

## ABSTRACT

Statistical surveillance is used to repeatedly evaluate the amount of information contained in observations which are achieved continuously. This makes it possible to quickly and safely detect changes in the way economic and financial time series evolve through time. Thus, the optimal time for decisions can be determined.

The thesis treats systems for early warnings of turns in economic processes. In papers I and II it is demonstrated how such systems can be used to predict the turning points of the general business cycle, by detecting turns in leading indicators. In papers III and IV some strategies for timely transactions in the financial market are analyzed by means of the theory of statistical surveillance.

In paper I, three likelihood based methods for turning point detection in business cycles are compared. One of the methods is based on a hidden Markov model. The two others are based on the theory of statistical surveillance. One of these is free from parametric assumptions of the curve. Evaluations are made of the effect of assumptions on the curve shape and also on the amount of information available about the earlier states of the process. The timeliness of the warnings is evaluated.

The second paper (II) also concerns on-line methods for turning point detection in business cycles. Here some special data problems, met in practice, are considered. The estimation procedure, effect of smoothing, seasonal variation, autoregression, the presence of a trend and multivariate problems are discussed. A period of the Swedish industrial production is used for comparisons.

In paper III inferential differences and similarities between some methods of statistical surveillance and some prospective decision rules used in finance are investigated. A brief review of such rules is given from a statistical viewpoint. The Hang Seng Index is used for illustration.

In the last paper (IV) two approaches to control the false alarms in on-line monitoring are compared. One is to have a fixed probability of any false alarm. This agrees with the practice for testing a hypothesis. The other has a fixed average time until the first false alarm. This is often used in surveillance. The effects of the two approaches are evaluated by the economic return of trading and by different measures of the timeliness of the decisions. The Hang Seng Index is used for illustration.

**Keywords:** Monitoring; Surveillance; Early warning system; Turning point detection; Regime switching; Hidden Markov models; Non-parametric regression; Trading rules; Business cycles.