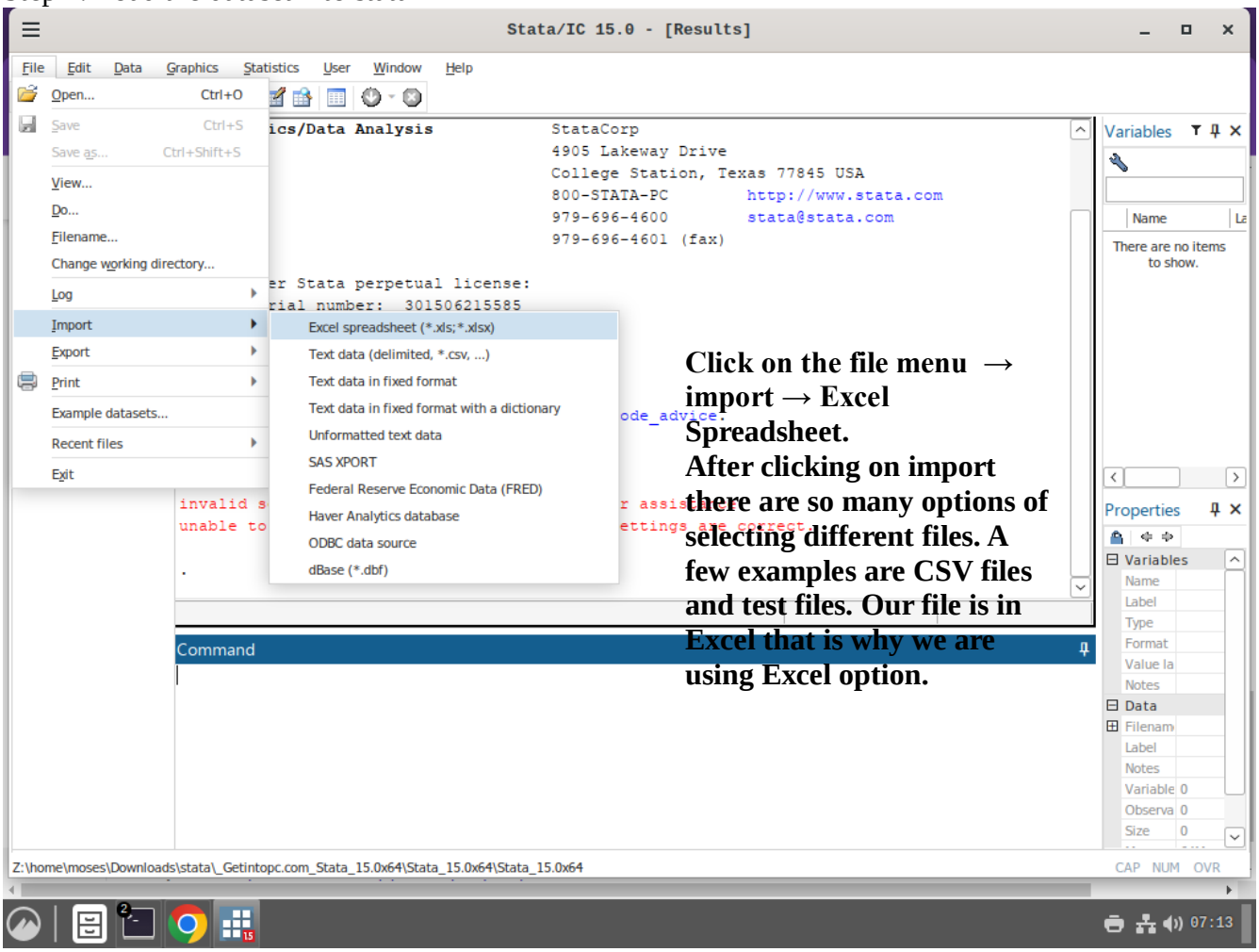
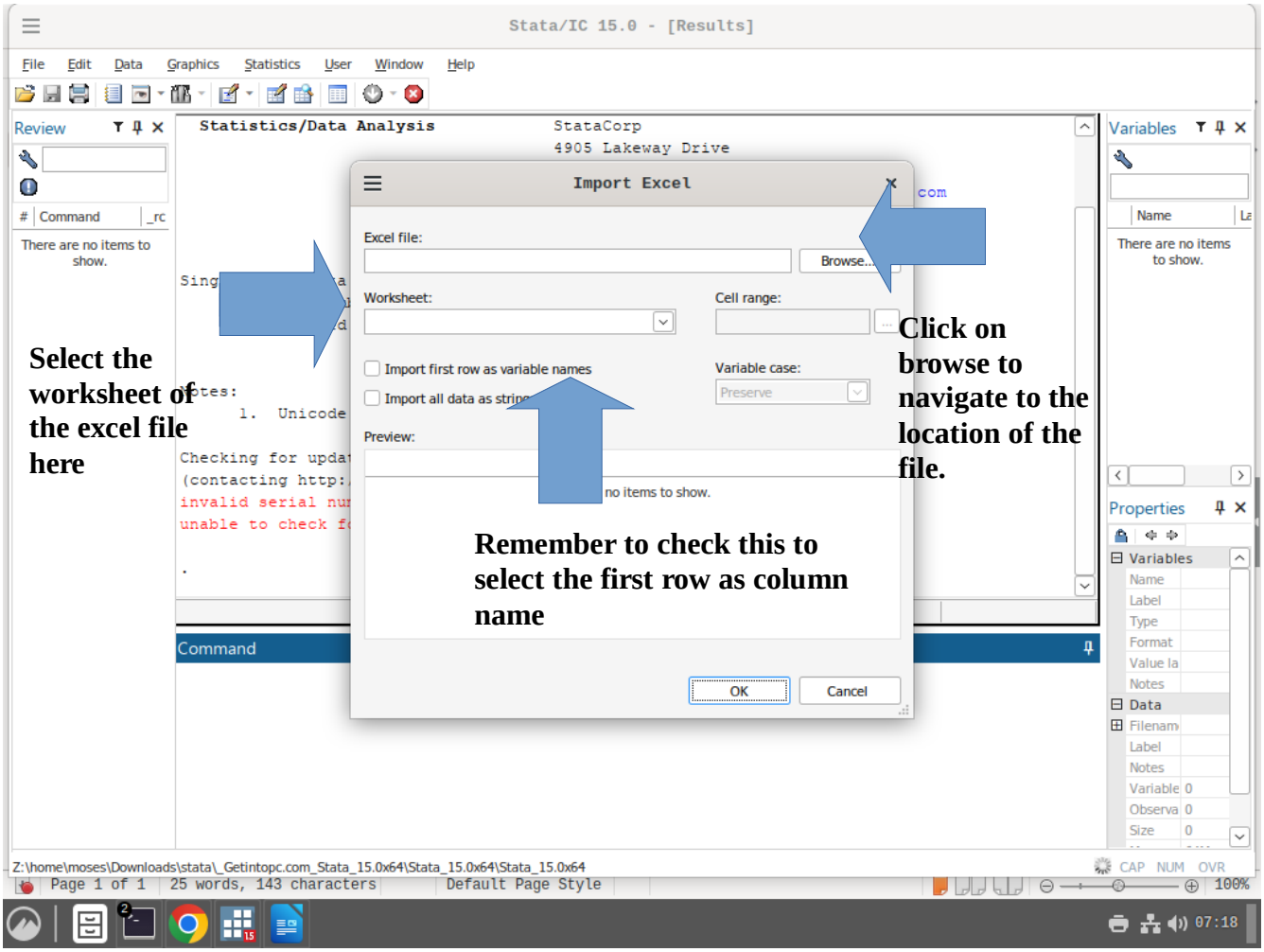
Fitting an ARIMA model in Stata Using Box-jenkins Approach

Step 1: Load the dataset into stata

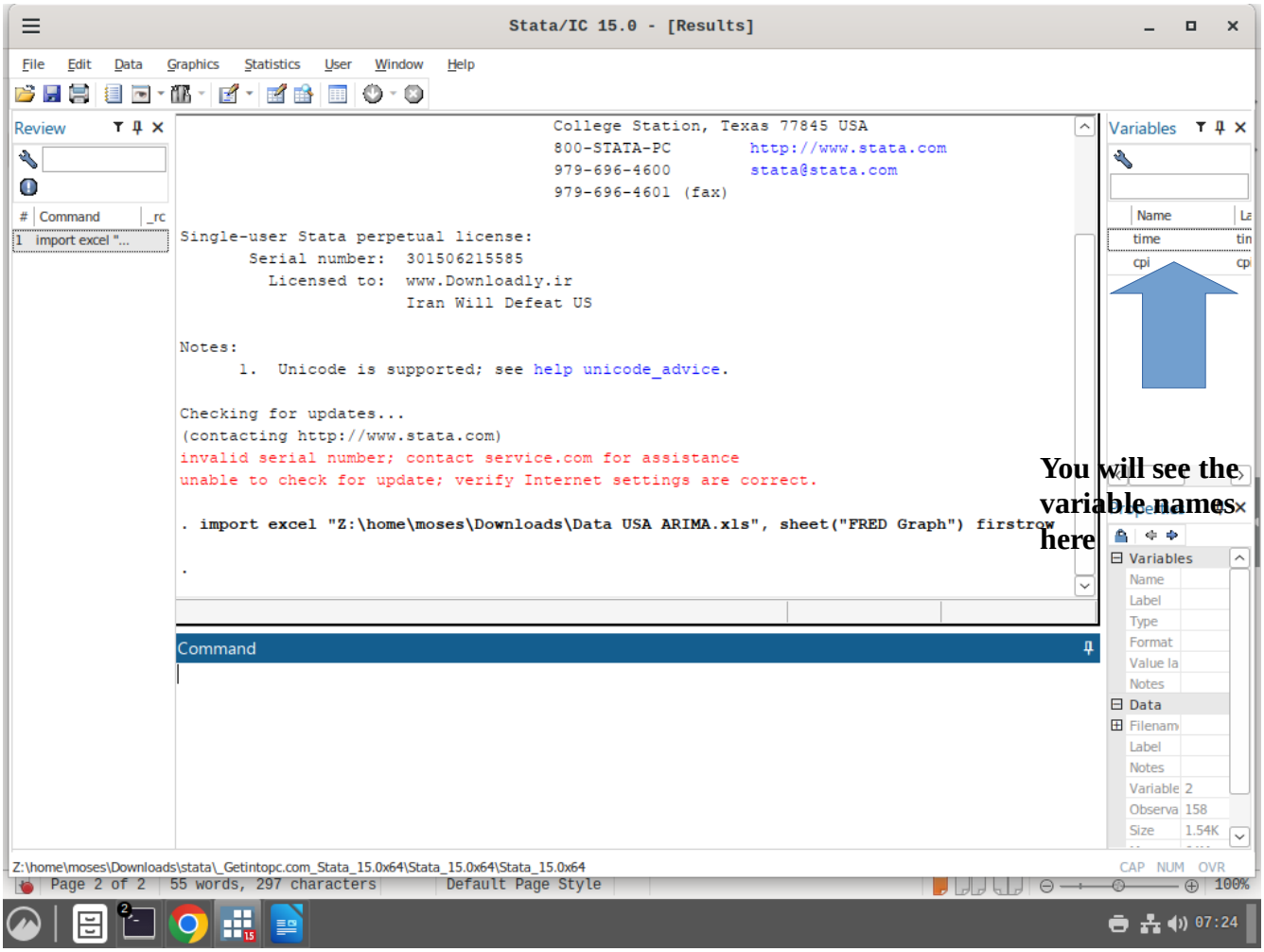


Click on the file menu → import → Excel Spreadsheet.
After clicking on import there are so many options of selecting different files. A few examples are CSV files and test files. Our file is in Excel that is why we are using Excel option.

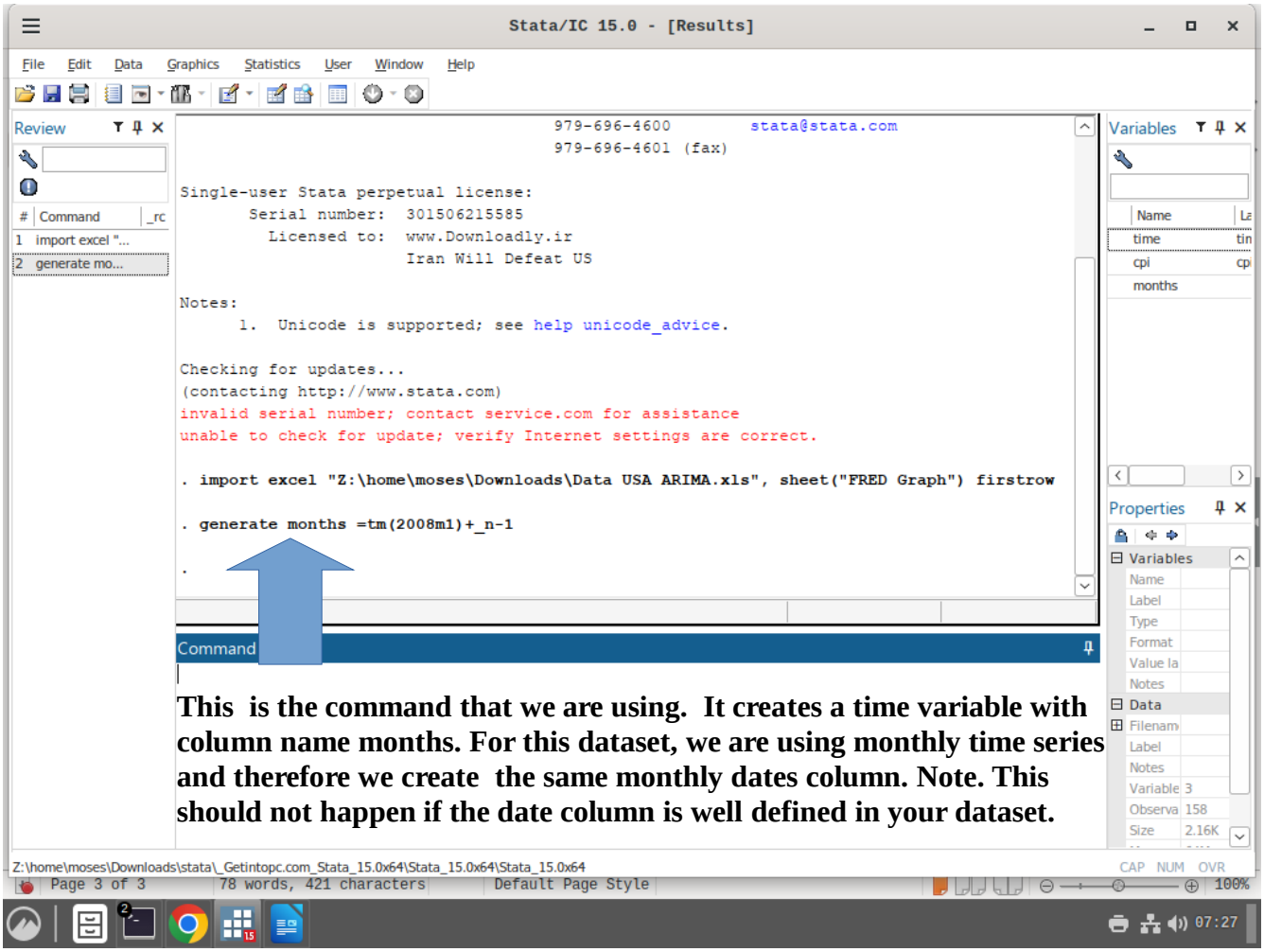
After clicking the above this is what will appear.



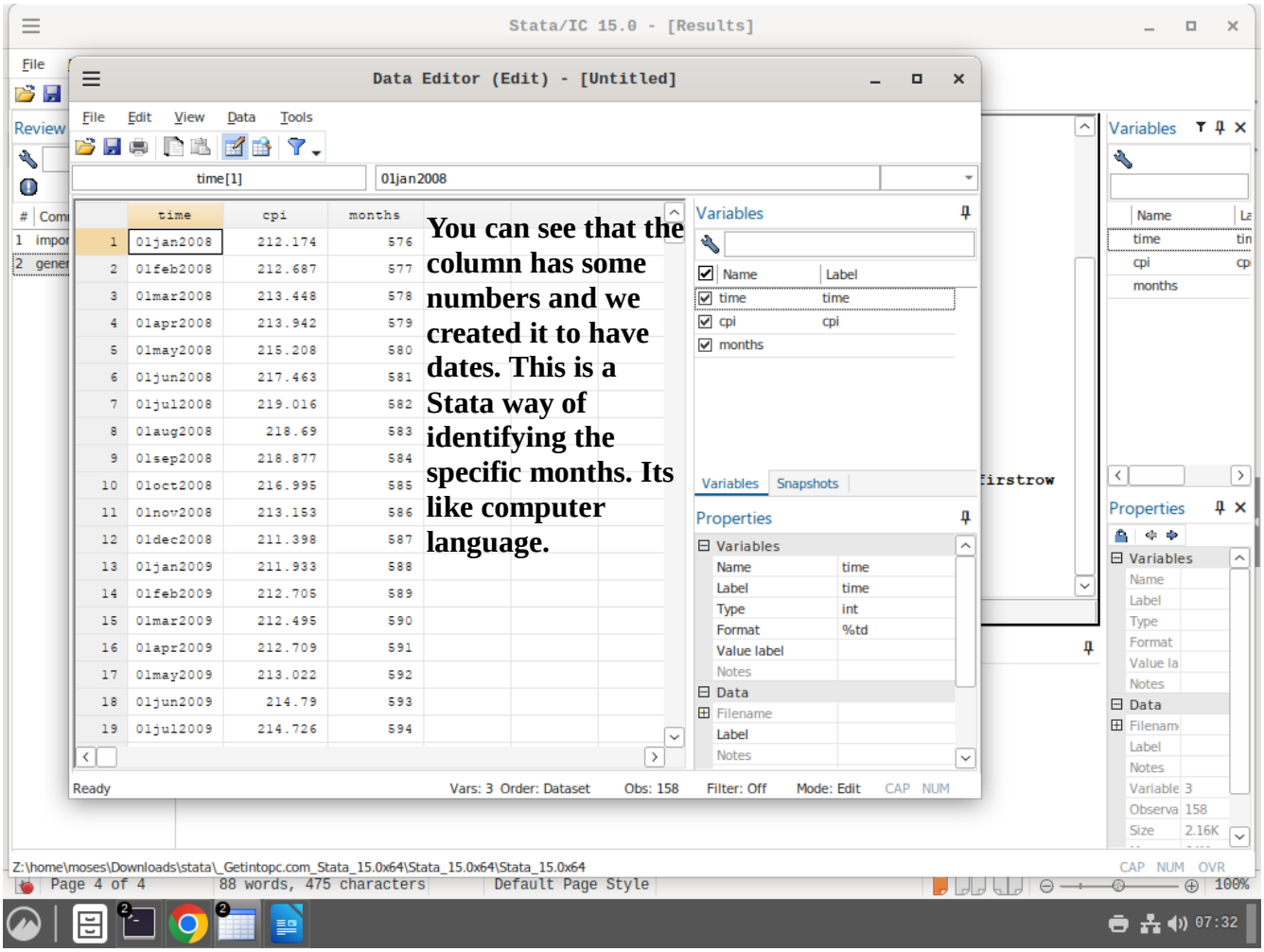
Once you have done the above, click okay and the file will be loaded to stata. The below image shows shows the evidence of the Data set loaded into stata.



