Statistical Test Comparison

Feature / Test	Durbin-Watson (DW) Test	Breusch-Godfrey (BG) Test	Breusch-Pagan (BP) Test	White Test	Jarque-Bera (JB) Test	Shapiro-Wilk (SW) Test	Variance Inflation Factor (VIF)
Purpose	Detect 1st-order autocorrelation in regression residuals.	Detect higher-order autocorrelation in regression residuals.	Detect heteroscedasticity (non-constant variance of errors).	Detect general heteroscedasticity.	Test for normality of residuals (based on skewness & kurtosis).	Test for normality of residuals (general goodness-of-fit).	Quantify multicollinearity (how much variance of a coefficient is inflated).
H_0 (Null Hypothesis)	No 1st-order autocorrelation.	No autocorrelation up to specified order p.	Homoscedasticity (constant error variance).	Homoscedasticity (constant error variance).	Residuals are normally distributed.	Residuals are normally distributed.	(Diagnostic, no formal H_0)
H_1 (Alternative Hypothesis)	Positive or negative 1st-order autocorrelation.	Autocorrelation exists.	Heteroscedasticity exists.	Heteroscedasticity exists.	Residuals are not normally distributed.	Residuals are not normally distributed.	(Diagnostic, no formal H_1)
Test Statistic Range	0 to 4	Typically χ^2 (Chi-squared) distributed.	χ^2 distributed.	χ^2 distributed.	χ^2 distributed.	0 to 1	≥ 1
Interpretation / Cutoff	• ≈ 2: No autocorrelation. • < 2: Positive autocorrelation. • > 2: Negative autocorrelation. • Exact cutoffs depend on n and k (use tables).	• Compare p-value to α. • If p-value $< \alpha$, reject H_0.	• Compare p-value to α. • If p-value $< \alpha$, reject H_0.	• Compare p-value to α. • If p-value $< \alpha$, reject H_0.	• Compare p-value to α. • If p-value $< \alpha$, reject H_0.	• Compare p-value to α. • If p-value $< \alpha$, reject H_0. • (Higher p-value means more evidence for normality)	• ≈ 1: No multicollinearity. • $1 <$ VIF < 5: Moderate. • ≥ 5 or ≥ 10: Significant multicollinearity.
Common Use Cases/Context	Time series regression (checks for AR(1) errors).	Time series regression (more general than DW, handles AR(p) and MA(p) errors, lagged dependent variables).	Cross-sectional regression, time series regression.	Cross-sectional regression, time series regression (more robust to model misspecification than BP).	Checks assumption for OLS inference; often used after fitting.	Checks assumption for OLS inference; generally preferred for smaller samples.	Identifying problematic predictor variables in multiple regression.
Limitations	Only for 1st-order AR errors, doesn't work with lagged dependent variables.	Can be sensitive to model misspecification.	Can be sensitive to model misspecification.	Can be less powerful than BP if BP's assumptions hold; doesn't indicate source of heteroscedasticity.	Sensitive to sample size (often rejects for large n even with minor non-normality).	Less powerful than JB for large samples; specific to normality.	Only detects linear relationships; doesn't fix multicollinearity, only identifies it.

End of table