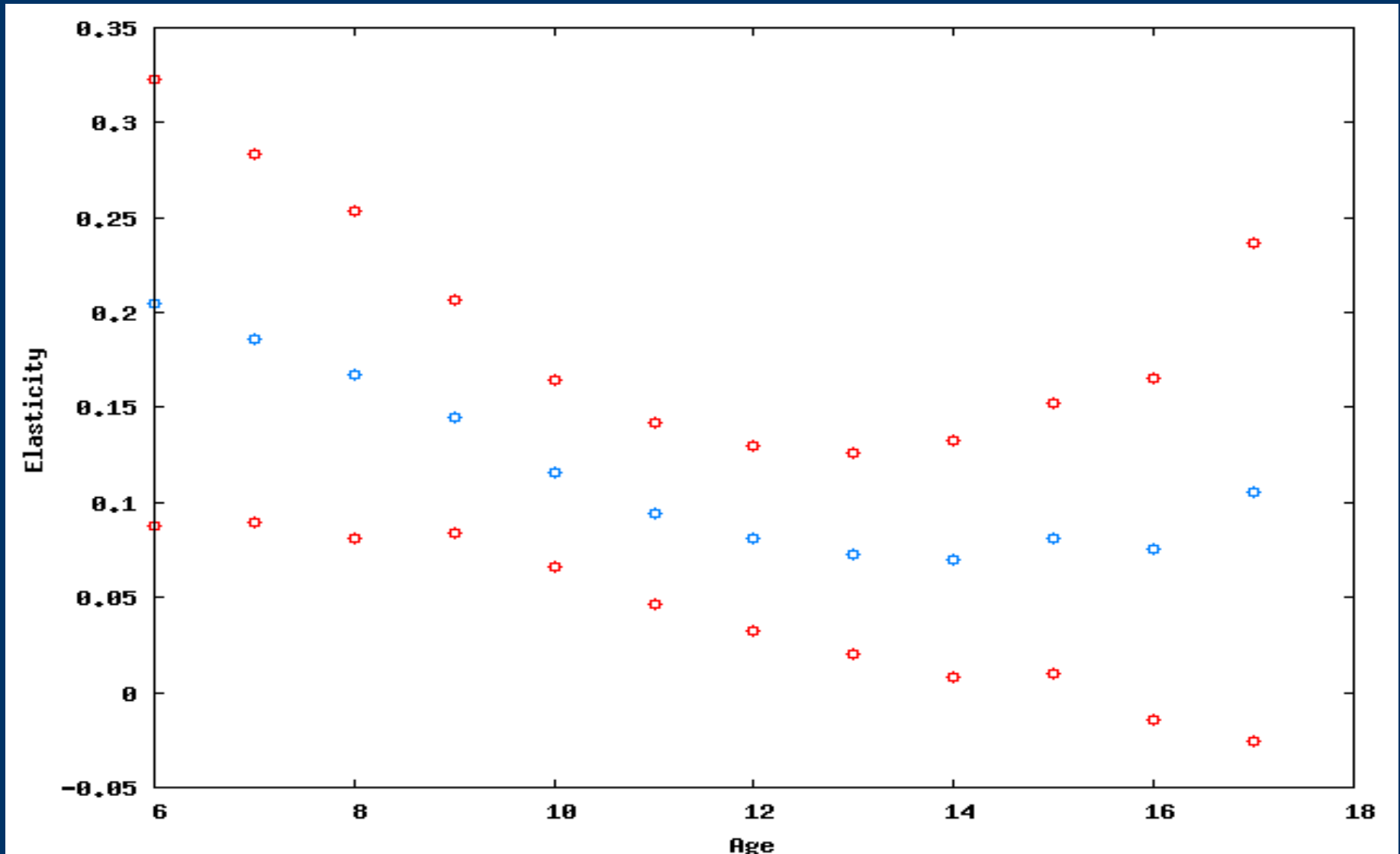
Contemporaneous Specification

- This specification considers contemporaneous inputs only.
 - Results about the impact of the education of the parents on achievement scores remain similar.
 - Here age gives us the effects of schooling. At age 10 one more year of schooling can raise the achievement score about 2 points.