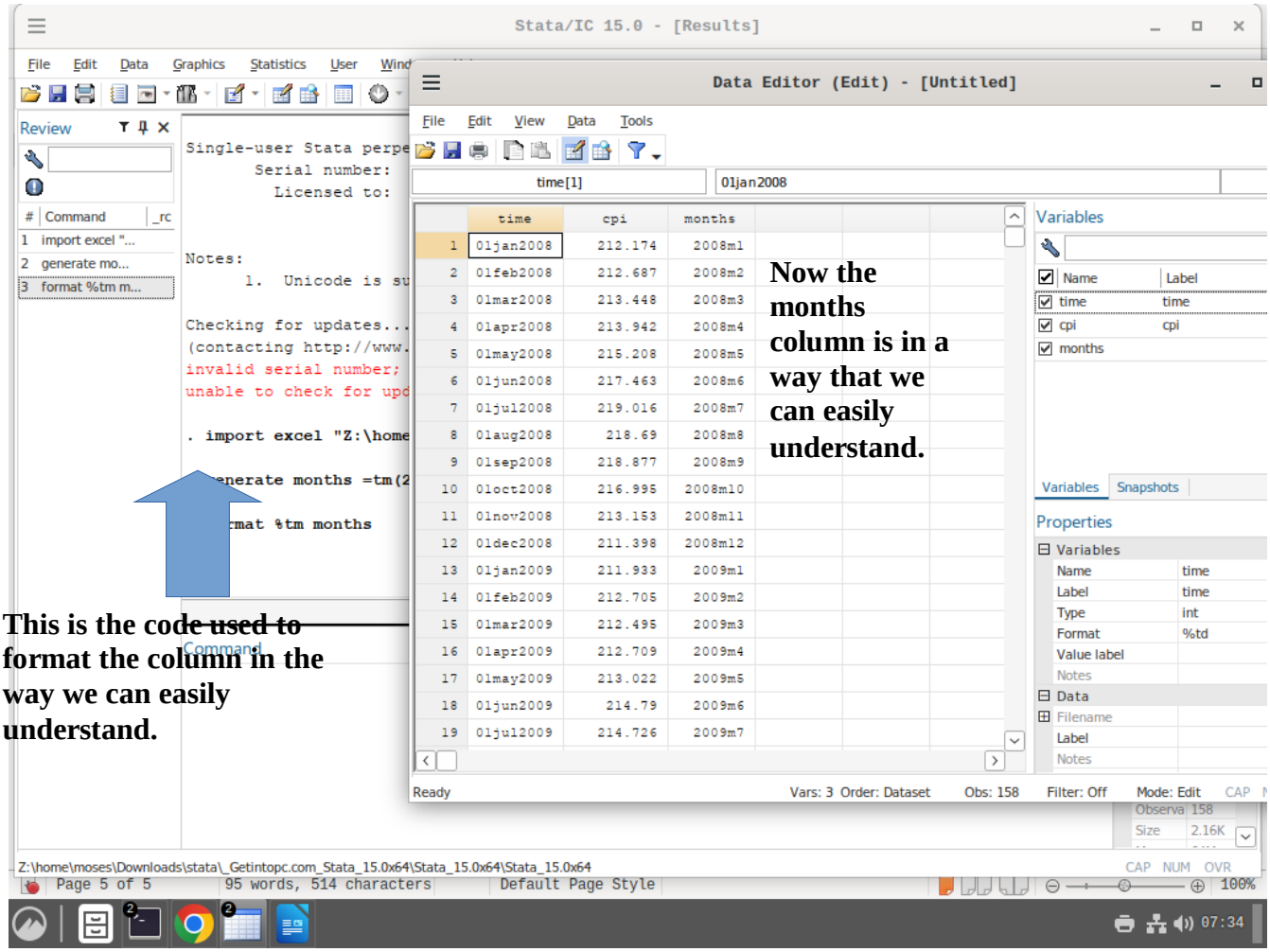
Now, its time we create a date variable because this dataset does not have a good date variable. We use the command below.



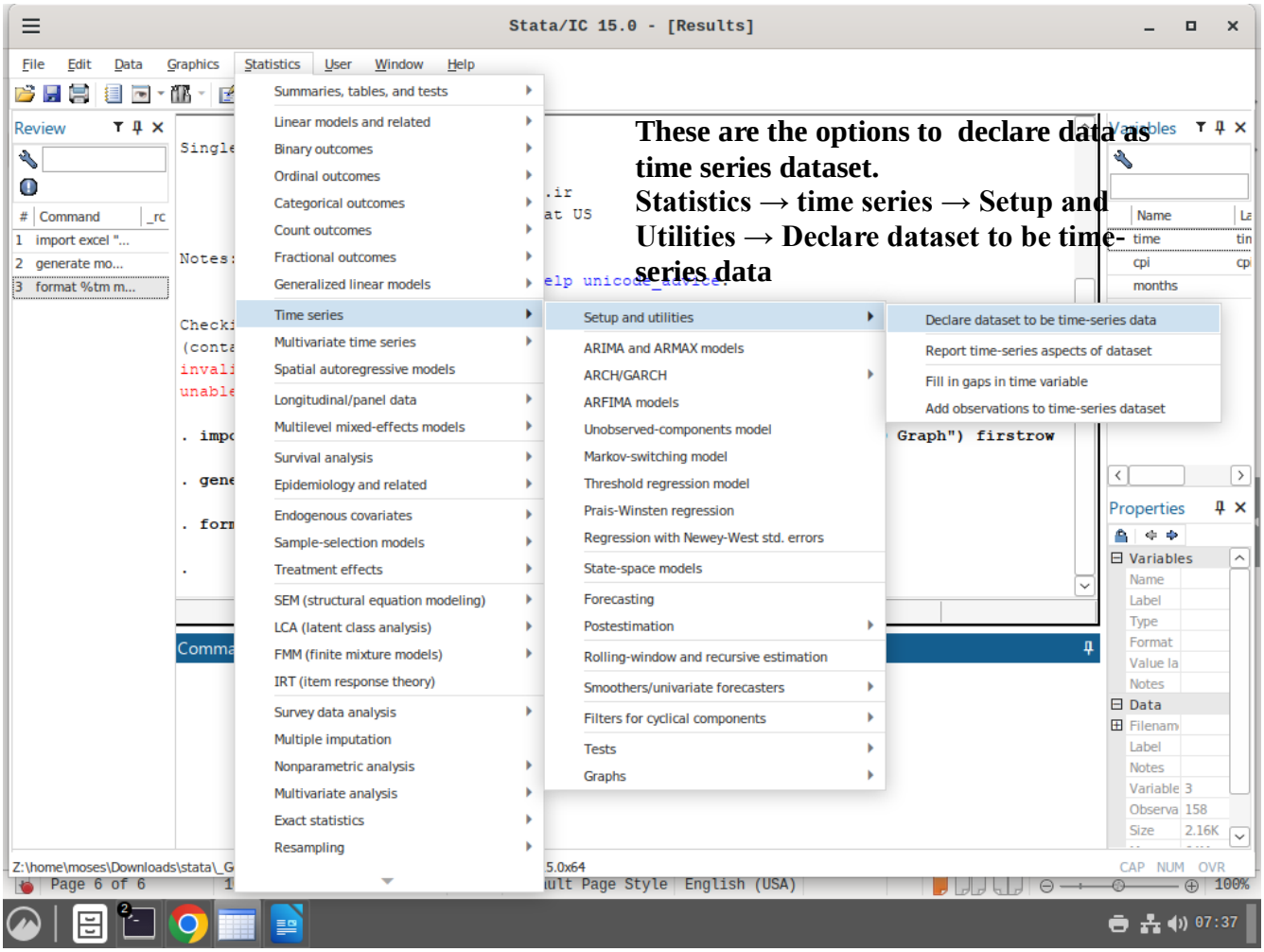
Lets look at the months column that we have created.



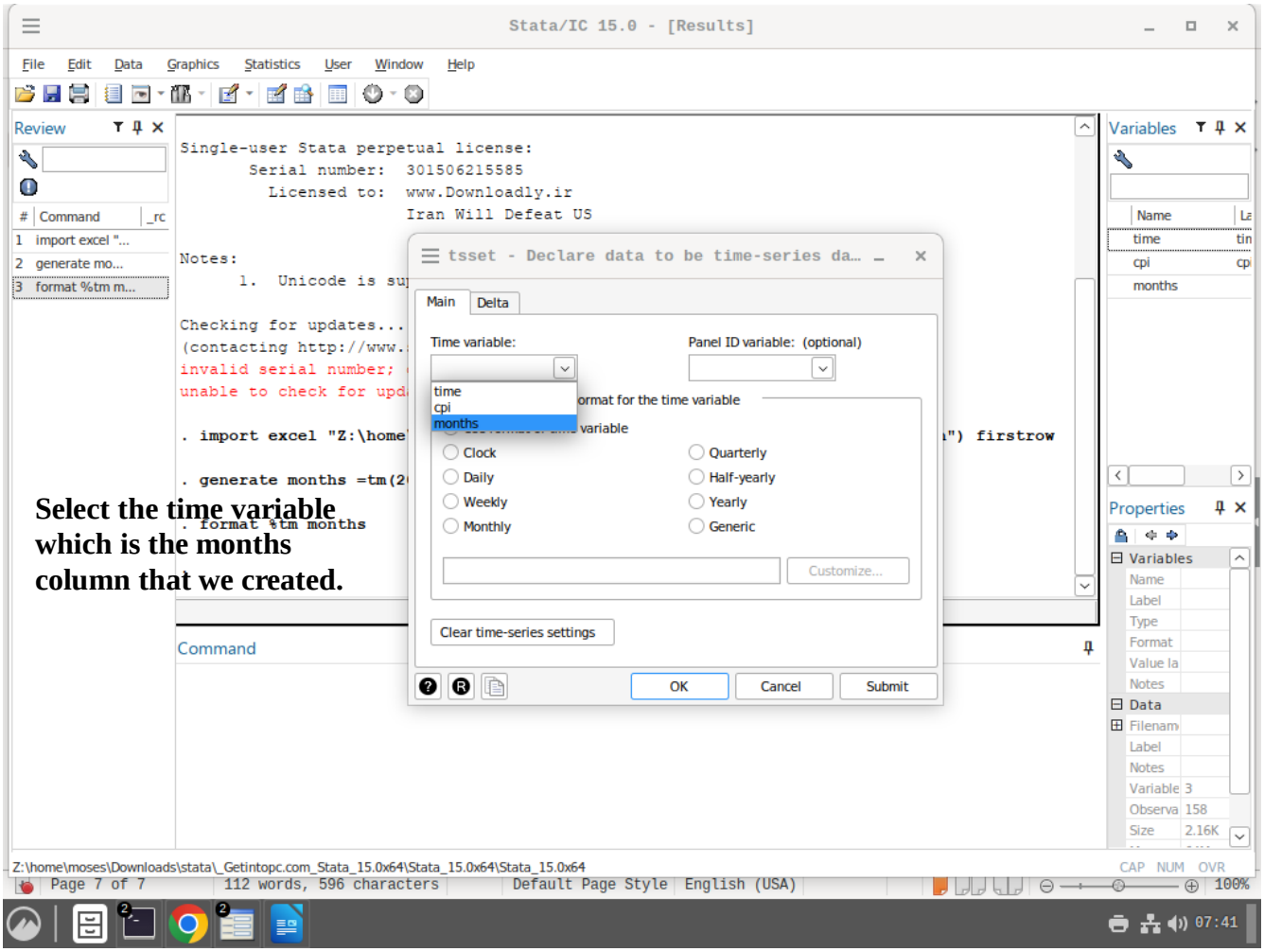
Lets format the months column very well



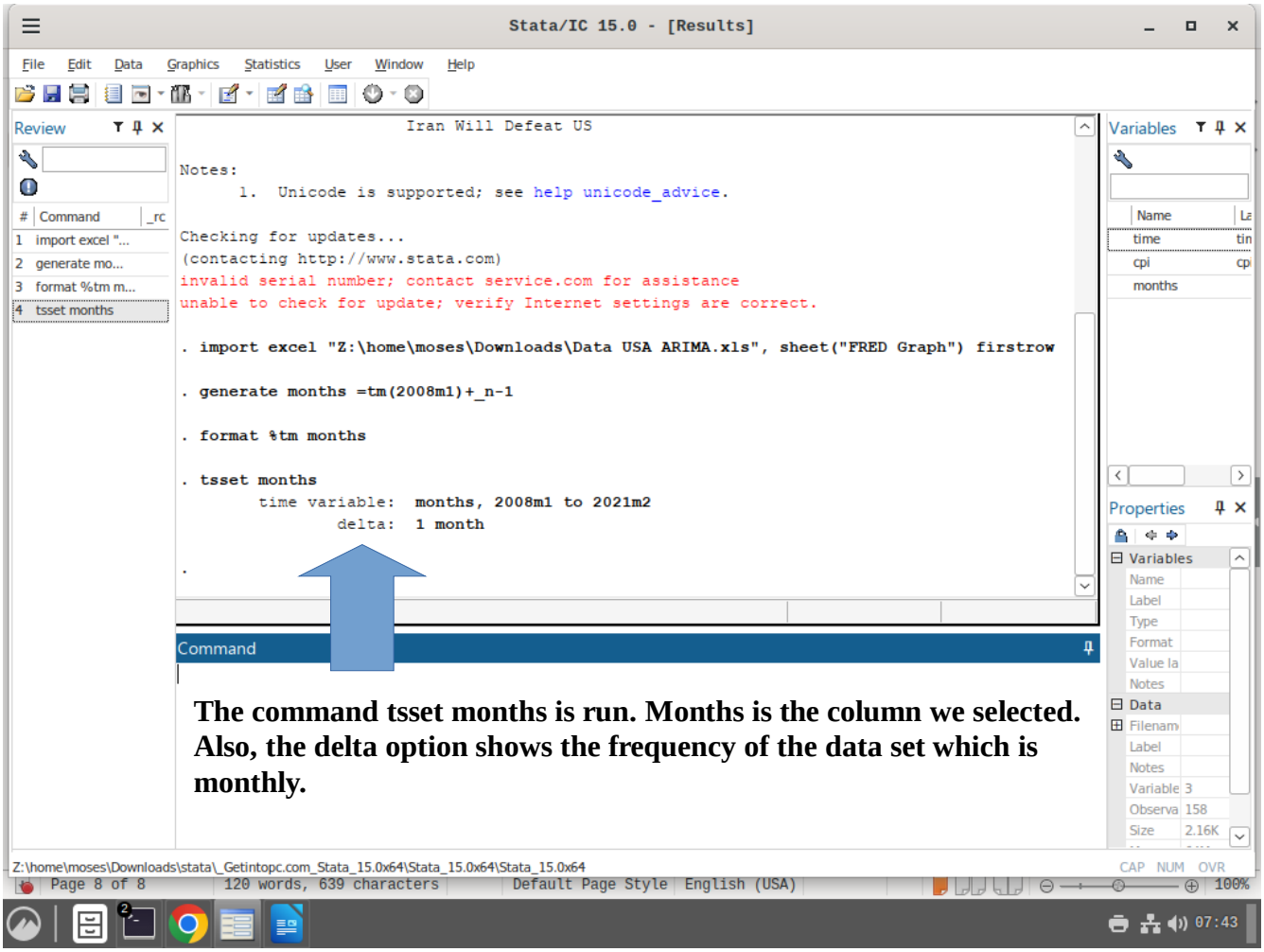
step 2: set the data set as time series



If you click on it, the following appears.

