

## **ABSTRACT**

**THESIS PAPER:** Time series analysis of Saudi Arabia oil production data

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Saudi Arabia is the largest petroleum producer and exporter in the world. Saudi Arabian economy hugely depends on production and export of oil. This motivates us to do research on oil production of Saudi Arabia. In our research the prime objective is to find the most appropriate models for analyzing Saudi Arabia oil production data. Initially we think of considering integrated autoregressive moving average (ARIMA) models to fit the data. But most of the variables under study show some kind of volatility and for this reason we finally decide to consider autoregressive conditional heteroscedastic (ARCH) models for them. If there is no ARCH effect, it will automatically become an ARIMA model. But the existence of missing values for almost each of the variable makes the analysis part complicated since the estimation of parameters in an ARCH model does not converge when observations are missing. As a remedy to this problem we estimate missing observations first. We employ the expectation maximization (EM) algorithm for estimating the missing values. But since our data are time series data, any simple EM algorithm is not appropriate for them. There is also evidence of the presence of outliers in the data. Therefore we finally employ robust regression least trimmed squares (LTS)

based EM algorithm to estimate the missing values. After the estimation of missing values we employ the White test to select the most appropriate ARCH models for all sixteen variables under study. Normality test on resulting residuals is performed for each of the variable to check the validity of the fitted model.