Opponent's review of Altynay Jazybayeva's thesis
"Regional population forecast for the Republic of Kazakhstan"

Altynay Jazybayeva's thesis "Regional population forecast for the Republic of Kazakhstan" consists of 133 numbered pages of the text. Having the standard structure, it is divided into ten basic chapters including Introduction and Conclusion. Attached are the Bibliography and Lists of tables, and charts.

The thesis includes a variety of significant shortcomings, but the review only reacts to one of them, which is of essential importance. The submitted thesis is an example of undoubted plagiarism. In many places, it includes the text that was fully or only with minor modifications taken over from the article Heather Booth "Demographic Forecasting: 1980 to 2005 in Review" published in 2006 in the third issue of Journal of Forecasting (pp. 547–581). Based on an analysis of plagiarism of the relevant text passages, I have come to the conviction that the author of the thesis violated the principles of ethic of professional work, either consciously or out of gross ignorance. Above all, although the question was repeatedly discussed at doctoral seminars, the author of the assessed text does now know where the bounds of direct quotations are and the difference between standard and secondary quotations. The statement is corroborated by the fact that the Bibliography includes several tens of items that were not quoted in the text and the thesis itself contains a number of references to the sources that are not mentioned in the Bibliography.

I give the following selected examples of plagiarism:

Text in the submitted thesis (page 26, third paragraph):
Recent developments extend the applicability of the Lee–Carter method. Li, Lee, and Tuljapurkar (2004) demonstrate how, by assuming a linear trend in the level parameter, the method can be applied to populations with limited data at unequal time intervals. Li and Lee (2005) develop an augmented common factor method for overcoming the divergence problem, using a common factor to model group mortality and an additive population-specific factor. Such approaches make use of demographic convergence of mean levels; Edwards and Tuljapurkar (2005) note that substantial differences in variances should also be taken into account (Booth 2006).
Text in the article Heather Booth (2006, page 556):
Recent developments extend the applicability of the Lee–Carter method. Li, Lee, and Tuljapurkar (2004) demonstrate how, by assuming a linear trend in the level parameter, the method can be applied to populations with limited data at unequal time intervals. Li and Lee (2005) develop an augmented common factor method for overcoming the divergence problem, using a common factor to model group mortality and an additive population-specific factor. Such approaches make use of demographic convergence of mean levels; Edwards and Tuljapurkar (2005) note that substantial differences in variances should also be taken into account.