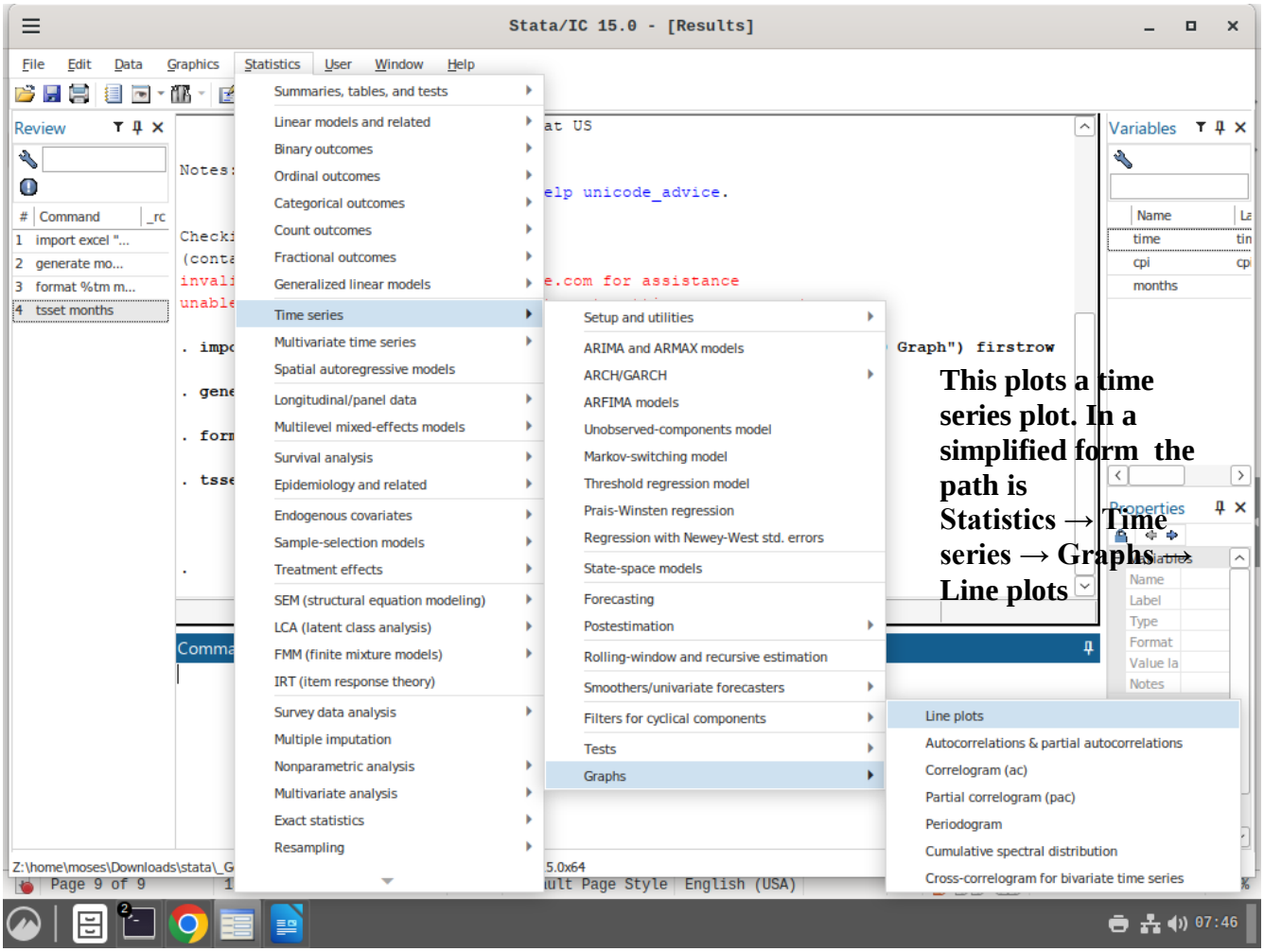


On the output window this is what appears.

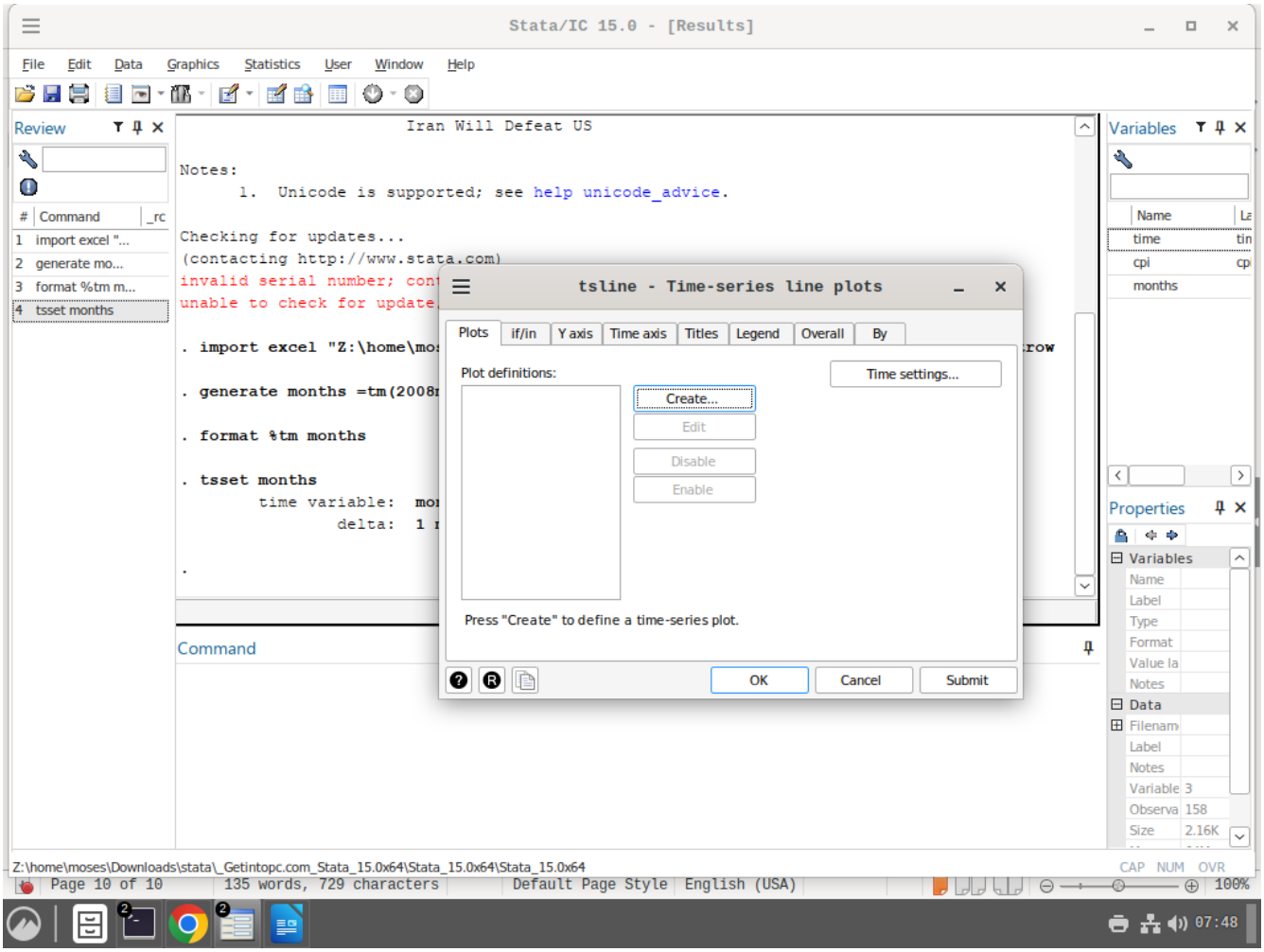


Step 3: Checking for stationary

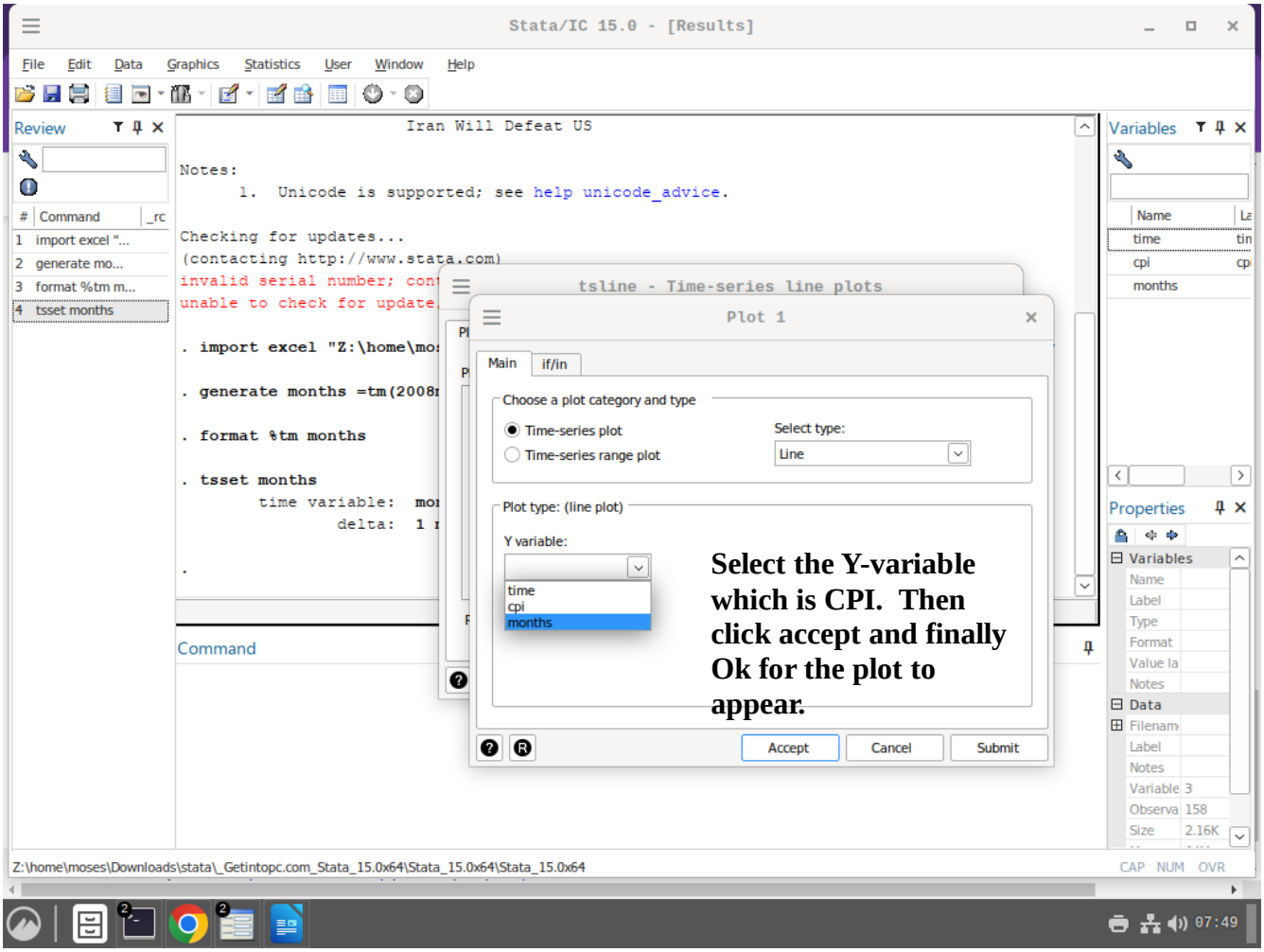
First we start with the visual inspection of the dataset.



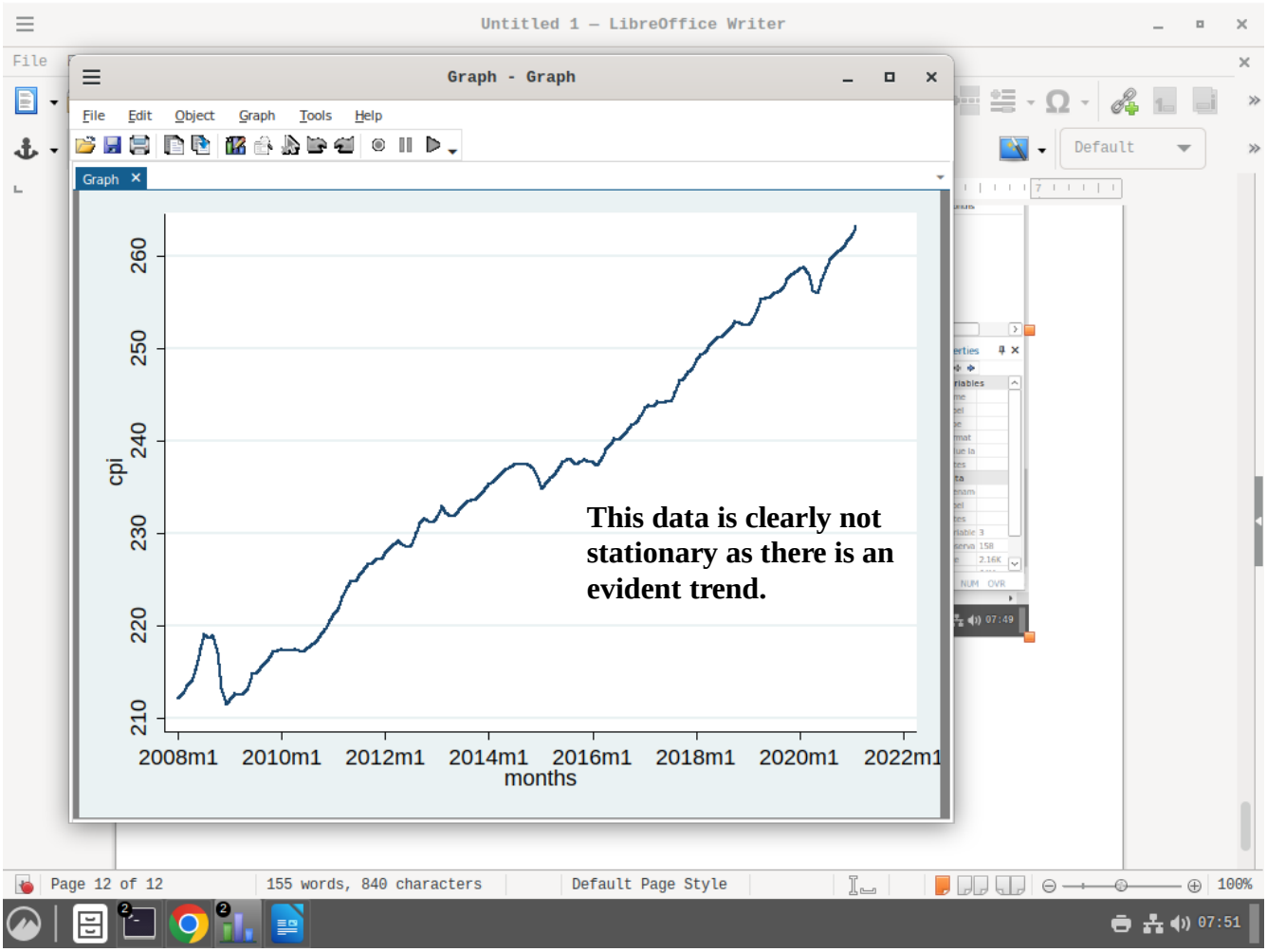
The following dialog box appears.



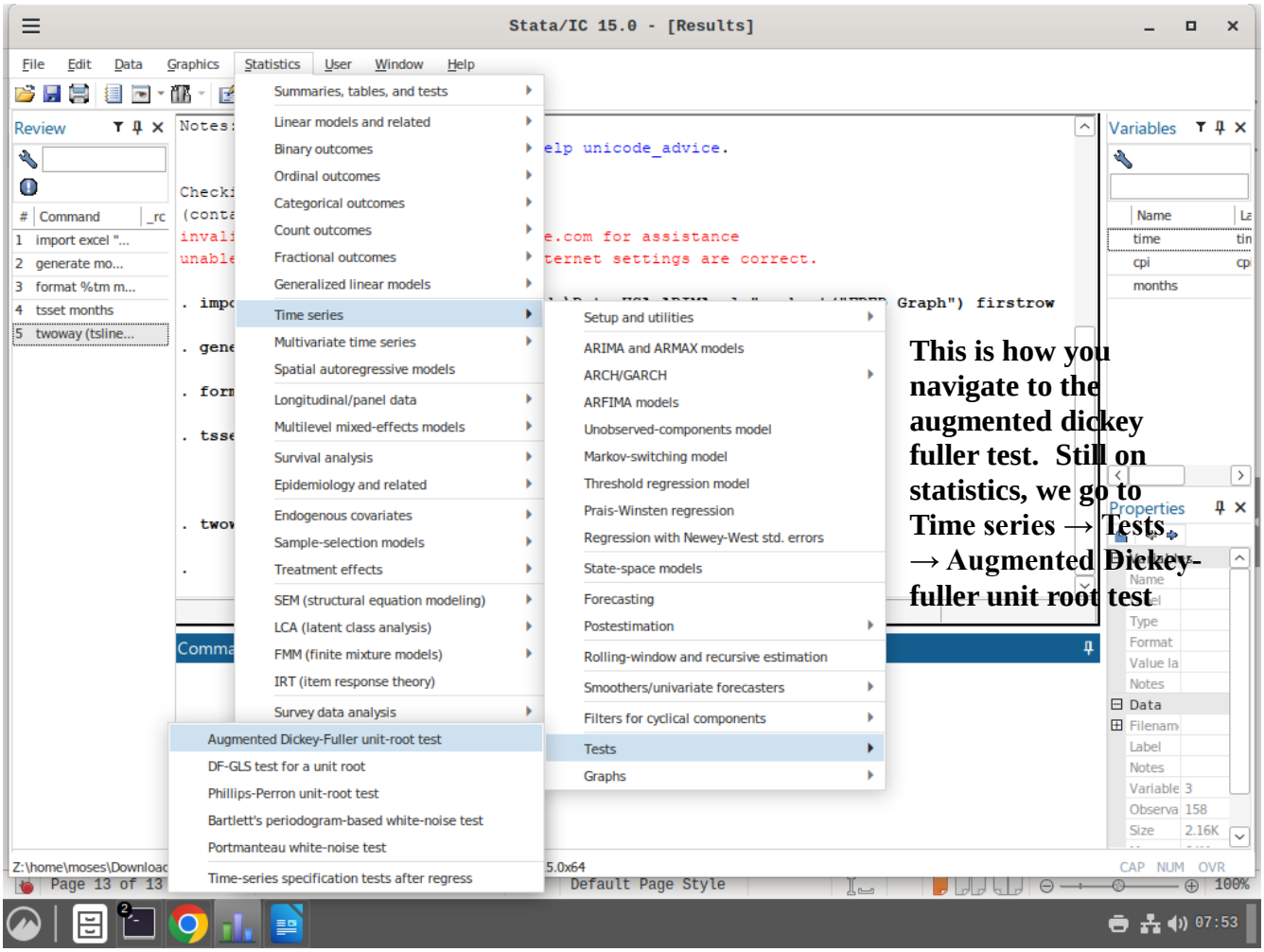
Click on create and another window appears that we will use to create a plot.



