There is ample evidence in the literature that many macroeconomic and financial time series display structural instability. Ignoring this feature in model specification can lead to misleading conclusions and is a main source of poor forecasts. Possible changes in the inflation process and its persistence have received especially much attention in the literature. Inflation persistence, i.e. the speed with which inflation returns to its baseline after a shock, is important for many aspects of macroeconomics in general and monetary policy in particular. However, the empirical evidence on the properties of inflation persistence in the literature is not unambiguous. Some authors find that inflation persistence increased in the early 1970s, remained high for around a decade and declined afterwards. Others conclude that inflation persistence was roughly constant and high over the past 40 years.

This article contributes further evidence to this ongoing debate by applying non-parametric Bayesian techniques. More specifically, we analyze the dynamics of U.S. inflation using an infinite hidden Markov model (IHMM). The IHMM has been successfully applied to inferential problems in fields like genetics or machine learning. However, to our knowledge the IHMM has not been applied in the econometric literature so far.

The IHMM is based on the hierarchical Dirichlet process (HDP) and is thus a nonparametric Bayesian model. A nonparametric Bayesian model is a probability model with infinitely many parameters. In other words, it is a parametrized model that allows the number of parameters to grow with the number of observations. However, for a given sample it will only select a finite subset of the available parameters to explain the observations. Thus, the IHMM does not fix the number of change points a priori but infers them from the data. Therefore, it is an attractive alternative to existing change-point models that typically either assume a small number of change-points or assume that the parameters change at each point in time.

We find that inflation persistence was roughly constant and high in the last decades.