This dissertation contains four essays on econometric time series modelling. More specifically, the focus is on theoretical properties as well as multivariate applications of time-varying parameter models. This dissertation is therefore split in two parts: a more theoretical part and a more applied part.

The more theoretical part considers optimality properties of score-driven models. The class of score-driven models has gained considerable popularity in the recent statistical literature. Score-driven models are typically appreciated for their robustness properties since the models flexibly adapt themselves to the distribution of the innovations. Despite being relatively new, a wide range of applications of score-driven models is already available in the literature. This part further extends the theoretical motivations for score-driven models.

The more applied part considers two multivariate applications. The first application is motivated by structural changes observed in a number of key macroeconomic variables, such as interest rates, GDP growth and inflation. This application contributes to a growing literature on how best to model time variation in macro time series models in a forecasting context. The second application investigates covariance matrix estimation in vast-dimensional spaces of 1,500 up to 2,000 stocks using fundamental factor models. In particular, it evaluates whether recent linear and non-linear shrinkage methods help to reduce the estimation risk in the asset return covariance matrix.

Andries van Vlodrop graduated from the Tinbergen MPhil program in 2014. Upon completion of this program he joined the Finance department at the Vrije Universiteit Amsterdam as a PhD student. Currently he is working as a quantitative risk specialist at UBS.