Group10 Review on Group01

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1 Our Peer Review – Group 1 Assignment

According to us, group 1 showed a good understanding of the topic of time series and their ideas are expressed with clarity and precision.

First and foremost, regarding stationarity, we appreciated the fact that they provided a graphical interpretation before implementing their quantitative analysis(ADF test). Their graphical interpretation of the plotted time series is accurate and the discussion of the ADF test they provided is correct, since they correctly specified the null hypothesis and they rejected it by observing a p-value approximately equal to zero.

Regarding the choice of ARMA model that fits the series, they correctly specified the steps of the Box-Jenkins procedure. However, we found a contraddiction in the fact that firstly they specify that no sharp cut-off are detected but then, analyzing the PACF they specified that there is a sharp cutoff at lag 3. Among these two ideas we consider the second to be correct, therefore an autoregressive process might also have been appropriate, as they later specified.

Regarding the identification of the order, we appreciated the fact that they tested many models(9) to try to identify the most suitable one. However, as their information criteria they used only the AIC. We believe that using also the BIC or only the BIC because it consistently selects the optimal model , whereas AIC generally prefers more parametrized specifications. However, they have managed to specify a model with statistically significant coefficients that is suitable to capture the time structure of the simulated time series they analyzed.

One last remark is that the Ljung Box Test and the Jarque Bera test are referred to the residuals.

2 AI Peer Review – Group 1 Assignment

This peer review evaluates the time series analysis carried out by Group 1, focusing on methodological correctness, clarity of exposition, and consistency with the Box–Jenkins framework presented in the course.

2.1 General Assessment

Overall, the assignment is well structured and follows a sound methodological approach. The analysis is coherent with the slides discussed in class, the code implementation is clear, and the main conclusions are generally well supported by the empirical evidence. Minor theoretical imprecisions and some aspects that could be further clarified are noted below.

2.2 Data Visualization and Preliminary Analysis

The time series is correctly downloaded and plotted. The visual inspection suggests fluctuations around a constant mean and variance, which is consistent with the behavior of a covariance-stationary process. The interpretation of the series as mean-reverting is reasonable based on the plot.

As reported by Group01, visual inspection is a useful first step in assessing stationarity but it should be complemented with formal statistical tests to be considered conclusive evidence of stationarity.

2.3 Stationarity Testing

The use of the Augmented Dickey–Fuller (ADF) test to formally assess stationarity is appropriate. The test statistic is strongly negative and the p-value is close to zero, leading to a correct rejection of the null hypothesis of a unit root.

Consequently, treating the series as stationary in levels is justified.

It is worth noting that the ADF test specifically tests for the presence of a unit root rather than stationarity itself.

As a small suggestion for improvement, explicitly stating the deterministic components included in the test (intercept and/or trend) and the rationale behind the chosen lag length would further improve clarity and rigor.

2.4 Model Identification (ACF and PACF Analysis)

The identification step follows the Box–Jenkins methodology and correctly relies on the joint analysis of the ACF and PACF plots.

The gradual decay observed in the ACF and the presence of significant partial autocorrelations at the first lags suggest the presence of autoregressive dynamics, making a mixed ARMA specification a reasonable modeling choice.

While the PACF shows significant spikes at early lags, the absence of a very sharp cutoff supports the decision to consider ARMA models rather than a pure AR process.

A suggestion on the qualitative interpretation: although the motivation for the final order selection could be made slightly more explicit.

2.5 Model Selection

Several ARMA specifications are compared using the Akaike Information Criterion (AIC), and the ARMA(1,2) model is selected as it yields the lowest AIC value among the candidates

This selection strategy is appropriate and consistent with standard practice.

Given the relatively large sample size, reporting the Bayesian Information Criterion (BIC) alongside AIC could further strengthen the robustness of the model choice by highlighting the trade-off between goodness of fit and parsimony.

2.6 Model Estimation

The ARMA(1,2) model is estimated using QMLE, and all estimated parameters are statistically significant. The autoregressive coefficient indicates strong persistence, while the moving average terms capture short-term shock dynamics. The economic interpretation provided is coherent and consistent with the estimated coefficients.

2.7 Diagnostic Checking

The diagnostic checks are correctly conducted. The Ljung–Box test shows no evidence of residual autocorrelation, and the Jarque–Bera test does not reject the null hypothesis of normality. Residual skewness and kurtosis are close to those of a normal distribution, supporting the adequacy of the model.

> Overall, the residual diagnostics suggest that the fitted model provides a satisfactory description of the data and that no major model misspecification issues remain.

3 Final Remarks

In conclusion, the assignment presents a solid and well-executed time series analysis. The methodology is correctly applied, and the results are clearly interpreted. Minor improvements could be made by refining some theoretical explanations and by providing additional justification in the identification and selection stages. Nevertheless, the analysis is thorough and consistent with the objectives of the assignment.

4 Comparison between our review and AI review

Comparing our review with the review of the AI, we can conclude that regarding stationarity our remarks are similar and their analysis is correct and well presented.

The AI was very rigorous in suggesting to Group 10 a more detailed specification of the components of the ADF test(e.g. explicitly stating the deterministic components included in the test).
We, on the other hand, managed to detect a contradiction between the general analysis of the PACF and its specific and more rigorous analysis.
The PACF is characterized by a sharp cut off not by a gradual decay, they assumed the opposite in the general joint analysis between ACF and PACF, but specified the correct interpretation only in the specific analysis of the PACF. Regarding model selection , AI also suggest to include the BIC as information criterion, but it does not notice that the BIC is more appropriate than AIC because AIC tends to prefer more parametrized models, whereas the BIC consistently selects the optimal model among the analyzed ones.

Our comment and AI are similar regarding diagnostic checking and we both arrive to the conclusion that the model for the time series is correctly specified.

In conclusion , both group 10 and AI think that the work presented by group 1 is clear, precise , and the results are clearly interpreted. About possible improvements, the AI reported : *"A suggestion*

on the qualitative interpretation: although the motivation for the final order selection could be made slightly more explicit".

We believe that, regarding this comment, the focus should not be the fact that they were not explicit in the order identification, since they explicitly said that they use the AIC criterion. The main problems according to us are the choice of the AIC as their only information criteria to choose the most suitable model and the contraddiction in their analysis of PACF.