Text in the submitted thesis (page 26, fourth paragraph):
The Lee–Carter method has close similarities to the principal components approach used by Bell and Monsell (1991), and Bell (1997) discusses the similarities and differences in detail, demonstrating the importance of bias adjustment and the superiority in short-term forecasts of Lee–Carter over both Heligman–Pollard and principal components using all components. Whereas the Lee–Carter method uses only the first component, the principal components approach typically uses several, thereby allowing for greater flexibility in forecasting change. Higher order terms in the Lee–Carter method were modelled by Booth, Maindonald, and Smith (2001, 2002) and modeled and forecasted using univariate ARIMA processes by Renshaw and Haberman (2003a).
Text in the article Heather Booth (2006, page 556):
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Text in the submitted thesis (page 27, fourth paragraph):
Integrated estimation and forecasting is a characteristics of modeling within the GLM framework. Renshaw, Haberman, and Hatzoupoulos (1996) proposed a two-factor model with two multiplicative terms: a Gompertz–Makeham graduation term and an age-specific trend adjustment term. This model was used to forecast UK mortality at ages 65+ with qualified success: the optimum fitted model parameters did not necessarily generate plausible forecasts, for which lower-order polynomials are often required (Sithole, Haberman, and Verrall, 2000). This study included a comparison with the standard actuarial practice of fitting the Gompertz–Makeham class of functions. Currie, Durban, and Eilers (2004) employed bivariate penalized Bsplines to smooth over both age and time within a penalized GLM framework with extrapolation of the fitted surface over time; comparison with Lee–Carter revealed a much slower mortality decline (Booth 2006).
Text in the article Heather Booth (2006, page 556):
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Text in the submitted thesis (page 27, fifth paragraph + page 28, first paragraph):
In modeling mortality reduction factors using GLM, Renshaw and Haberman (2000) identified the conditions under which the underlying structures of the GLM and Lee–Carter models are identical; they later demonstrated the use of the Lee–Carter methodology for forecasting the reduction factors. Renshaw and Haberman (2003c) developed a GLM-based approach that parallels the Lee–Carter method, including matching observed and expected total deaths. The important difference between the two approaches is in the treatment of time: in the Lee–Carter method time is a factor estimated by SVD, while under the GLM approach time is a known covariate. The GLM approach is based on a heteroscedastic Poisson (non-additive) error structure. Brouhns, Denuit, and Vermunt (2002) proposed a similar bilinear approach in which the Lee–Carter model forms the systematic component (predictor) in the Poisson error setting. Renshaw and Haberman (2003a) compare the Lee–Carter, linear, and bilinear approaches with and without age-specific enhancement: in the Lee–Carter case such enhancement is achieved by including the second term, in the GLM case it involves a break point or hinge to allow for greater emphasis on recent trends, and in the bilinear case the two-term Lee–Carter model is implemented as a double bilinear predictor (Booth 2006).
Text in the article Heather Booth (2006, pages 556 and 557):
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Text in the submitted thesis (page 28, second paragraph):
Forecasts based on cohort models are relatively few because of heavy data demands; where data are available the model may depend on the (inappropriate) experience of cohorts born in the nineteenth century if the entire age range is considered (Tabeau et al., 2001). This problem is reduced when only adult mortality is of interest. The cohort approach is

free of tempo distortions (caused by changes in timing). Bongaarts and Feeney (2002, 2003, 2005) propose an adjustment for tempo distortions in period life expectancy, with implications for forecasting. Other aggregate measures of mortality may be considered. In developing countries, restricted time series of observations limit the application of most forecasting methods. Lutz, Sanderson, Scherbov, and Goujon (1996) overcome this problem by deriving target life expectancy as the average expectation of experts (Booth 2006).

Text in the article Heather Booth (2006, page 557):

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Text in the submitted thesis (page 28, fourth paragraph):

Regression models are easily extended to three factors, but (as noted above) age–period–cohort (APC) models must accommodate the identification problem (see also Van Hoorn and De Beer, 2001). To address this, Wilmoth (1990, 2001) developed a modified model involving additive age and period effects and several multiplicative interaction terms. Tabeau (2001) concluded that mortality forecasting based on APC models is not feasible because of the difficulty in assuming future period effects (although age and cohort effects can be assumed to be fixed); only in forecasts of specific diseases would sufficient epidemiological knowledge be available. Caselli (1996, 2002) used the APC model to forecast mortality from leading causes (Booth 2006).

Text in the article Heather Booth (2006, page 557):

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Text in the submitted thesis (page 28, fourth paragraph + page 29, first paragraph):

Forecasting by cause of death has been advocated from a theoretical perspective as a means of gaining accuracy (e.g., Crimmins, 1981), but experience has largely proved otherwise. Little is gained from decomposition because of similar age patterns in the main causes; cause-of-death reporting is unreliable at older ages where most deaths occur; and cause reduction may have minimal effect on total mortality (Murphy, 1995). Further, model misspecification and the presence of leading indicators (where changes in one cause systematically precede changes in another) can result in reduced accuracy from decomposition (Alho, 1991). The short time series of cause-of-death data also limits extrapolation. Using the multiexponential model, McNown and Rogers (1992) found no consistent discernible gain in accuracy from cause-of-death decomposition. Wilmoth (1995a) demonstrated that, for proportional rates of change models, mortality forecasts based on the sum of cause-specific forecasts will always be higher than those based on aggregate data because causes of death that are slow to decline come to dominate as other causes are more rapidly diminished. Using APC models for ages 60+, Caselli (1996) found this to be true for females but reversed for males. Tabeau et al. (2001) also found this difference between the sexes for France, Italy and the Netherlands, but not for Norway (Booth 2006).

