

# RoME - Econometric Theory

## Time Series Models

### 1 Syllabus

1. Introduction to time series models. Stationary stochastic processes.

- Brockwell and Davis (2016), sec. 1.1–1.4, pp. 1–23; sec. 1.6, pp. 35–38; chapter 2, pp 45–71, pp. 75–78; chapter 4, pp. 111–114.
- Harvey (1993), sec. 2.1, pp. 9–14, sec. 2.7–2.8, pp. 40–46; sec. 6.1, pp. 166–169.

2. ARMA models. Specification, estimation and testing; model selection. Forecasting with ARMA models.

- Brockwell and Davis (2016), chapter 3
- Harvey (1993), ch. 2, sec. 2.2–2.4, pp. 16–30, sec. 2.6, pp 32–37; ch. 3, excluding pp. 58–59.
- Hamilton (1994), chapter 3, pp. 43–61, 64–68; chapter 4, pp 72–85, sec. 4.8, pp 108–113; ch 5, sec. 5.1–5.2, pp 117–119, pp. 122–123, 127–128, 132–133, 138–139, sec. 5.8, pp. 142–145.

3. Nonstationarity, unit roots and ARIMA models.

- Enders (2010), chapter 4, pp 181–218.
- Harvey (1993), ch. 5, pp. 113–120, sec. 5.4, pp 129–134.
- Hamilton (1994), chapter 15, pp. 435–447; chapter 17, pp 475–477, 501–503.

4. State Space Models

- Harvey (1993), ch. 5, sec. 5.3, pp. 120–129, ch. 4, pp 82–104.
- Proietti (2009), pp. 1–9.
- Proietti and Luati (2013), up to page 11, including sec. 4.1.

5. The Analysis of Financial Time Series: Generalized Autoregressive Conditional Heteroscedasticity Models (GARCH).

- Tsay (2005), chapter 3.
- Hamilton (1994), chapter 21.

6. Markov Switching models

- Hamilton (1994), chapter 22.

## 7. Multivariate Time Series Models.

- Harvey (1993), ch. 7, sec. 7.1–7.4, pp. 233–247.
- Hamilton (1994), chapter 10, pp. 257–262, sec. 10.4, excluding 272–274; ch. 11, sec. 11.2; sec. 11.4; sec. 11.6 (read only).
- Johansen, S. (2015) Time Series: Cointegration, In: James D. Wright (editor), International Encyclopedia of the Social & Behavioral Sciences, 2nd edition, Vol 24. Oxford: Elsevier. pp. 322–330

## 2 Assessment

- 30% of the assessment is based on the solution of problem sets; the remaining 70% is based on the final exam.
- The final exam is a closed book written test consisting of three questions, with duration 120 minutes.
- The three questions will concern the topics 1–6 above (i.e., excluding Multivariate Time Series).

## References

- Brockwell, P. J., & Davis, R. A. (2016). *Introduction to time series and forecasting*. springer.
- Enders, W. (2010). *Applied econometric time series*. John Wiley & Sons.
- Hamilton, J. D. (1994). *Time series analysis* (Vol. 2). Princeton university press Princeton.
- Harvey, A. C. (1993). *Time series models* (Vol. 2). Harvester Wheatsheaf New York.
- Proietti, T. (2009). Structural time series models for business cycle analysis. In *Palgrave handbook of econometrics* (pp. 385–433). Springer.
- Proietti, T., & Luati, A. (2013). 15 maximum likelihood estimation of time series models: the kalman filter and beyond. *Handbook of Research Methods and Applications in Empirical Macroeconomics*, 334.
- Tsay, R. S. (2005). *Analysis of financial time series* (Vol. 543). John Wiley & Sons.