This thesis develops methods for conducting inference on nonlinear panel data models in the presence of latent stochastic variables. We focus on developing likelihood-based methods that enable the efficient estimation of the deterministic model parameters and allow for the extraction of conditional estimates for the latent stochastic variables. The new estimation methods are based on either simulation methods, such as importance sampling, or on iterative optimization methods, such as the expectation-maximization algorithm. The methodology is illustrated using panel data from different fields of research including macroeconomics, microeconomics, finance and sociology.

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