The role of birth cohort on liver cirrhosis mortality in 5 European countries (1950-2011)

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Background

- Alcohol-attributable mortality is higher in European countries than elsewhere in the world because of the high prevalence of alcohol consumption.
- However, alcohol-related mortality presents differences over time and between sexes and countries (Rehm et al. 2007).
- Additionally, birth cohorts are likely to differently contribute and explain alcohol-related mortality trends by sexes and countries (Corrao et al. 1997). Therefore, investigating the role of birth cohort would provide valuable input for alcohol preventive policies.

Objective

To examine **the contribution of the cohort dimension** on alcohol-attributable mortality trends by simultaneously assessing the effects of age, period and birth cohort on **liver cirrhosis mortality** since 1950 in different European countries.

Data and methods

- Liver cirrhosis mortality data, 1950-2011 (WHO Mortality database).
- Age-specific population and mortality data (HMD).
- Analyzed countries: **Hungary, Spain, Finland, Austria and the UK**
- Descriptive analysis: Age-standardized liver cirrhosis mortality rates.
- **Age-Period-Cohort (APC) modelling**: Clayton and Schifflers approach (1987). Four models: Age, Age-Drift*, Age-Period, Age-Period-Cohort (APC).
  - Poisson regression models, with the natural logarithm of population at risk as the offset term.
  - Formulation of the APC model:

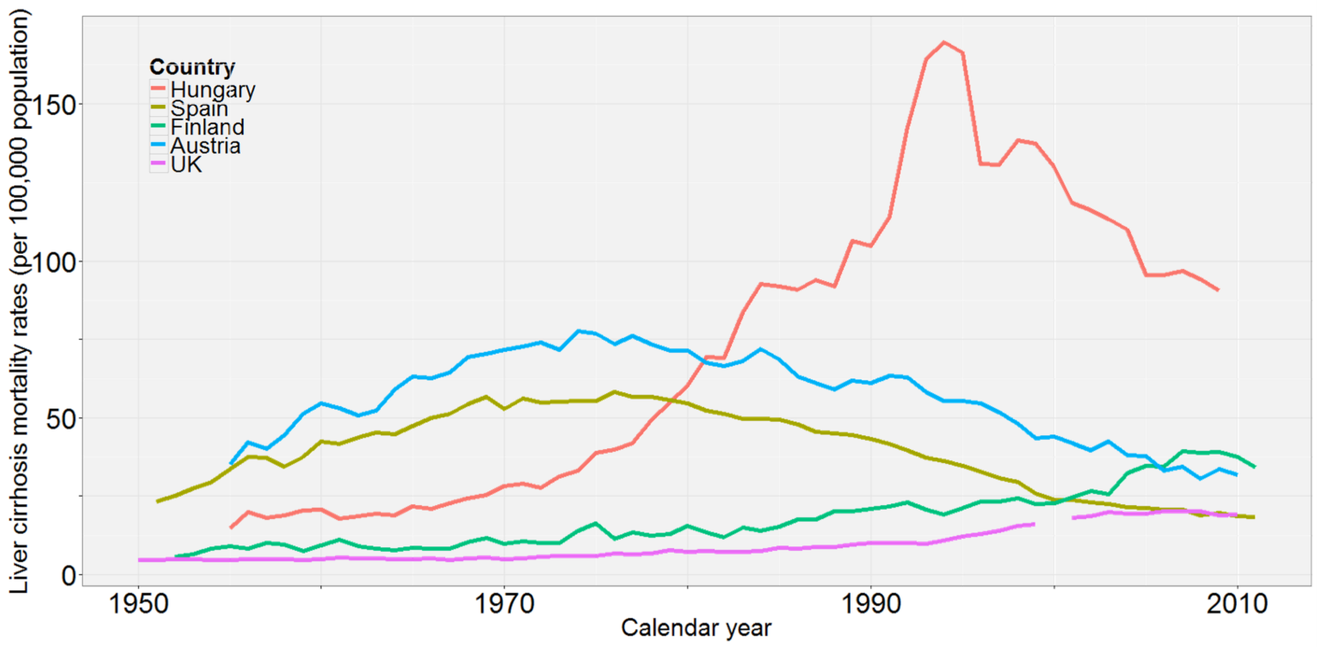
$$\ln[\lambda_{ap}] = \mu + \alpha_a + \beta_p + \gamma_c$$

Where λ is the liver cirrhosis mortality rate. μ is the intercept and a, β and γ represent the age, period and birth cohort effects.

