

Get Acquainted with *Quantile Regression*

Agung Santoso
Faculty of Psychology
Universitas Sanata Dharma

Tri Hayuning Tyas
Faculty of Psychology
Universitas Gadjah Mada

This article was written to introduce quantile regression (QR) analysis technique for research in Psychology. The authors present the advantages possessed by QR compared with ordinary least square (OLS) for the regression analysis approach. The QR's main advantage than OLS is the information concerning the effects of the independent variables on the dependent variable at a location other than the mean. QR can also provide information regarding the effect of independent variables on the distribution and skewness of the dependent variable. Another QR's advantage is associated with the robustness against violations of assumptions about the normal distribution of data and homogeneity of variance. These two advantages make the authors feel the need to introduce QR in studies in Psychology. The authors are then applying the QR on real data as an illustration. The results of the analysis in the illustration show the advantages of QR over OLS, especially in providing information on the phenomenon under study.

Keywords: quantile regression, ordinary least squares, assumption violation, robustness, variance heterogeneity

Artikel ini ditulis untuk memperkenalkan teknik analisis regresi kuantil (QR) dalam penelitian di Psikologi. Penulis memaparkan kelebihan-kelebihan yang dimiliki QR dibandingkan analisis regresi dengan pendekatan *ordinary least square* (OLS). Kelebihan utama QR dibandingkan OLS adalah informasi mengenai efek variabel independen terhadap variabel dependen pada lokasi selain rerata. QR juga dapat memberikan informasi mengenai efek variabel independen terhadap sebaran dan kejulungan variabel dependen. Kelebihan QR yang lain terkait dengan ketangguhan (*robustness*) terhadap pelanggaran asumsi mengenai distribusi data yaitu normalitas dan homogenitas varian. Dua kelebihan ini lah yang membuat penulis merasa perlu untuk memperkenalkan QR dalam penelitian-penelitian di Psikologi. Penulis kemudian mengaplikasikan QR pada data riil sebagai ilustrasi. Hasil analisis dalam ilustrasi menunjukkan kelebihan QR dibandingkan OLS khususnya dalam memberikan informasi mengenai fenomena yang diteliti.

Kata kunci: regresi kuantil, ordinary least squares, pelanggaran asumsi, tangguh (*robust*), heterogenitas varian

Regression analysis is a technique that is often used in studies of psychology. Flexibility, compactness and the existence of a variety of software options that further facilitate the application of regression analysis on substantive research is the main reason behind the high frequency of use of this analysis. Regression allows researchers to involve the independent variable (IV) with a continuum and/or discrete of data. The regression model also allows researchers to estimate the non-linear

relationship between the IV and the dependent variable (DV), so far as the non-linear relationship does not involve regression coefficients as, for example, rank numbers. For instance, model like $y_i = x_{1i}^{\beta_1} + \beta_2 \log(x_{2i}) + e_i$ cannot be estimated using regression model. The regression model can easily develop into the more complex analysis, like factor analysis and structural equation modeling.

There are several ways to do parameter estimation in regression, like ordinary least squares (OLS), weighted least square (WLS), maximum likelihood (ML), and least absolute deviation (LAD). Among the various ways, the OLS is an estimation technique that most often used by researchers in psycho-

Correspondence concerning this article should be addressed to Agung Santoso, Universitas Sanata Dharma Paingan, Maguwoharjo, Depok, Sleman, Yogyakarta 55281. E-mail: agungsan_psy@yahoo.com