

U-Shapes and Diagnostic Tests after Quadratic

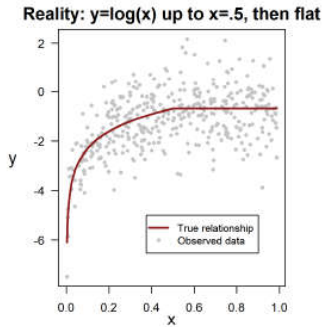
By: Uri Simonsohn
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Example for [Colada 62](#) of diagnostic test following quadratic not being diagnostic of u-shape conclusion.

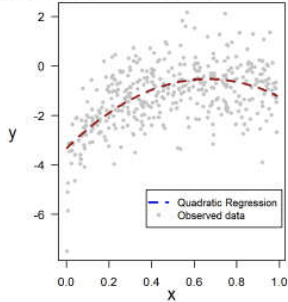
Currently Figure 4 in the Two-Lines paper on SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3021690

In the left column there is a false-positive u-shape, in the right column a true-positive. The diagnostic plot (third row) looks the same. You cannot tell false-positive from true-positive u-shapes with diagnostic plots.

True effect is **not** u-shaped

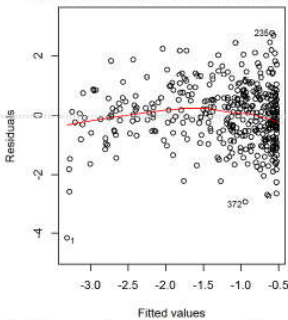


Quadratic: false-positive u-shape ($p < .05$)

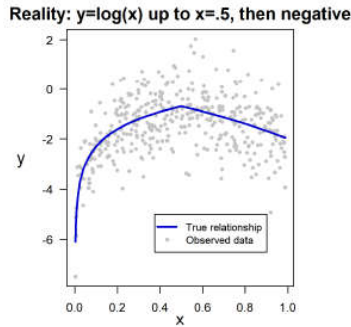


Diagnostic Plot for False-Positive U-Shape

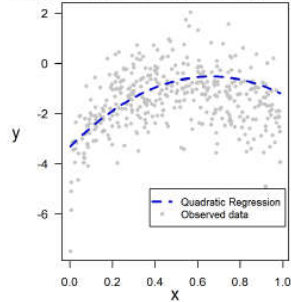
A bit suspicious: middle residuals slightly higher



True effect is u-shaped



Quadratic: true-positive u-shape ($p < .05$)



Diagnostic Plot for True-Positive U-Shape

A bit suspicious also: middle residuals also slightly higher

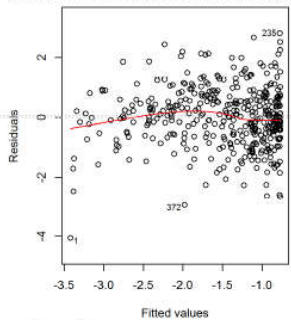


Fig. 4. Diagnostic plots are not diagnostic about u-shapedness
Notes: The data were generated by drawing 400 observations from $U(0,1)$ for x and adding noise $N(0,1)$ to the true y -value (see top-row for true model). Each column has the same dataset for the three charts, but they differ across columns.
R Code to reproduce figure: <https://osf.io/cb7he>