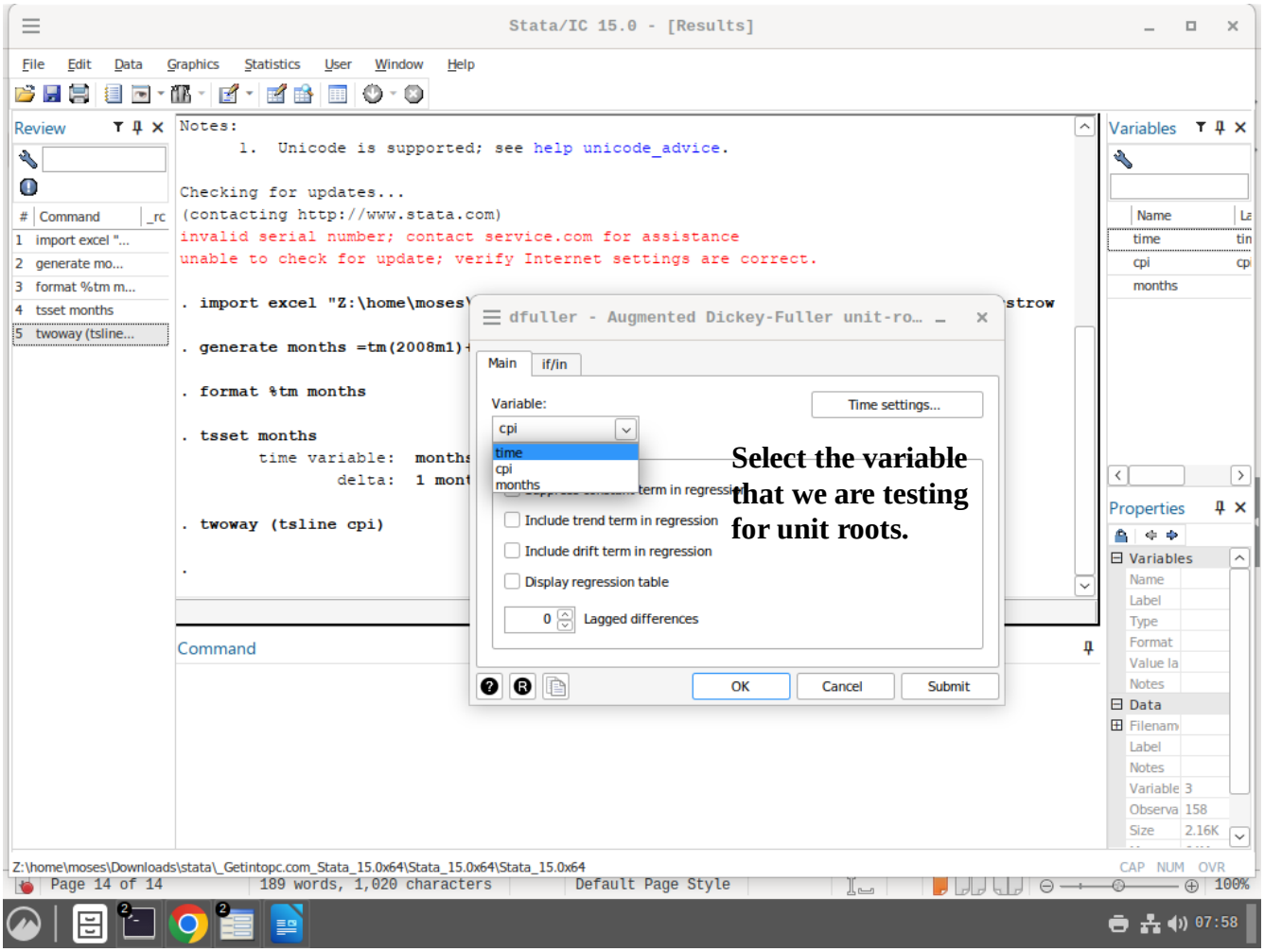
The following is a plot the opens on a new window.



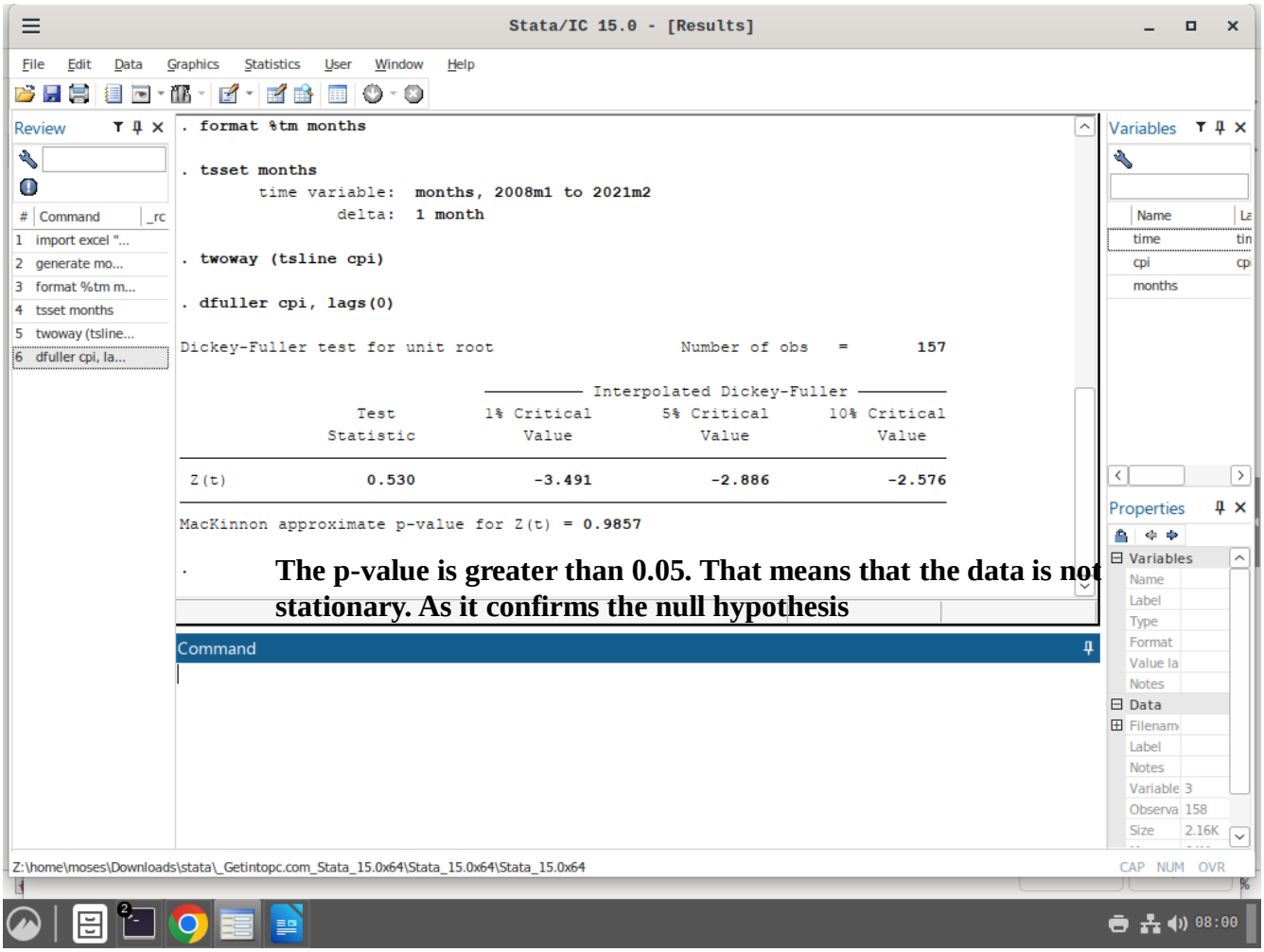
Lets check for stationarity using a statistical test. Lets just use Dickey fuller test



This is what appears when you click on it.

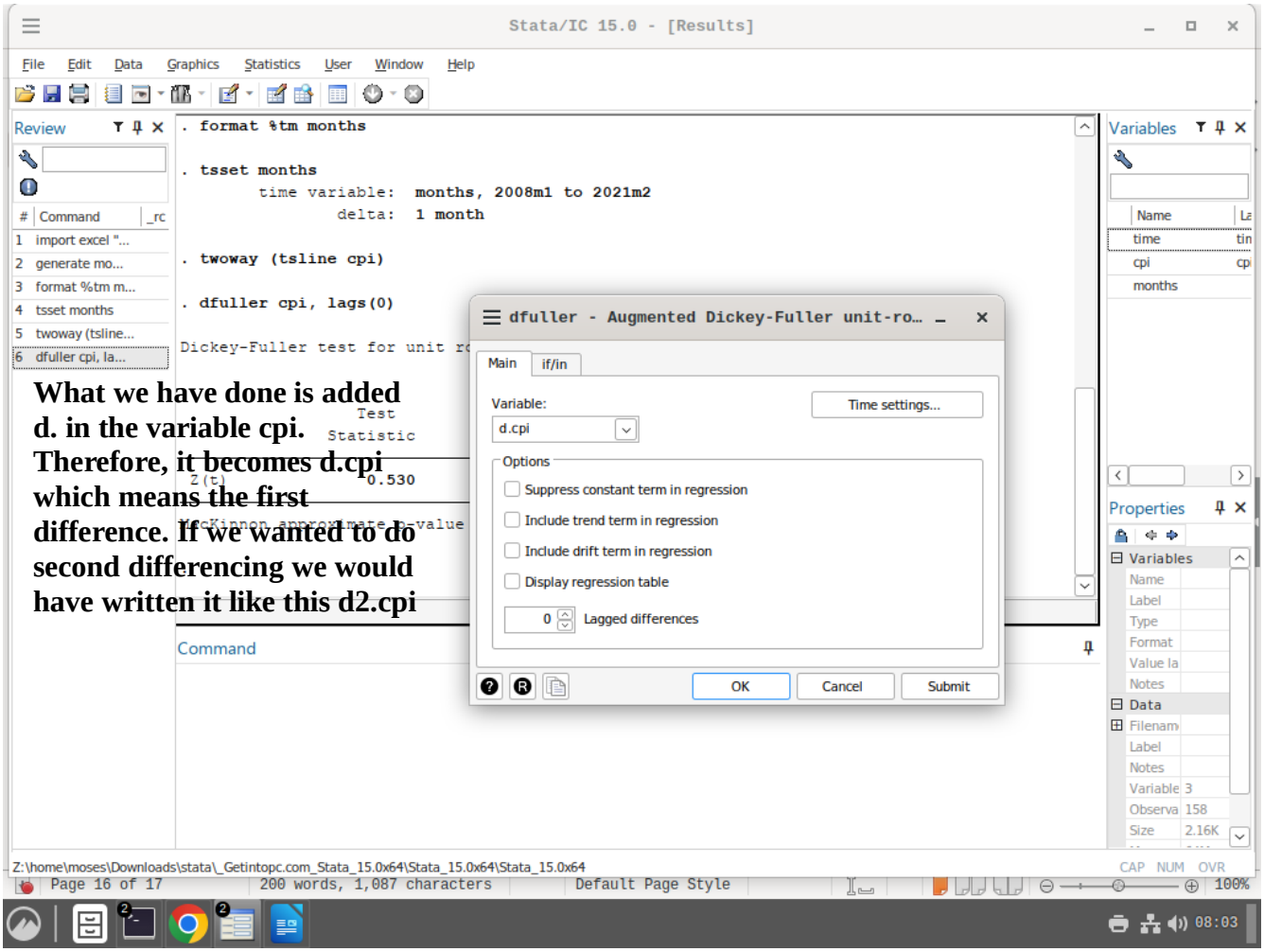


Lets see the results and interpret

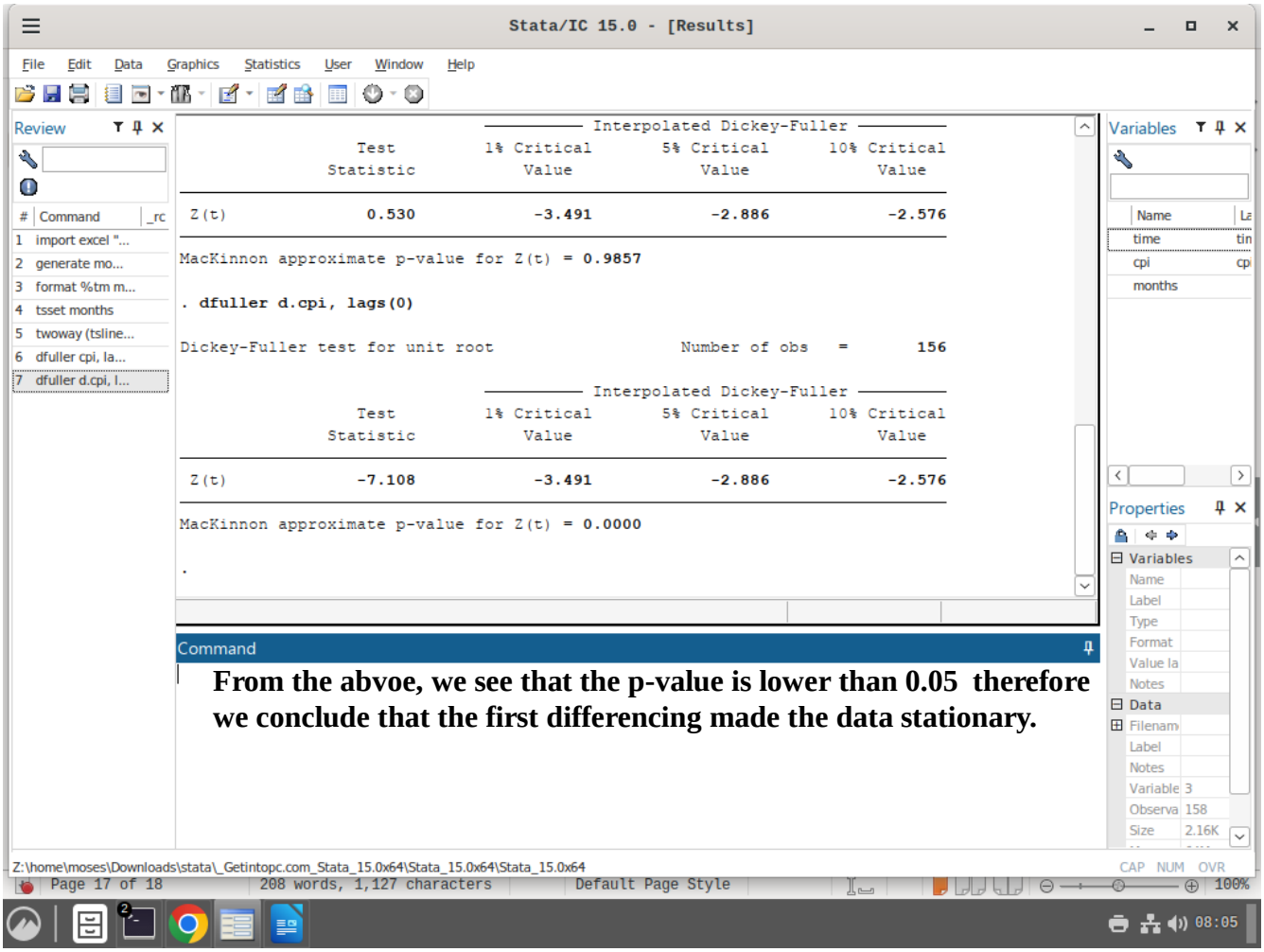


The p-value is greater than 0.05. That means that the data is not stationary. As it confirms the null hypothesis