 - Schooling has a very important effect in explaining achievement measurement improvements in early years and this effect declines and becomes insignificant at around age 15-16.
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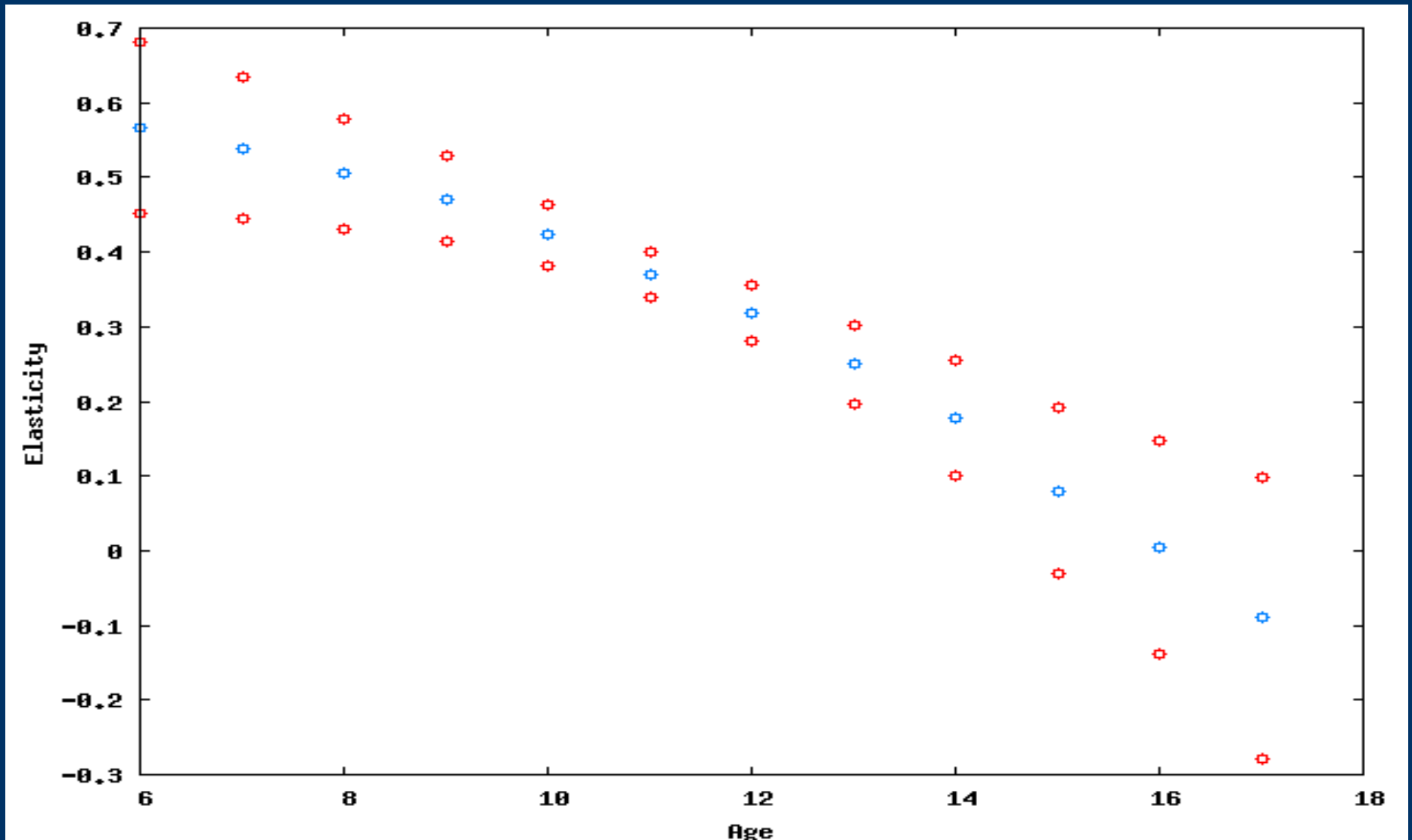
Model without lagged APP score: APP-father's education elasticity



