

Economics 413: Economic Forecast and Analysis

Department of Economics, Finance and Legal Studies

University of Alabama

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Final Exam – Answers

1. (a) Time series plot – white noise with mean of zero. ACF and PACF – white noise (no significant spikes)
- (b) Time series plot – stationary with mean of μ . ACF – significant spikes at 1 and 3, PACF – decay
- (c) Time series plot – stationary with mean of $c/(1 - \phi^2)$. ACF – decay, PACF – significant spike at 2
- (d) Time series plot – random walk. ACF – very slow decay, PACF – significant spike at 1 with value near 1
- (e) Time series plot – random walk plus drift. ACF – very slow decay, PACF – significant spike at 1 with value near 1
2. (a) $Y_t = c + \phi Y_{t-1} + \beta X_{t-1} + \varepsilon_t + \theta \varepsilon_{t-1}$
- (b) Correlogram (ACF and PACF) for the first two and cross-correlation function (correlation between Y_t and X_{t-j})
- (c) $Y_{t+h} = c + \phi Y_{t+h-1} + \beta X_{t+h-1} + \varepsilon_{t+h} + \theta \varepsilon_{t+h-1}$
- (d) $Y_{t+1} = c + \phi Y_t + \beta X_t + \varepsilon_{t+1} + \theta \varepsilon_t$, $\widehat{Y}_{t+1|t} = E(Y_{t+1}|\Omega_t) = E(c + \phi Y_t + \beta X_t + \varepsilon_{t+1} + \theta \varepsilon_t|\Omega_t) = c + \phi Y_t + \beta X_t + \theta \varepsilon_t$
- (e) Because we do not know how X evolves over time
3. (a) $Y_{t+h} = Y_{t+h-1} + \varepsilon_{t+h} = Y_t + \varepsilon_{t+1} + \varepsilon_{t+2} + \dots + \varepsilon_{t+h}$. $\widehat{Y}_{t+h|t} = E(Y_{t+h}|\Omega_t) = Y_t \forall h$
- (b) $Y_{t+h} = \delta + Y_{t+h-1} + \varepsilon_{t+h} = \delta h + Y_t + \varepsilon_{t+1} + \varepsilon_{t+2} + \dots + \varepsilon_{t+h}$. $\widehat{Y}_{t+h|t} = E(Y_{t+h}|\Omega_t) = \delta h + Y_t \forall h$
- (c) $Y_{t+h} = \delta + \beta(t+h) + Y_{t+h-1} + \varepsilon_{t+h} = \delta h + \beta \sum_{l=1}^h (t+l) + Y_t + \varepsilon_{t+1} + \varepsilon_{t+2} + \dots + \varepsilon_{t+h}$. $\widehat{Y}_{t+h|t} = E(Y_{t+h}|\Omega_t) = \delta h + \beta \sum_{l=1}^h (t+l) + Y_t \forall h$
4. (a) Difference series until stationary – vi (plot series – mean changes over time), v (correlogram – nonstationary), vii (Dickey-Fuller test – fail to reject unit root), iii (take first difference – stationary)
- (b) Identify the tentative model – viii (correlogram – ARMA)
- (c) Estimate the model – iv (ARMA(2,2))
- (d) Diagnostic checking – i (residual correlogram appears to be white noise)
- (e) Forecasting – ii (forecast two years worth of data)