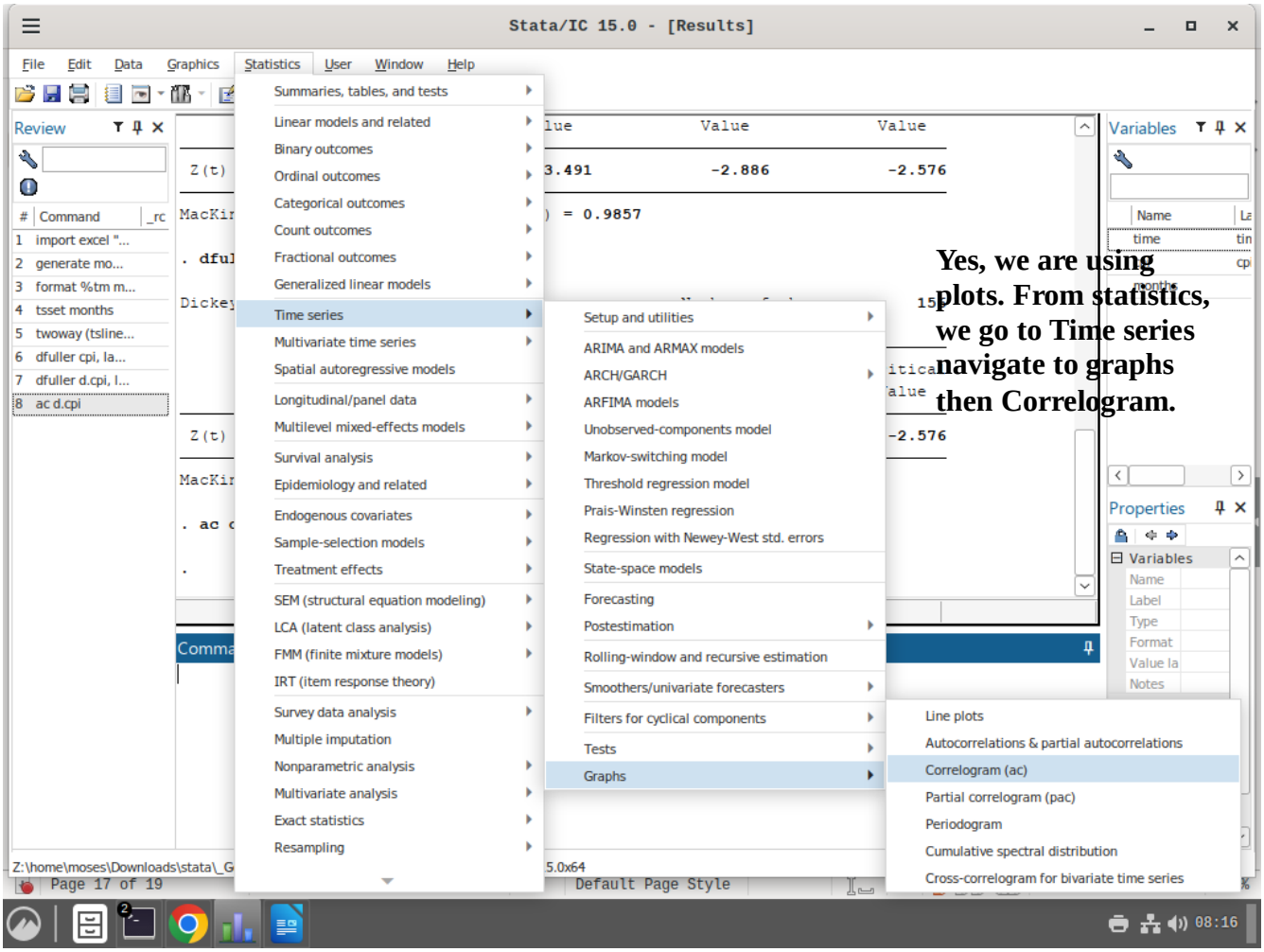
Step 3: differencing if necessary



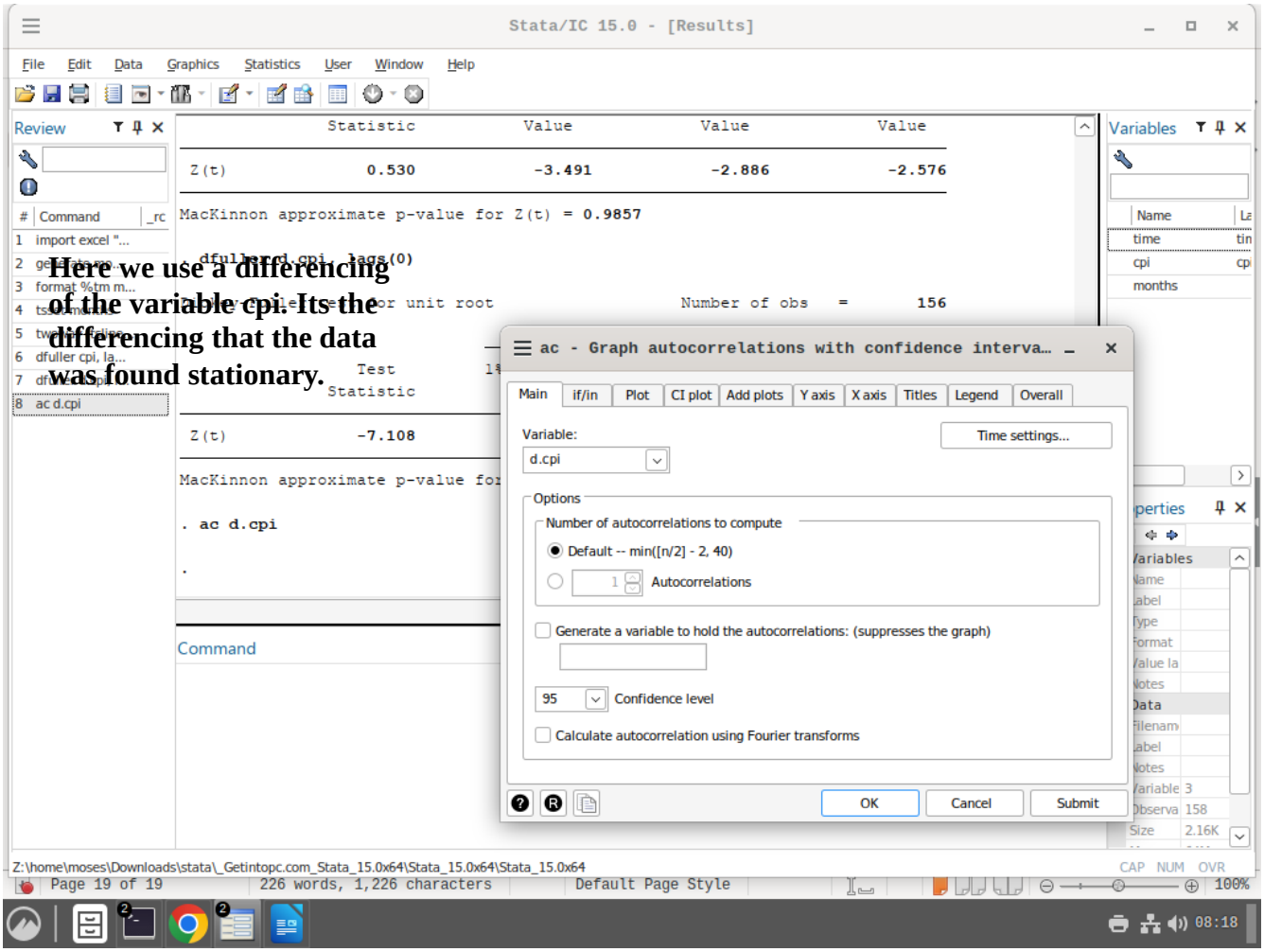
The results of the above is shown below.



Step 5: Determine the ma values using ACF plots

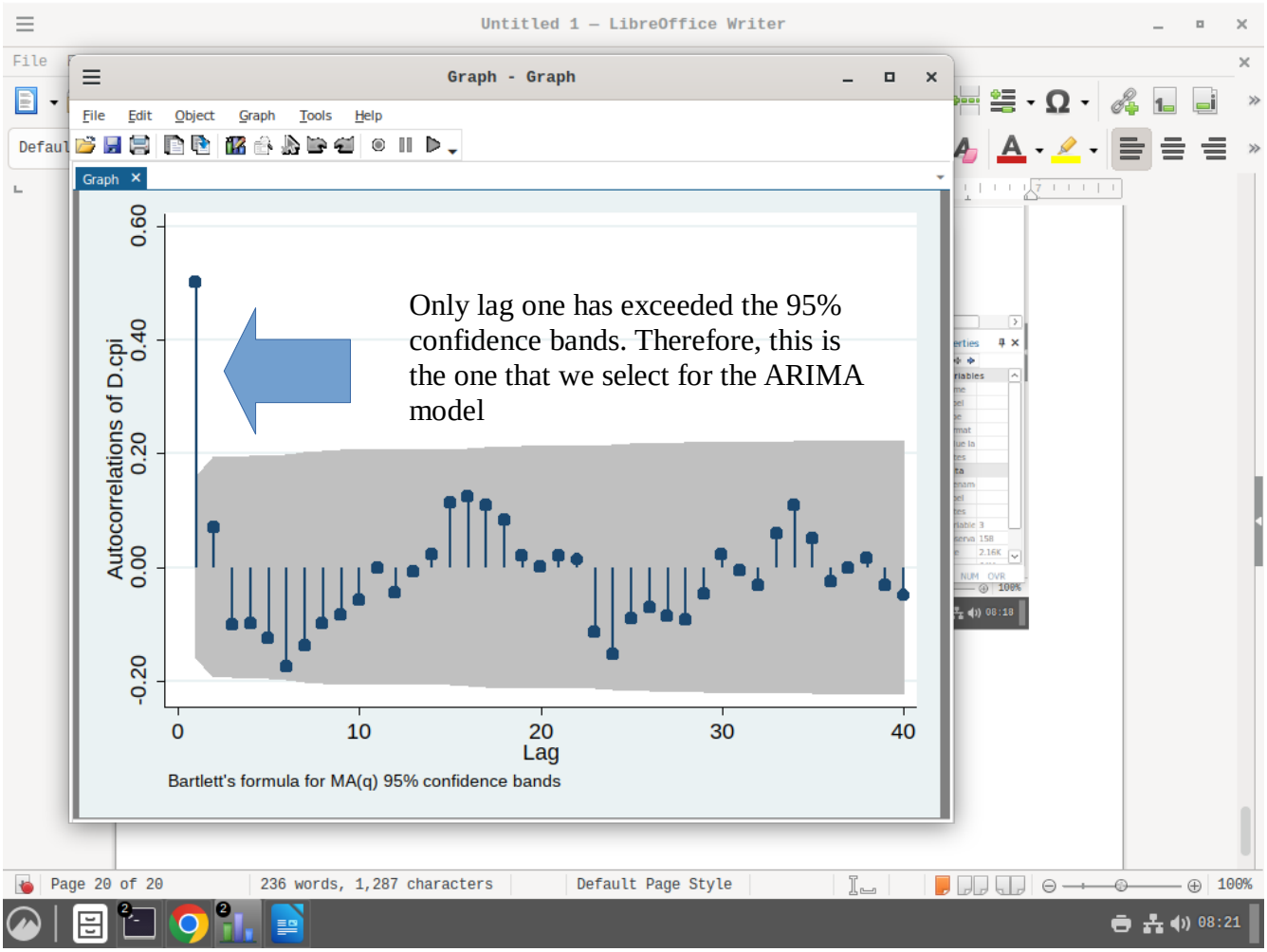


After clicking the above, we see the following window.

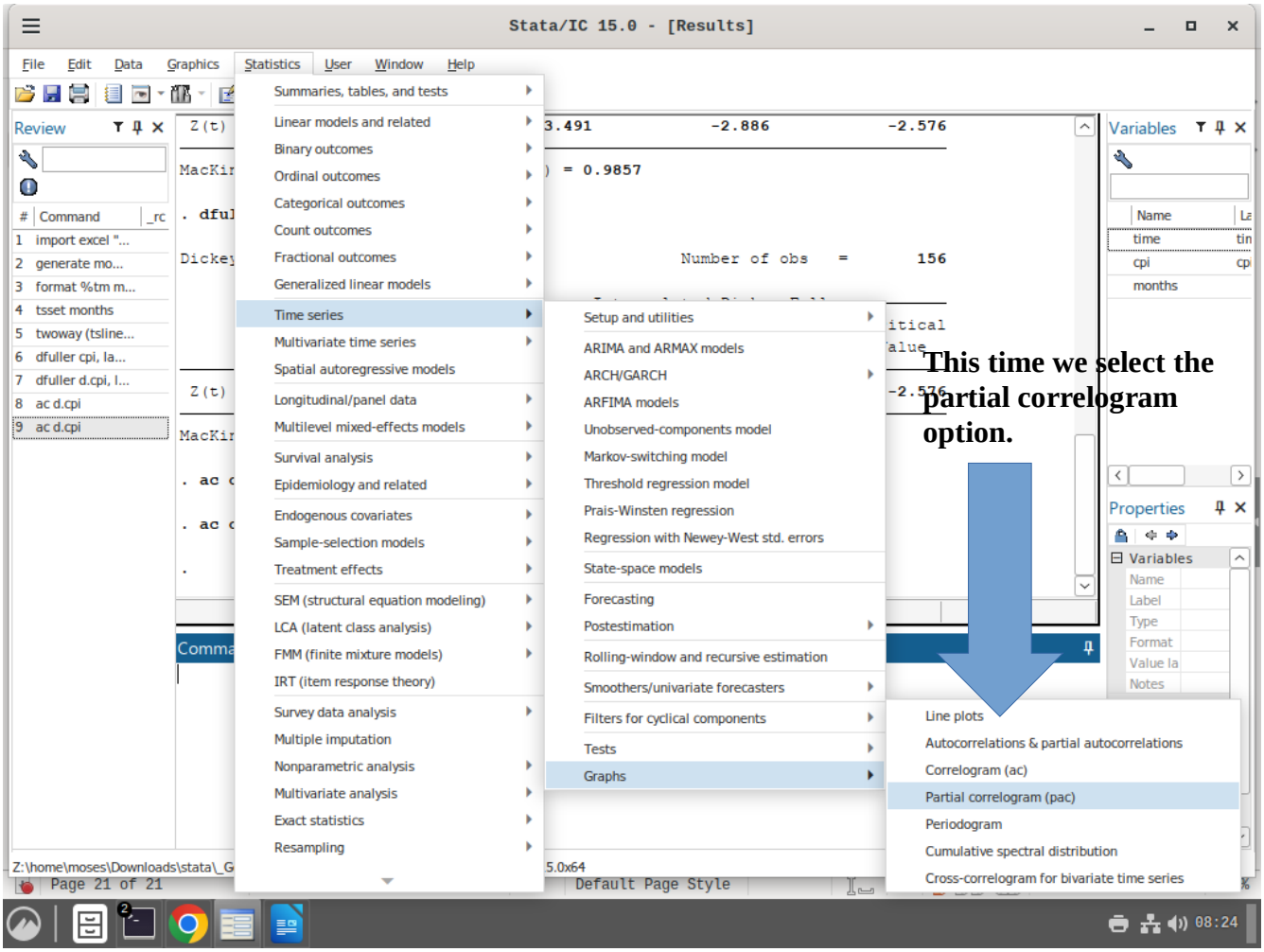


Here we use a differencing of the variable cpi. Its the differencing that the data was found stationary.

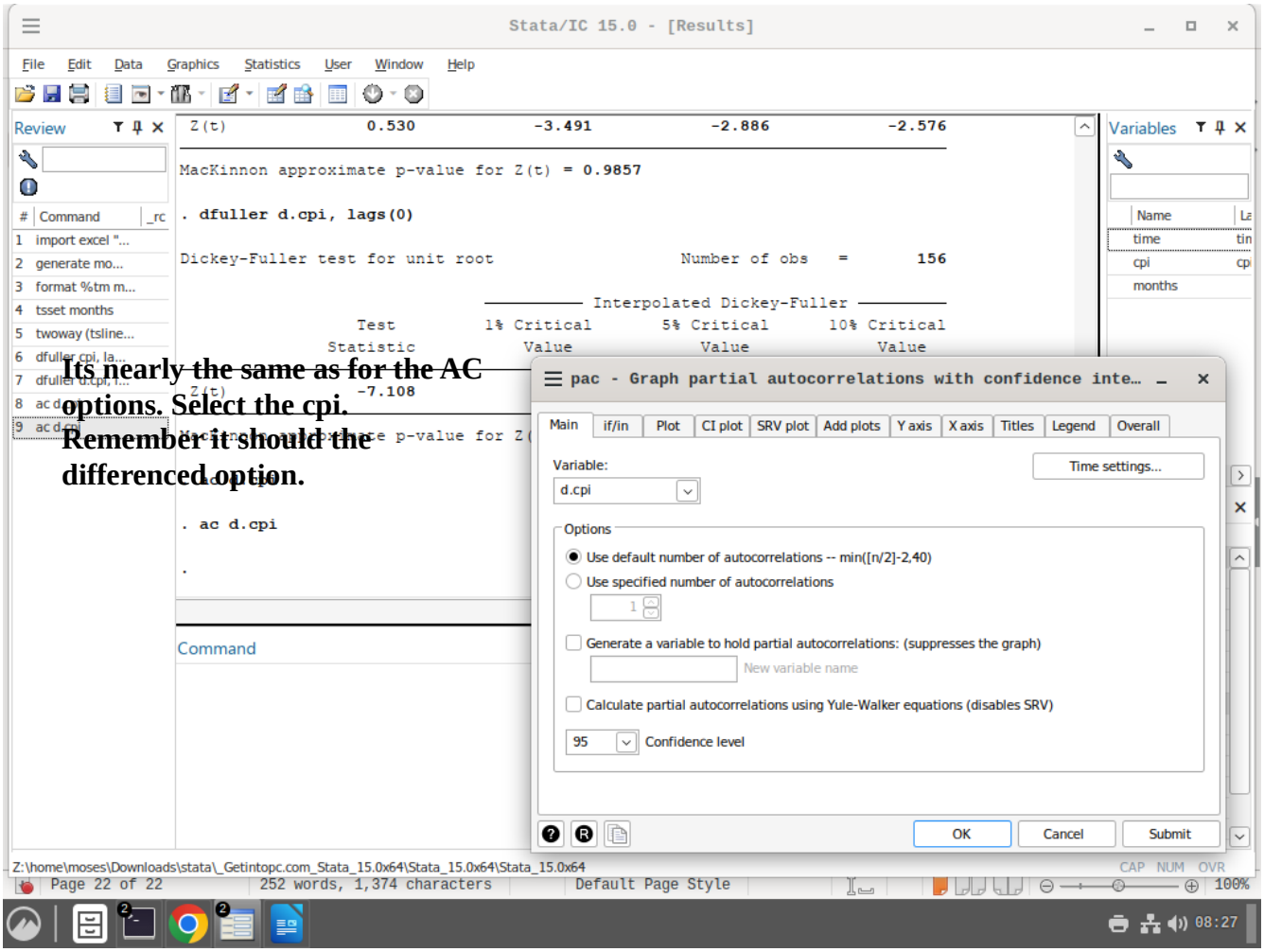
After clicking okay, this is the chart that is displayed.