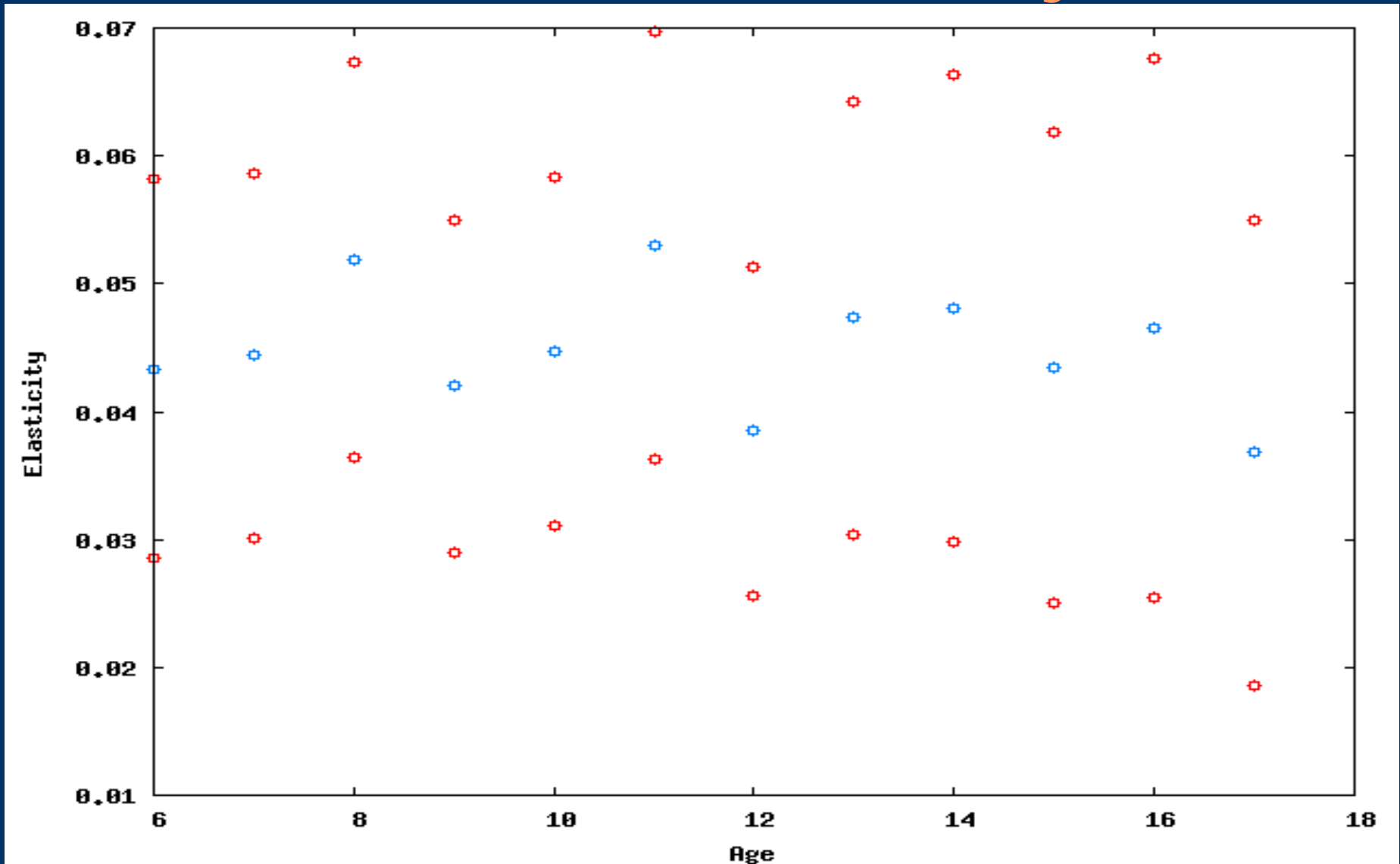
Model without lagged APP score : APP-mother's education elasticity



Model without lagged APP score: APP score-age elasticity



Model without lagged APP score: APP score-income elasticity



Future Work

- Exploring the possible endogeneity of lagged scores.
 - Analyzing the possible joint effects of years of education of parents and their time spent with their children.
 - Exploring further the impact of school characteristics.
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