* Drift represents the linear change in the natural log of liver cirrhosis mortality that is shared between period and birth cohort.

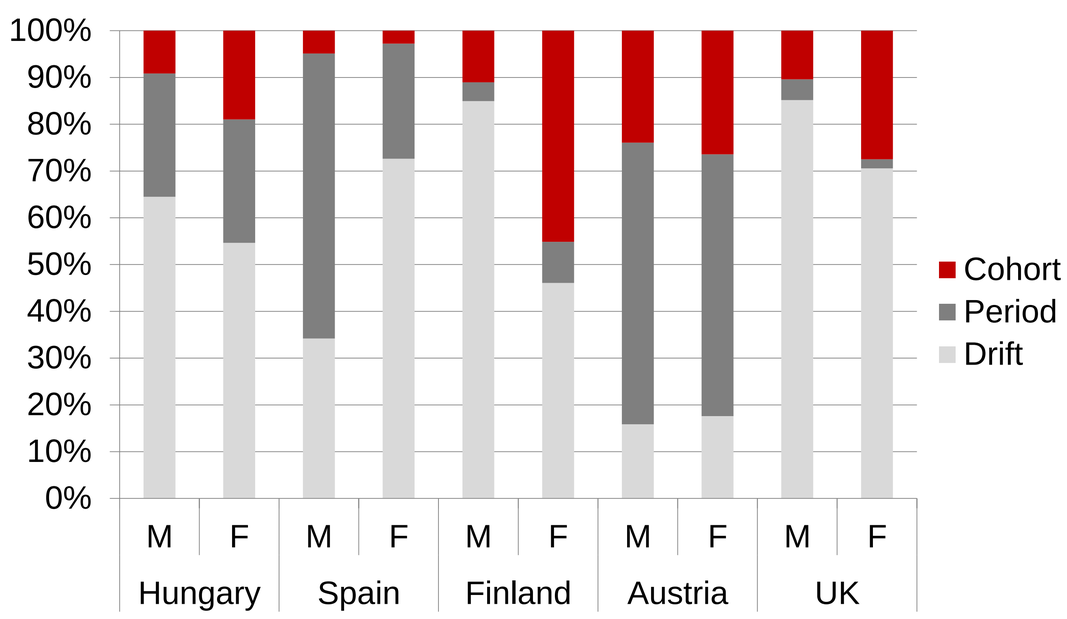
Results

I. Age-standardized liver cirrhosis mortality rates, ages 15-99



- Remarkable differences in levels and trends in liver cirrhosis mortality between countries exist, Hungary an outlier.
- Women's liver cirrhosis mortality levels are less than half as compared to men, but patterns and trends are similar.