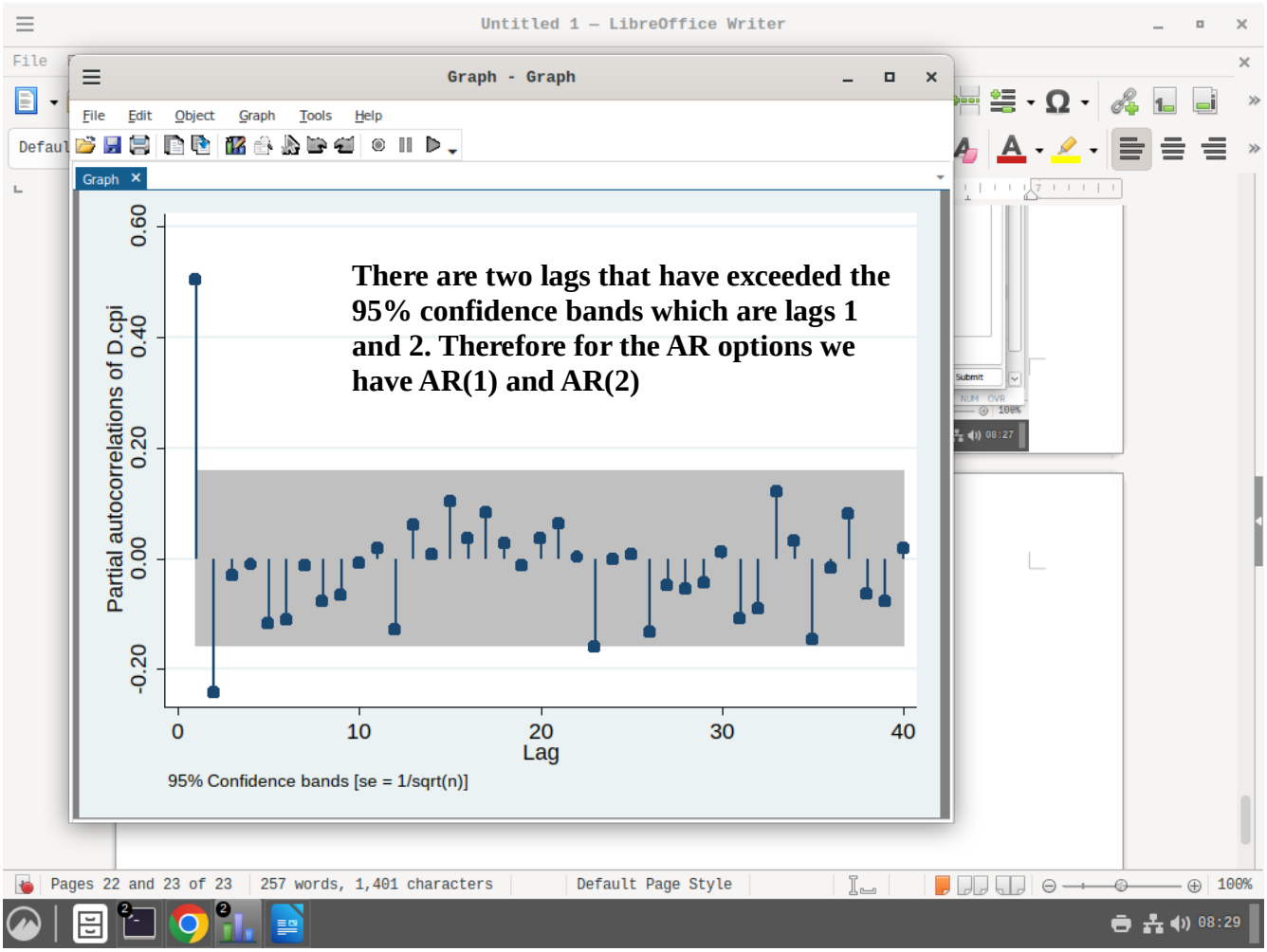
Step 6: Selecting the p values for the model.



This is the resulting window that appears



This is the resulting graph



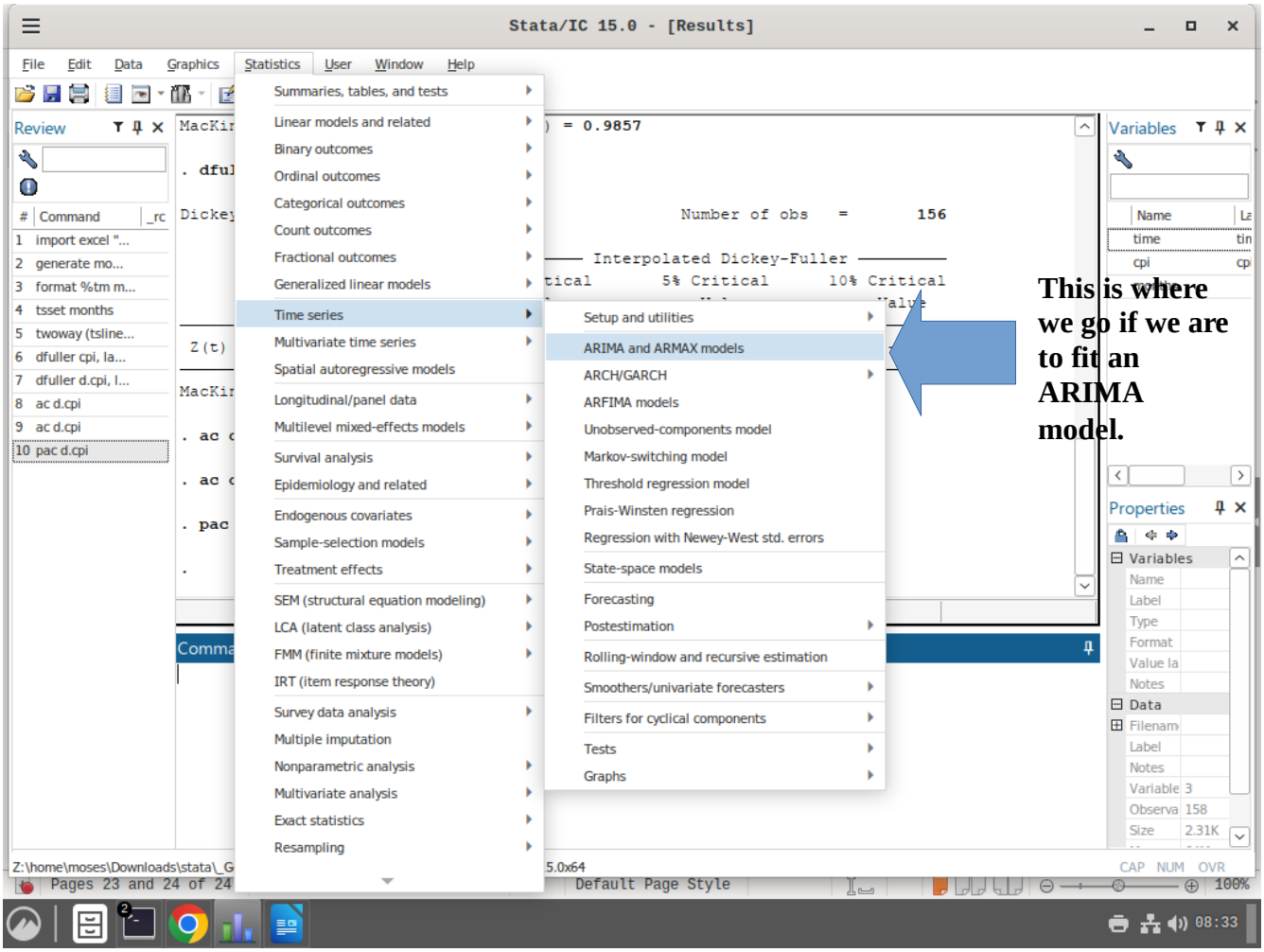
A simple summary of what we have obtained.

AR	I	ma
1	1	1
2		

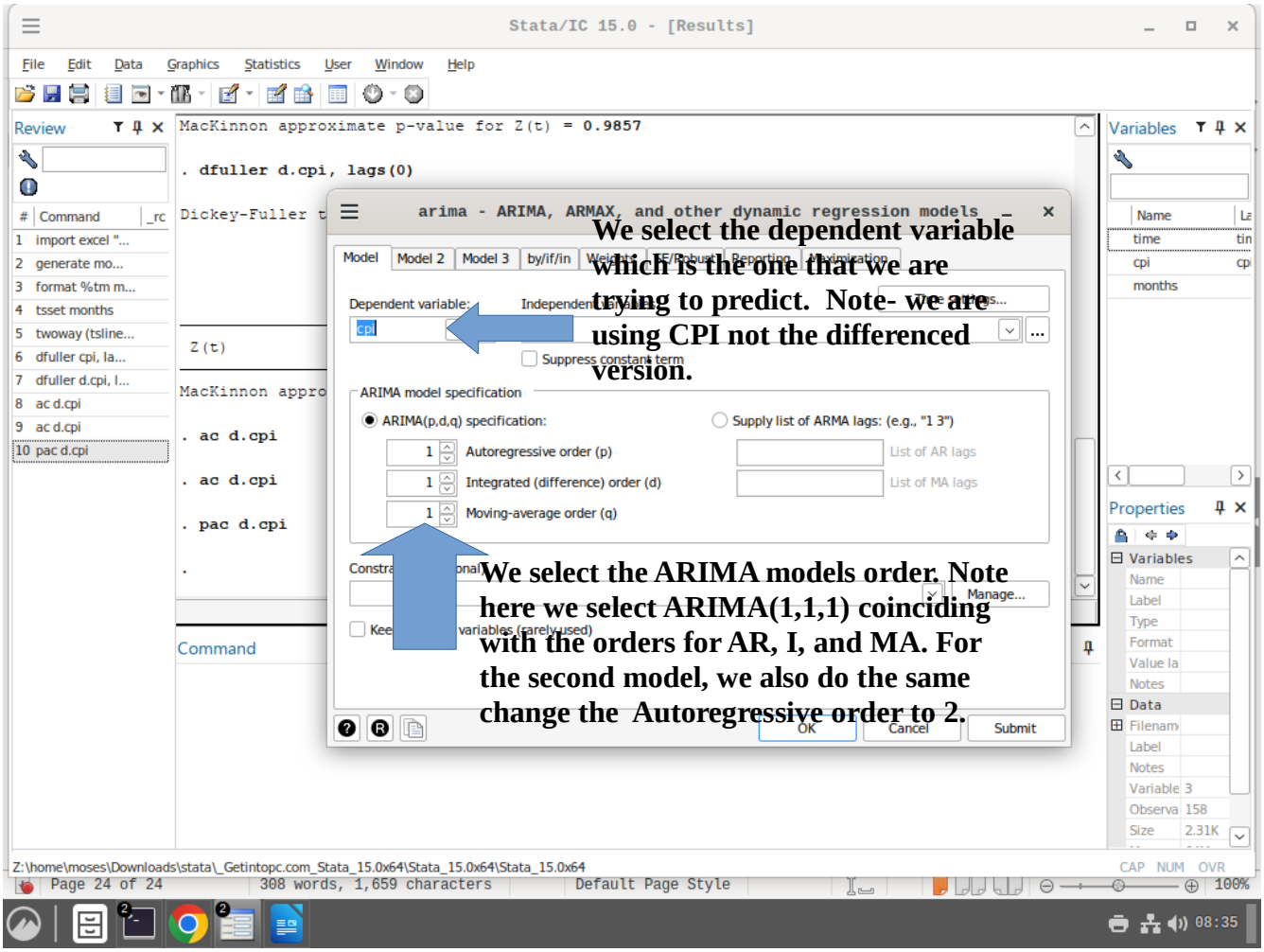
Therefore we have the options of the following ARIMA models

ARIMA(1,1,1) and ARIMA (2,1,1). These are the ones that we will fit.

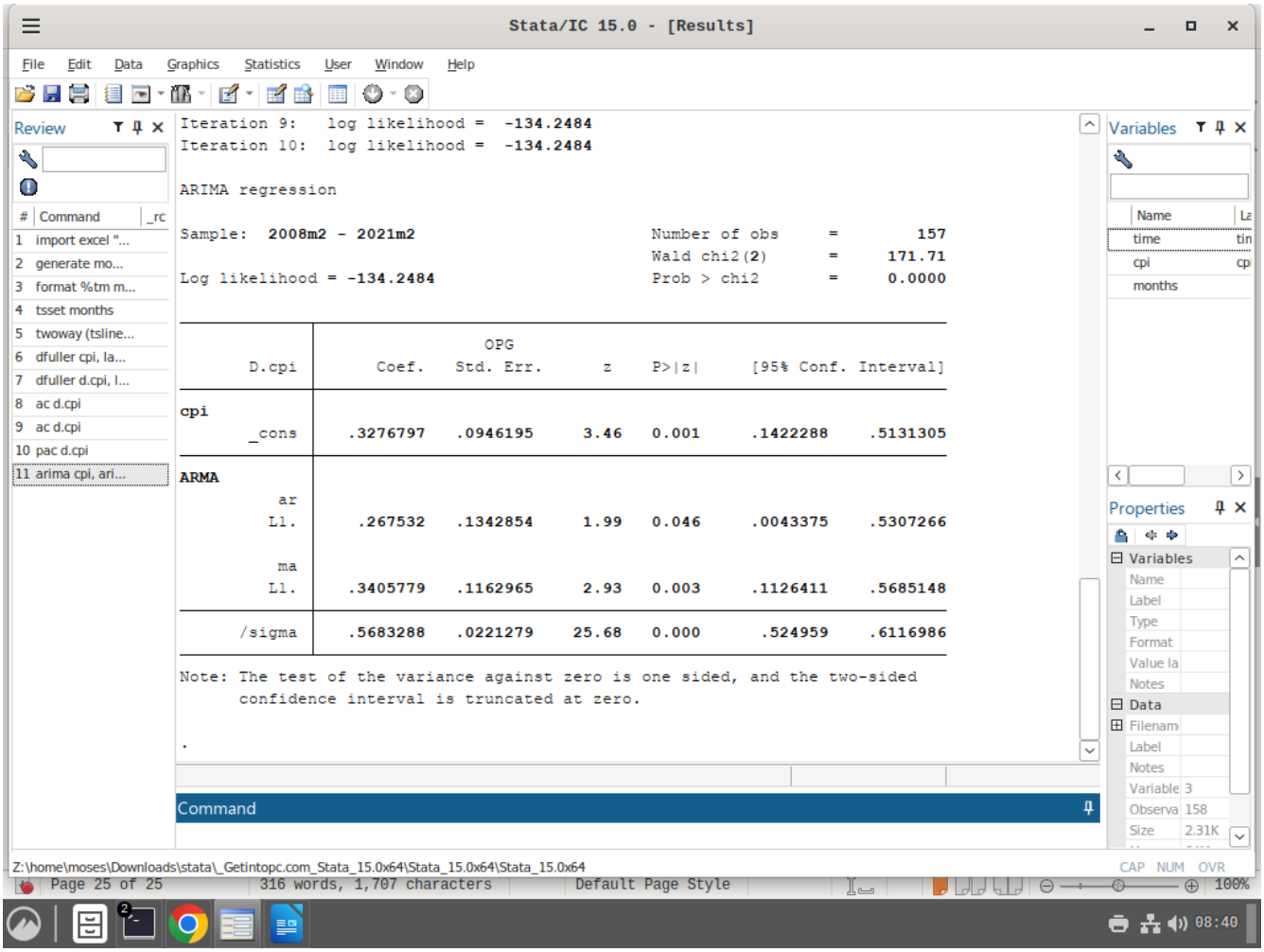
Fitting the models that we found



After clicking the above this is what appears.

