

VID Colloquium

# A Statistical Model of Annual Migration Counts for Rural Municipalities

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The past years have seen an increasing interest in modelling aggregate demographic counts as realizations of random variables. A basic model assumption is the conditional variance of a count. Established models for migration have often applied the Poisson regression model or semiparametric extensions like Poisson quasi likelihood. We review the underlying assumptions of the Poisson process and their apparent violations in migration flows. For annual migration counts of rural municipalities we propose a two-parameter variance function which represents, respectively, clustering of persons by household migration and unobserved heterogeneity between municipalities. The variance function has an interpretation as quasi negative binomial variance with specified shape parameter. Provided the conditional mean of the migration count is correctly specified, consistent and asymptotically efficient parameter estimation is achieved by quasi-generalized pseudo maximum likelihood, using a (possibly robust) root-n-consistent estimator of the shape parameter. A possible misspecification of the conditional mean arises from simultaneity between migration count and person-years lived in a migration rate model. Instead of traditional demographic approaches to this endogeneity problem, we propose a method based on instrumental variables, namely two-stage residual inclusion. Our model is illustrated by applying it to the 2012 annual totals of in- and out-migration of the 171 municipalities of Burgenland, a rural province of Austria.

## About the presenter

Johannes Klotz is project leader for demographical syntheses at Statistik Austria. He graduated in statistic from the University of Vienna, where he also obtained his PhD in 2014.

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