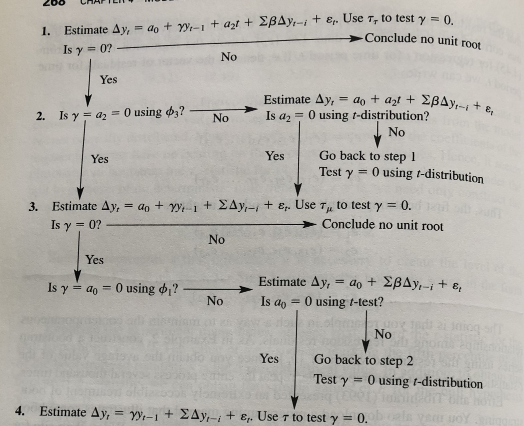

FIGURE A2.1 A Procedure to Test for Unit Roots

deterministic trend term $a_2 t$, the null hypothesis $\gamma = 0$ can be tested using a t-distribution if you estimate the model in the form of (4.25). However, if the superfluous deterministic trend is included, there is a substantial loss of power. As such, papers such as Dolado, Jenkinson, and Sosvilla–Rivero (1990) suggested a procedure to test for a unit root when the form of the data-generating process is *completely* unknown. The following is a straightforward modification of the method:

STEP 1: As shown in Figure A2.1, start with the least restrictive of the plausible models (which will generally include a trend and drift) and use the τ_τ statistic to test the null hypothesis $\gamma = 0$. Thus, in the most general case, you estimate the model in the form of (4.25) so that $\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \Sigma\beta_i\Delta y_{t-i}$. Unit root tests have low power to reject the null hypothesis; hence, if the null hypothesis of a unit root is *rejected*, there is no need to proceed. Conclude that the $\{y_t\}$ sequence does not contain a unit root.

STEP 2: If the null hypothesis is *not rejected*, the next step is to determine whether the trend belongs in the estimating equation. Toward this end, you test the null hypothesis $a_2 = \gamma = 0$ using the ϕ_3 statistic. If you do not reject the null hypothesis, assume the absence of a trend and proceed to Step 3.

If you have reached this point, it is because the τ_τ test indicates that there is a unit root, and the ϕ_3 test indicates that γ and/or a_2 differs from zero.