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**Extension of population projections by multiple regression analysis**

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**How do changes in fertility, mortality and migration affect future population  
in England & Wales, Germany, France and Japan?**

Short title: Multiple regression in population projections

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**Abstract.** Traditionally, population projections are deterministic; they try to cover the uncertainty about the future development of the demographic components fertility, mortality and migration by the use of different assumptions, e.g. a low, medium and high version. However, it is unclear what happens if these assumptions are dropped. Moreover, the interaction of the three demographic components and their effect on future population size and age structure is unspecified.

This paper deals with this problem and analyses the impact of fertility, mortality and migration on future population in England & Wales, France, Germany and Japan. More precisely, we estimate multiple regression models which quantify the dependencies between changes in the demographic components and changes in future population size, age structure and dependence ratios. This (time dependent) approach allows the modelling of various scenarios - without complex calculations - and illustrates the effects of the demographic components in a simple and clear way.

**Keywords:** population projection, multiple regression analysis, cohort-component