

Forecasting German fertility rates via a beta distribution

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Consequences for the occurrence of Down's Syndrome and Stillbirths

Bernhard Babel¹, Eckart Bomsdorf¹ and Rafael Schmidt^{1,2,3}

¹University of Cologne, Germany, and ²London School of Economics, UK

Abstract

Most developed countries have shown clear tendencies towards late motherhood over the last decades. Therefore, modeling fertility curves attracts the interest of demographers for many years. Recently, Peristera and Kostaki (2007) evaluated a number of fertility models for various countries and pointed out that the beta distribution performs well. This paper embeds the beta distribution into a stochastic fertility model with time varying parameters which involve a multivariate time series. Furthermore we investigate the resulting implications for the likelihood of genetic defects or complications at delivery. In particular, we examine the stochastic dynamics of German fertility rates over time and specify their correlation with two risks at birth: Down's syndrome and stillbirths.

Subject headings: Stochastic fertility, Down's syndrome, Stillbirths

1 Introduction

Women's mean age at childbirth has risen in most developed countries over the last 30 years. For example, in Germany the mean age at childbirth has increased by 3 years (up to 29 years) from 1975 to 2004, in Australia by 1.3 years from 1995 to 2004 (Australian Institute of Health and Welfare National Perinatal Statistics Unit 2006), in Norway by 2.5 years from 1980 to 2000 (Keilman and Pham 2000) and in the US by 2.6 years from 1970 to 2000 (National Center for Health Statistics 2003). This development may imply an increase of various risks at childbirth. In this paper we focus on two types of risk: Down's syndrome - which is the most common chromosome abnormality in newborns (Dzurova

³Corresponding author: Bernhard Babel. Department of Economic and Social Statistics, University of Cologne, Albertus-Magnus Platz, D-50923 Köln, Germany. Tel: +49 221 470 2334, FAX: +49 221 470 5074, Email: babel@wiso.uni-koeln.de