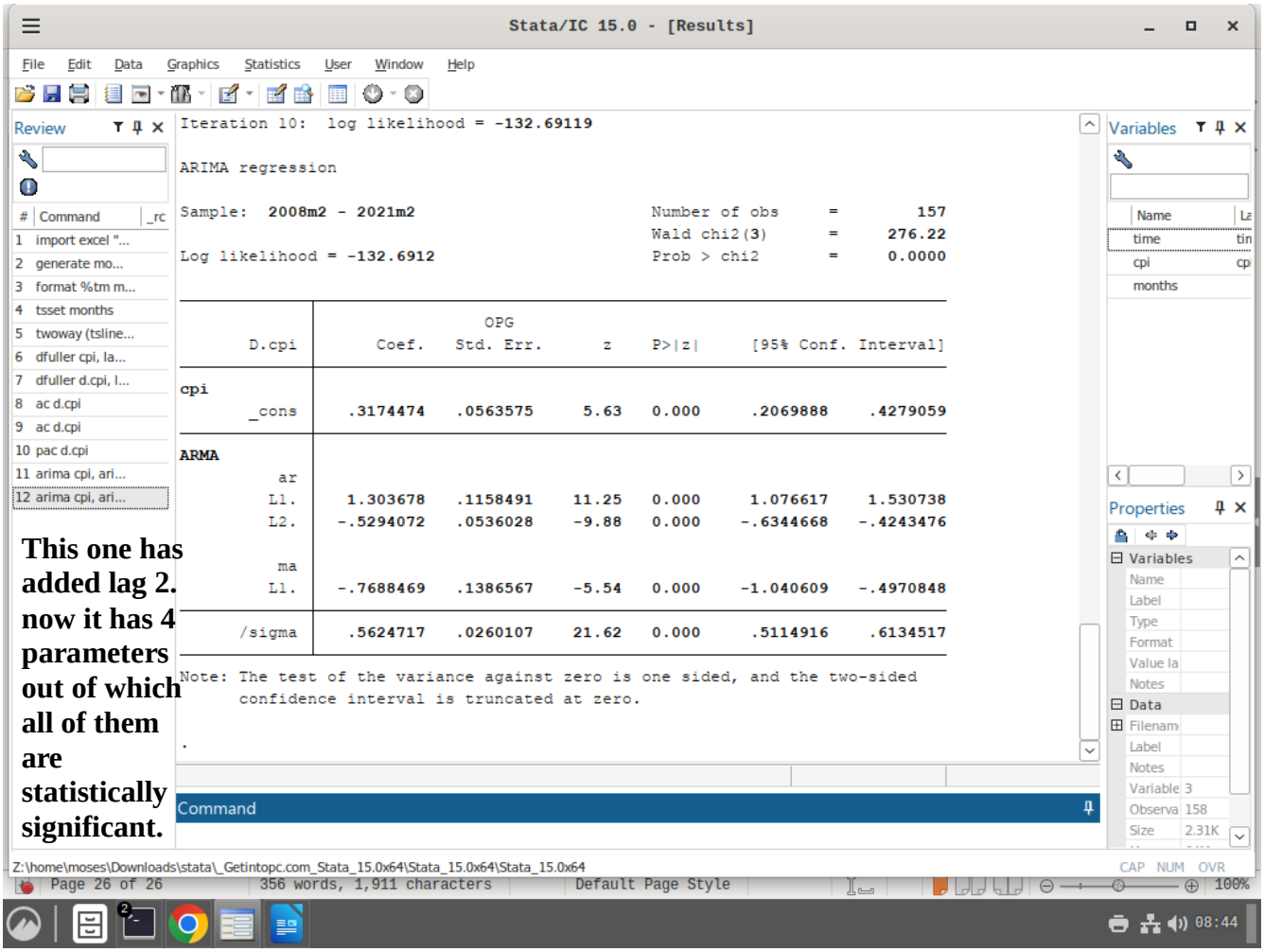


The results of the ARIMA(1,1,1) is shown below.

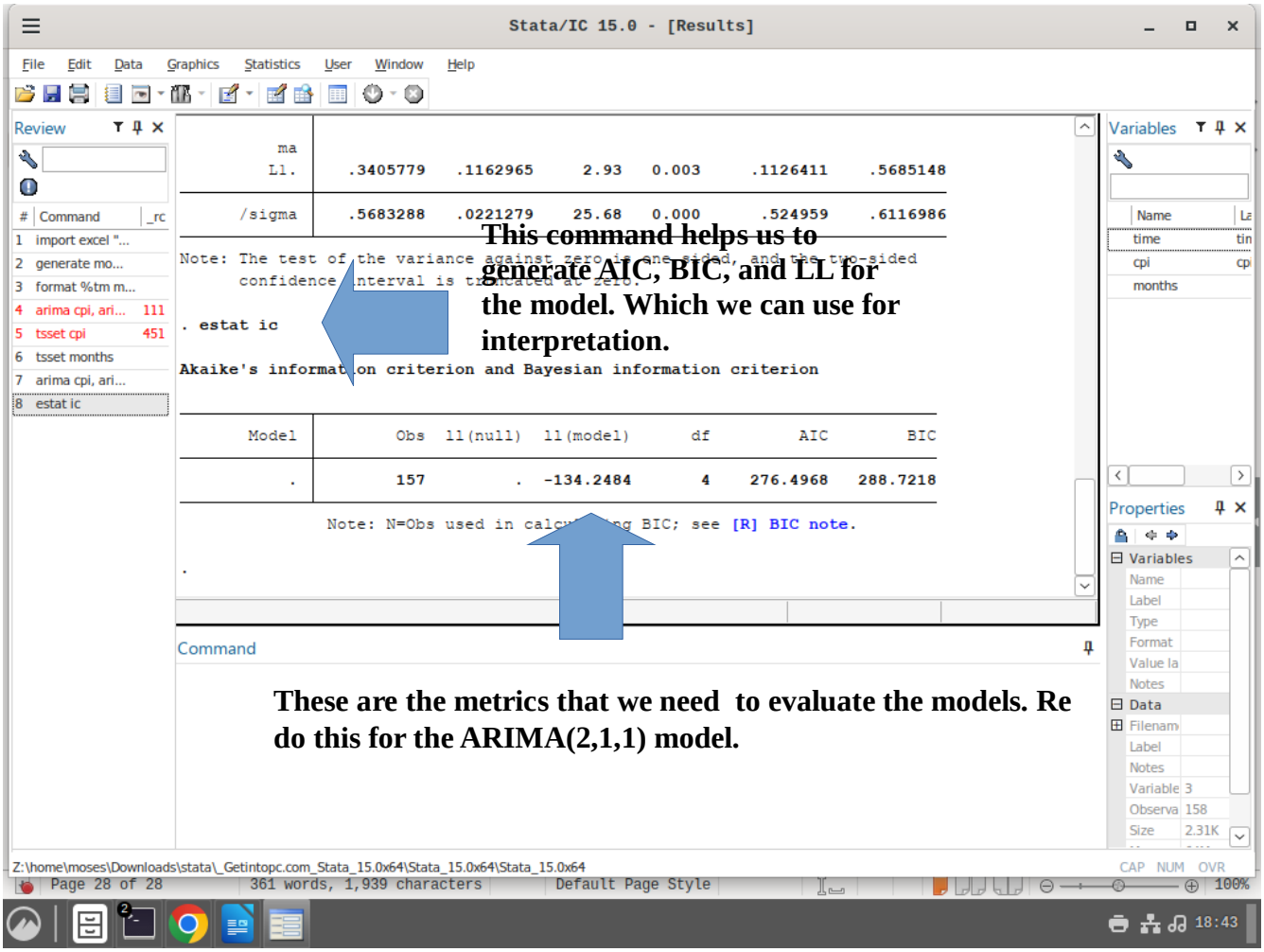


Note that ar at lag 1, ma at lag 1 and the constant is significant and 0.05.

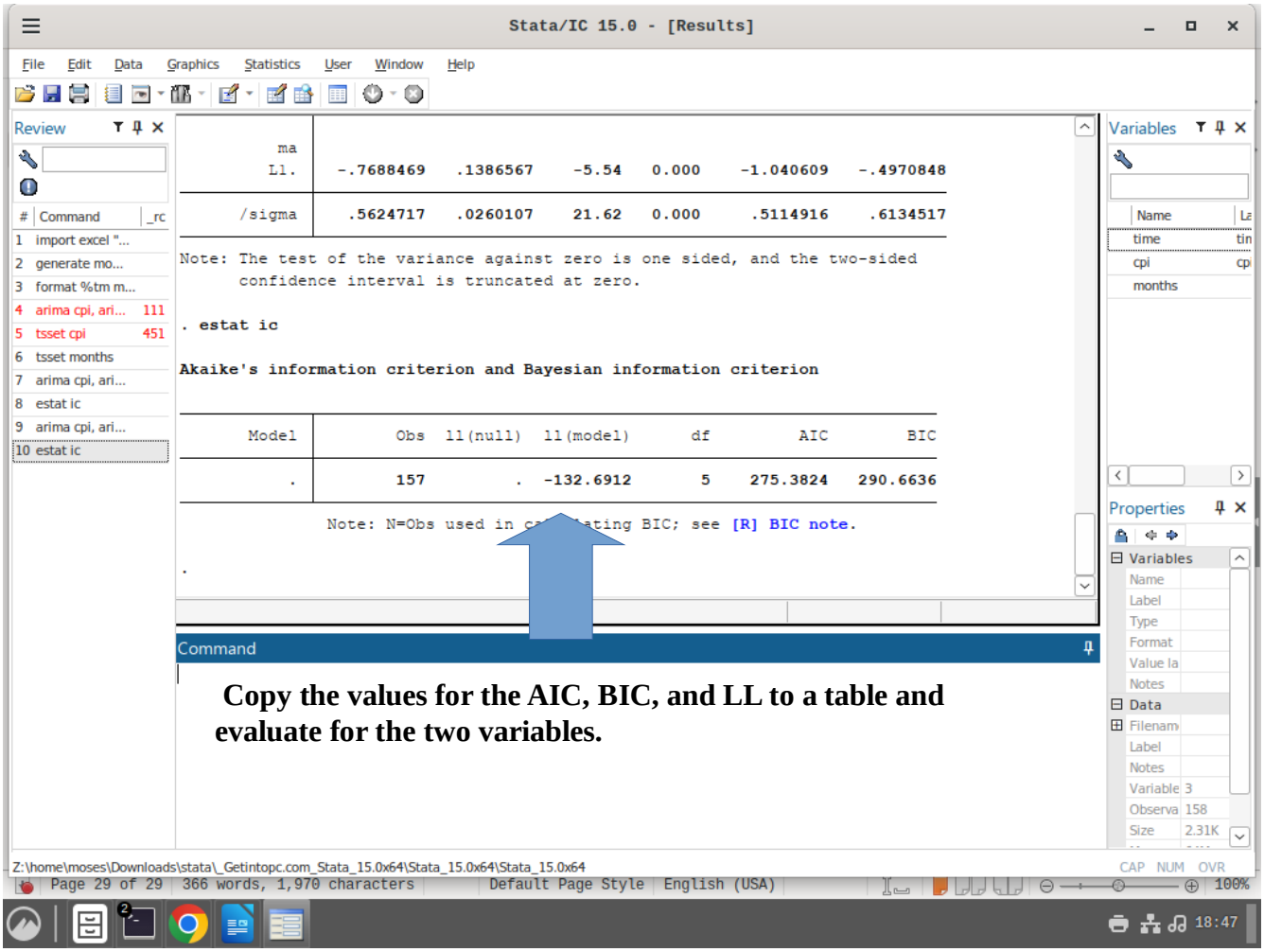
For the ARIMA(2,1,1) I did not provide the screenshot of fitting it as the approach is the same. However, here is the output.



Comparison of the two models

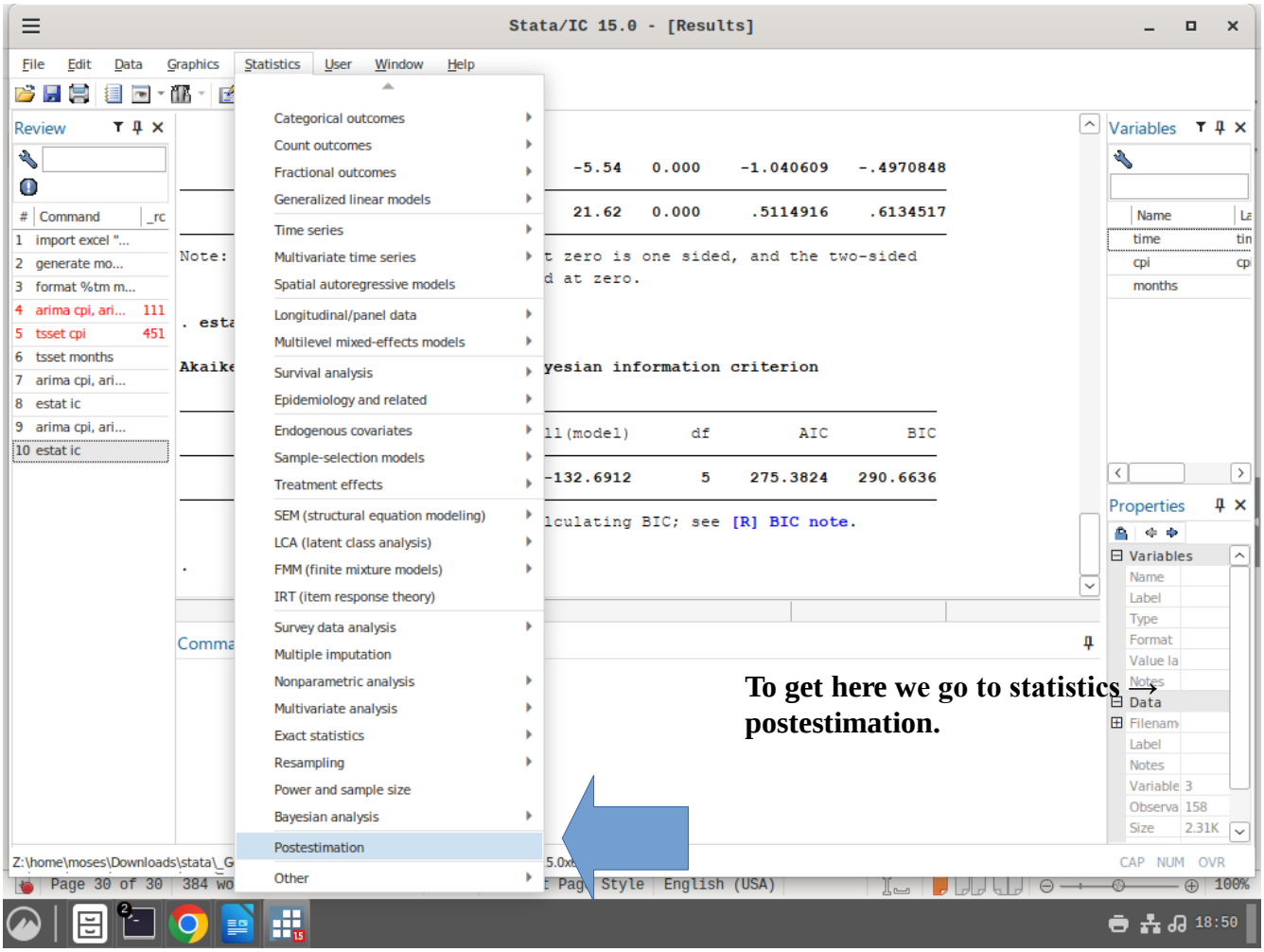


The results of the ARIMA(2,1,1)

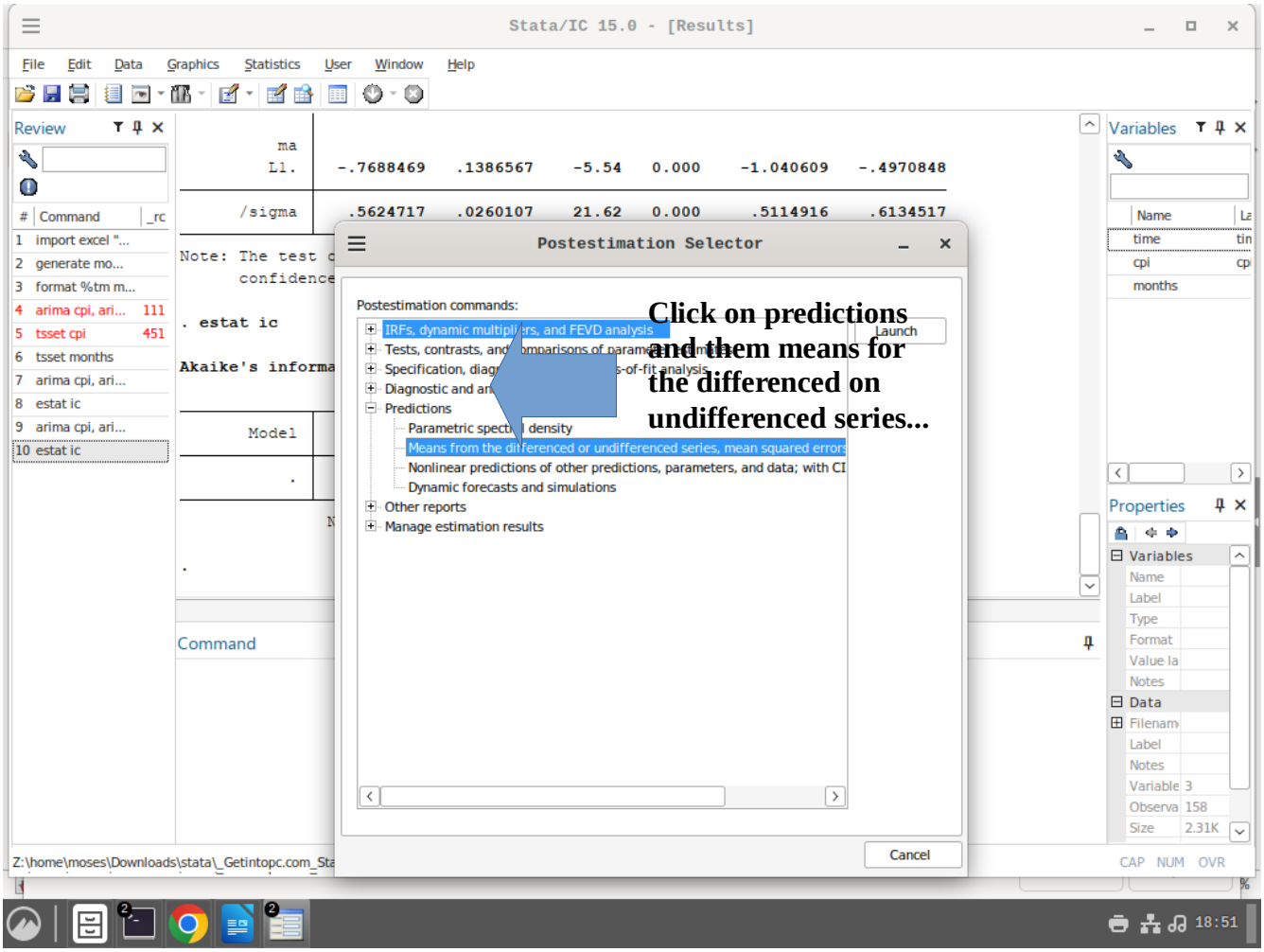


We found that ARIMA(2,1,1) was stable. So we use this model and perform diagnostic analysis.