II. Contribution to the deviance reduction

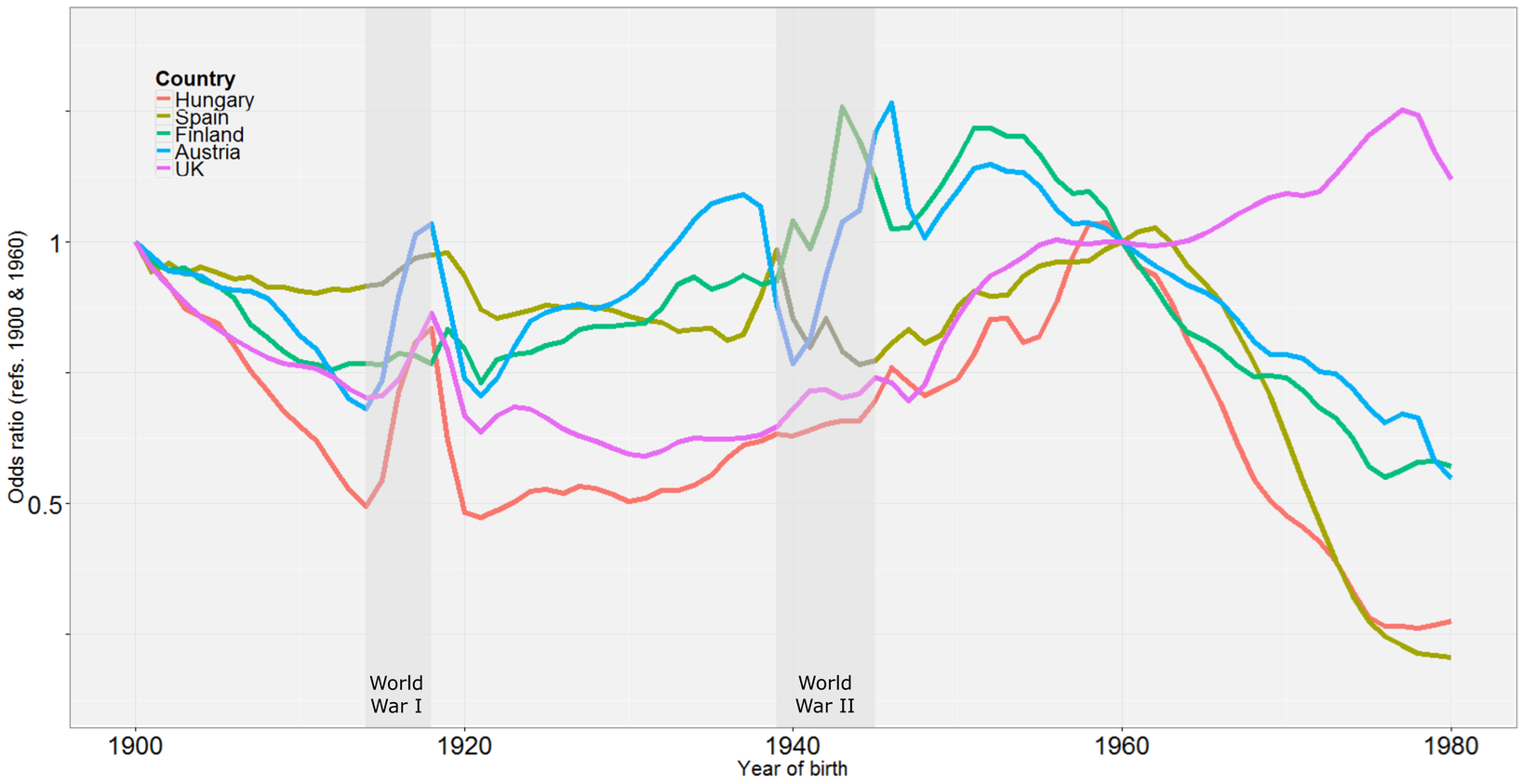


- Birth cohort statistically significantly contributes to liver cirrhosis mortality.
- In Finland and UK the contribution of birth cohort to the model fit is even larger than the contribution of period.
- The contribution of birth cohort is larger for women.

III. Birth cohort effects for men (APC model)

- Birth cohorts born in the 1950-60s have the highest risk of liver cirrhosis mortality, except for the UK.
- In general, the non-linear birth cohorts effects tended to decline from 1900 to 1920, increase until 1960 and decline again thereafter.
- However, country differences exist i.e. stagnation or moderate decline until the 1940s in Spain.
- Exceptional peaks may be explained by WWI (1914-18), the Spanish Flu (1918-19) and WWII (1939-45).

Birth cohort effects showed similar patterns and trends for women and men



Conclusions

- **The substantial effect of birth cohort on liver cirrhosis mortality differs by sex and across countries, although cohort patterns are remarkably similar.**
- **Cohorts born in the 1950-60s were at higher risk of liver cirrhosis mortality.**

References:
Clayton, D., & Schifflers, E. (1987). Models for temporal variation in cancer rates. II: age–period–cohort models. *Statistics in medicine*, *6*(4), 469-481.
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Rehm, J., Sulkowska, U., Mańczuk, M., Boffetta, P., Powles, J., Popova, S., & Zatoński, W. (2007). Alcohol accounts for a high proportion of premature mortality in central and eastern Europe. International journal of epidemiology, 36(2), 458-467.

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