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Text in the submitted thesis (page 29, second paragraph):
Mortality forecasting based on (partial) cause elimination and cause-delay models make use of targeting and informed judgment (Manton, Patrick, and Stallard, 1980; Olshansky, 1987, 1988); Kunst, Mackenbach, Lautenbach, Oei, and Bijlsma (2002) incorporated competing causes of death. These methods have often led to conservative forecasts of mortality reduction. Le Bras (2005) elaborates a cause-delay model of mortality change. Gutterman and Vanderhoof (1998) argue the case for structural models of cause-specific mortality change that take medical and other factors into account, despite the difficulties involved. Structural models of mortality at older ages relate lifestyle and other risk factors to functional status and mortality using vector autoregression, achieving some improvement over traditional time series and informed judgment methods (Manton, Stallard, and Tolley, 1991; Manton, Stallard, and Singer, 1992). However, their forecasting potential is limited by the short time series of risk factors, the large number of parameters and the non-linear interactions generating the mortality forecast. Epidemiological, structural and multistate approaches to cause-of-death forecasting are reviewed by Van Den Berg Jeths, Hoogenveen, De Hollander, and Tabeau (2001).

Text in the article Heather Booth (2006, pages 557 and 558):
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Text in the submitted thesis (page 29, fourth, fifth and sixth paragraphs):
Fertility rates and births are non-stationary series. A difficulty in fertility forecasting arises from structural change, seen in the trajectory of total fertility, changing age patterns and the complex association between the two. Forecasting success has been limited. Zero-factor models are relatively common in fertility forecasting.
Early forecasts focused on events. McDonald (1979, 1981) used time series methods to forecast total births and first marital births, easily outperforming economic–demographic structural models in the very short term. Improvements were achieved by incorporating transfer functions linking total births to females of childbearing age and first nuptial confinements to marriages (thus, in effect, forecasting rates).
Forecasting fertility rates more beneficial over deriving births since the number of women is known approximately for the first 15 years. Miller (1986) forecast total fertility and the mean age at childbearing by a transfer function model relating past trajectory of total fertility to changing age patterns. Age-specific fertility rates have been forecasted by Congdon (1980, 1989) using regressions and ARIMA models incorporating periodic time and relative cohort size (in line with the Easterlin hypothesis), and by McDonald (1983) using simple time series models, with greater success than structural models (Booth 2006).
Text in the article Heather Booth (2006, page 559):
It is generally agreed that fertility and births are non-stationary series (Alho, 1992a; Ermisch, 1992). The difficulty in fertility forecasting stems from structural change, seen in the trajectory of total fertility (quantum), changing age patterns (tempo) and the complex association between the two. Forecasting success has been limited. Zero-factor models are relatively common in fertility forecasting.

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Forecasting fertility rates rather than births has several advantages including, in deriving births, making use of the fact that the number of women is known with near certainty for the first 15 years. Miller (1986) forecast total fertility and the mean age at childbearing by a transfer function model linking past quantum to current tempo. Age-specific fertility rates have been forecast by Congdon (1980, 1989) using regressions and ARIMA models incorporating periodic time and relative cohort size (in line with the Easterlin hypothesis), and by McDonald (1983) using simple time series models, with greater success than structural models.

One can also find similar examples of plagiarism on pages 30, 31, 32 and 33.

Given the presented serious facts showing that Altynay Jazybayeva has violated the relevant authors' copyright, internal regulations of Charles University in Prague and the legislation of the Czech Republic (Law on Universities – law No. 111/1998 Sb.), I propose that the presented thesis "Regional population forecast for the Republic of Kazakhstan" should not be accepted for defence.

Prague, September 6, 2012

RNDr. Boris Burcin, Ph.D.
opponent