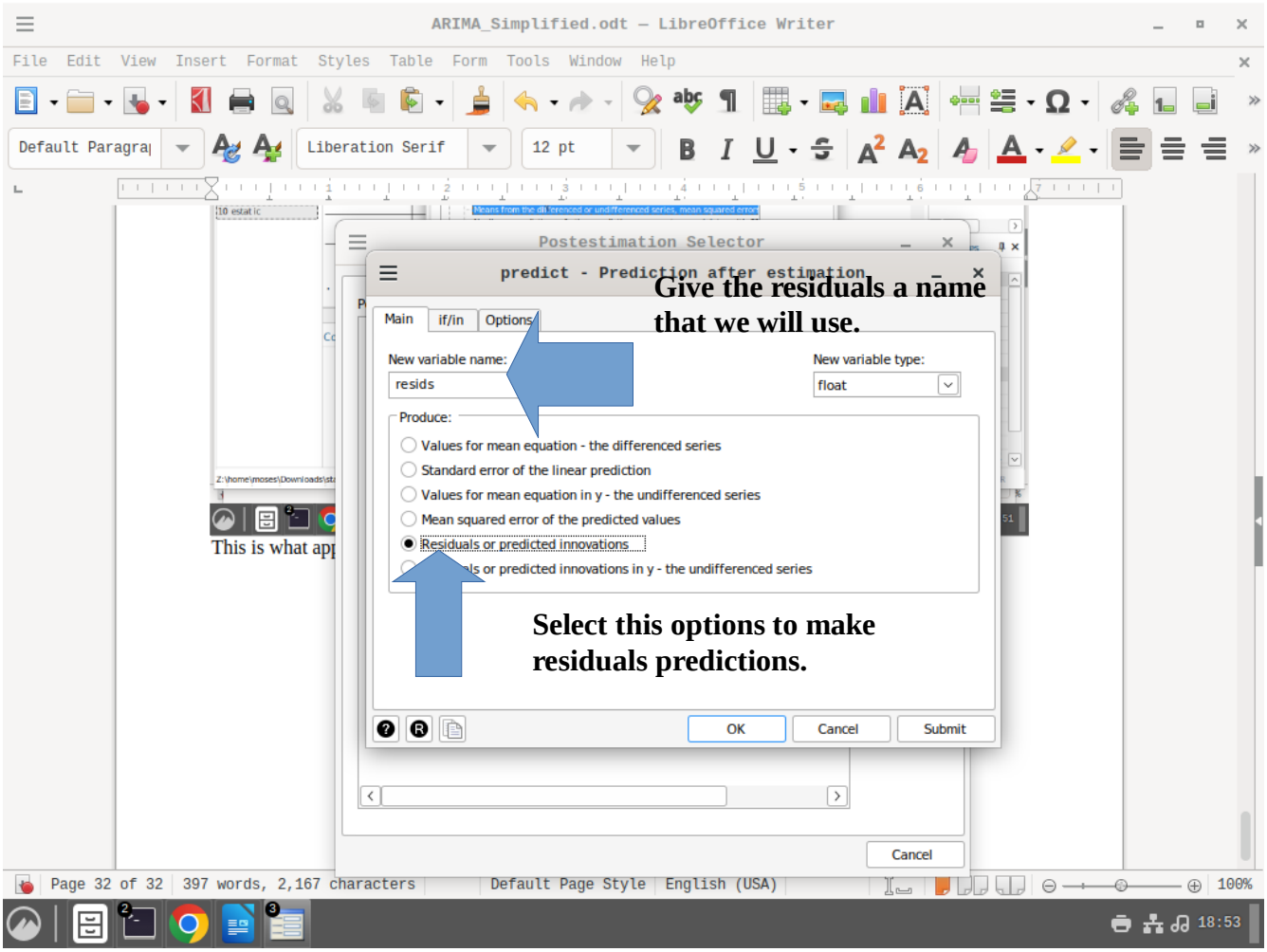
Make residual predictions



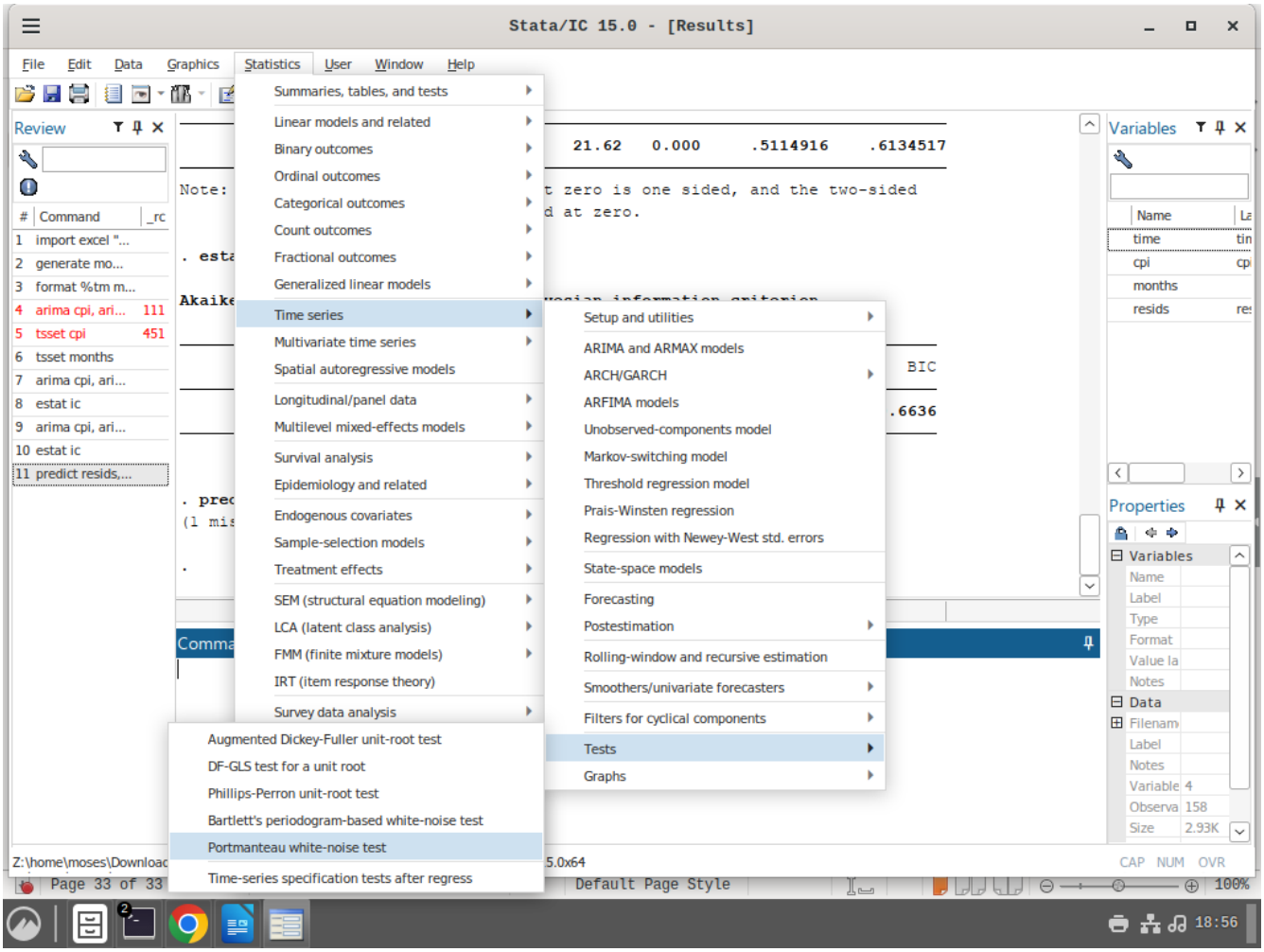
after clicking post estimation, we get the following.



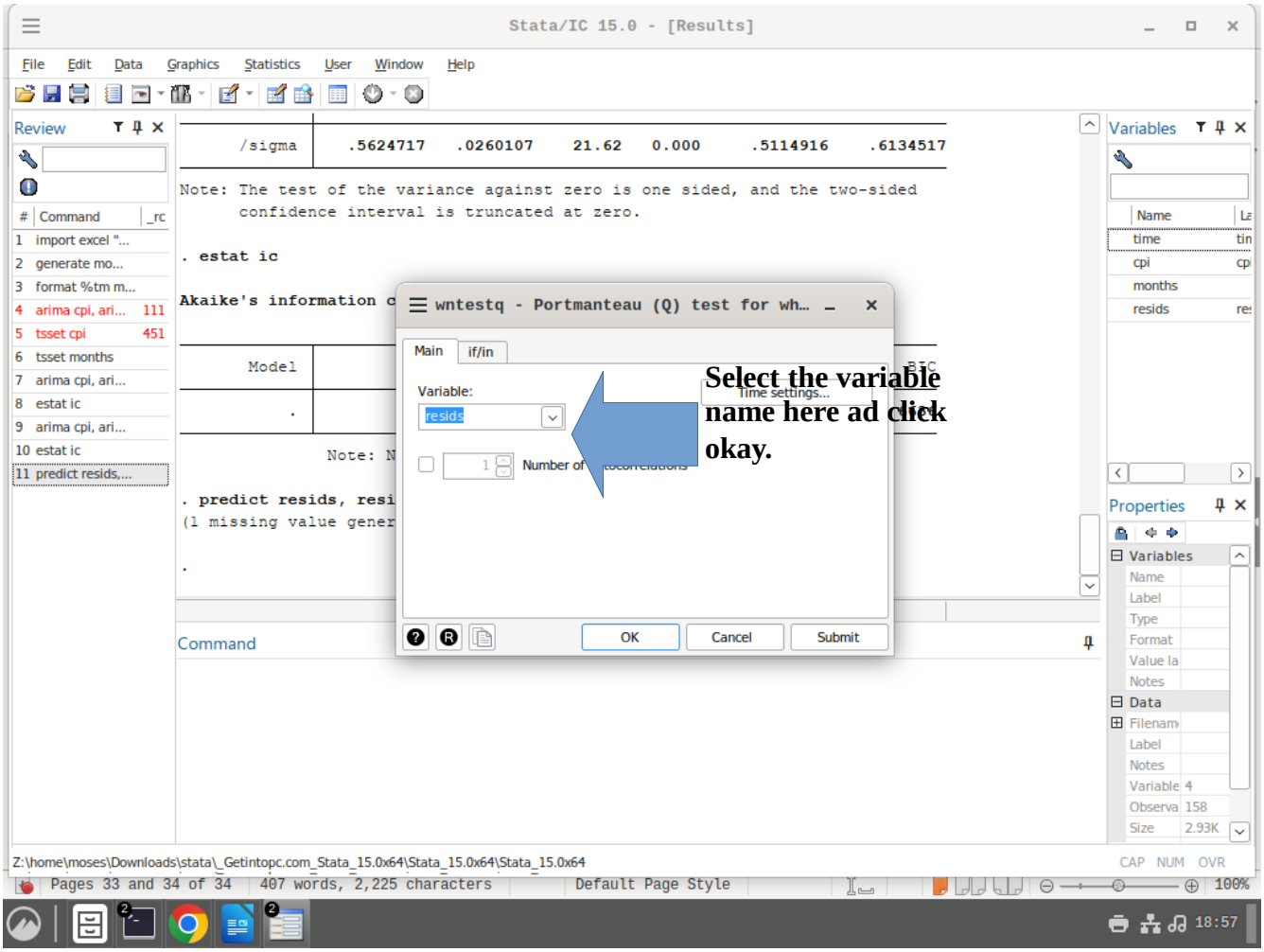
This is what appears next



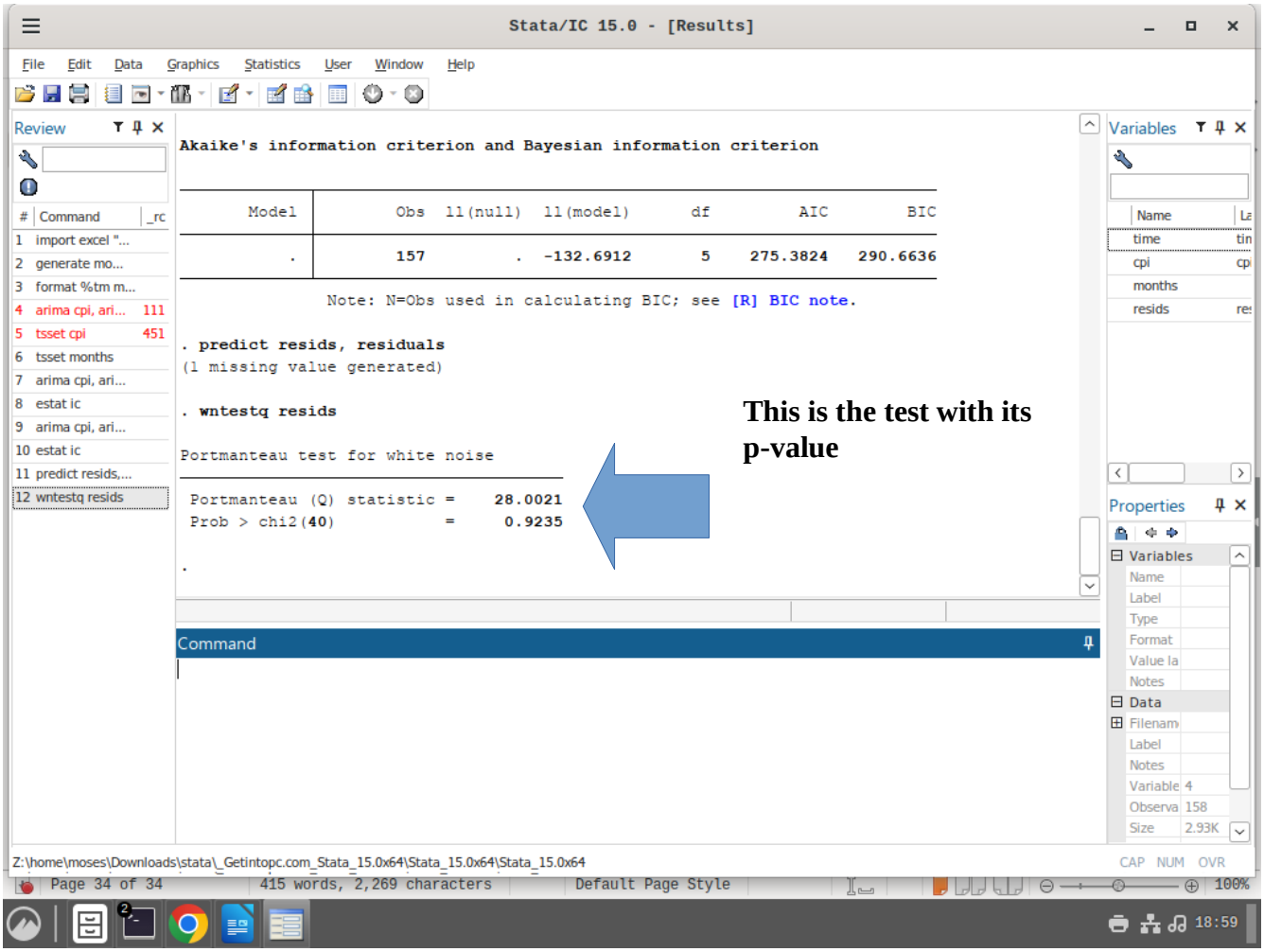
With that lets perform the Portmanteau test.



Click on tests



These are the results of conducting the test


Stata/IC 15.0 - [Results]
File Edit Data Graphics Statistics User Window Help
Review
Command _rc
1 import excel "...
2 generate mo...
3 format %tm m...
4 arima cpi, ari... 111
5 tsset cpi 451
6 tsset months
7 arima cpi, ari...
8 estat ic
9 arima cpi, ari...
10 estat ic
11 predict resids,...
12 wntestq resids
Akaike's information criterion and Bayesian information criterion
Model Obs ll(null) ll(model) df AIC BIC
. 157 . -132.6912 5 275.3824 290.6636
Note: N=Obs used in calculating BIC; see [R] BIC note.
. predict resids, residuals
(1 missing value generated)
. wntestq resids
Portmanteau test for white noise
Portmanteau (Q) statistic = 28.0021
Prob > chi2(40) = 0.9235
.
This is the test with its p-value
Command
Variables
Name
time
cpi
months
resids
Properties
Variables
Name
Label
Type
Format
Value la
Notes
Data
Filenam
Label
Notes
Variable 4
Observa 158
Size 2.93K
Z:\home\moses\Downloads\stata_Getintopc.com_Stata_15.0x64\Stata_15.0x64\Stata_15.0x64
CAP NUM OVR
Page 34 of 34
415 words, 2,269 characters
Default Page Style
100%
18:59