Gender Gap in Life Expectancy

- Age- and Cause-specific Decomposition of ten Countries -

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Extended abstract
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Introduction

On average worldwide, women tend to live significantly longer than men. At the beginning of the 1920s, in most industrialized countries the gap in life expectancy between the two sexes widened until the 1970s, when the difference started to narrow (Glei and Horiuchi, 2007). Important studies indicate that where some convergence has taken place, men have experienced more rapid gains in survival in relation to women. Evidence from low mortality countries reveals that the largest absolute difference between male and female mortality risk reaches its maximum at old ages. Moreover, the gender gap in mortality hazards have shifted rigidly to older ages, over the years. On the one hand, some studies argued that old-age deaths should become compressed at advanced ages; on the other hand, others argued that old-age deaths should become more dispersed with age (Zuo et al., 2018). As survival patterns at old ages become more important in driving the overall mortality decline in low mortality countries, old ages are also becoming more crucial in determining the gender difference in life expectancy, even though decreasing differences persist. However, the age pattern of old-age deaths remains hotly debated. Therefore, it is necessary to study the contributions of mortality age according to different causes of death to the overall gender gap as well as the changes in the distributions of age-specific contributions over time. It is important to understand the composition as well as the development of the gender gap in mortality in terms of causes and age contributions, to be able to react to it. For instance, if public policies aim for closing the gender gap in life expectancy, it might be helpful to understand which age groups mainly contribute to the gap as well as their developing patters in the recent period, for certain causes of death.
In this study we focus on the evolution of the age-specific contributions to the gender gap, according to different causes of death, for ten European and non-European countries. The aim is to show the developing patterns of age-specific contributions to the declining gender gap in life expectancy, according to different causes of death, which are shown by the chosen countries over the last

decade. Above all, this is done in the view of the fact that the development of age-specific contributions might be an indicator of different health transitions, which women and men experienced in a country over time. Consequently, this study addresses the patterns of age-specific contributions to the gender gap in life expectancy especially for old-ages over time, highlighting similarities as well as dissimilarities among the countries. Analyses are based on the assumption that variations in life expectancy by country, sex, age and causes of death may reflect differences in the availability as well as in the accessibility to health care system for the given population. Additionally, they might reflect the different impact that certain causes have on women with respect to men, at different ages. Focusing on patterns of distributions of age-specific contributions according to causes of death over time, gives a new as well as non-conventional view of the impact of age- and cause-specific mortality on the decreasing gender gap in life expectancy.

Data and methods

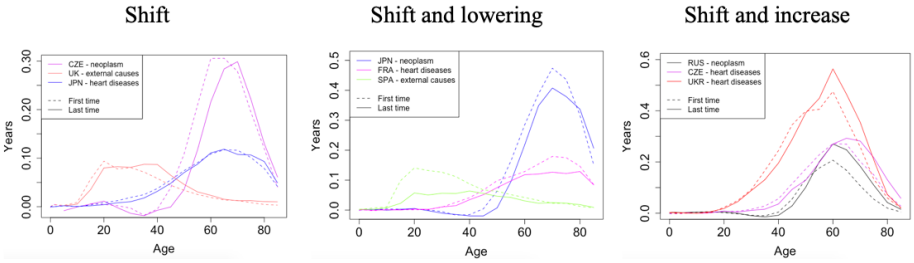
We combine period life tables (5-year age intervals) from the Human Mortality Database (HMD, 2019) with cause-of-death data provided by the Human Cause-of-Death Database (HCD, 2019), which has coherent cause-specific mortality data time series for the ten countries in study over the last 12 years available. The European countries selected refer to (1) Central Eastern Europe (Czech Republic, Poland, Russia, and Ukraine) and (2) Central Western Europe (UK, France, Germany and Spain). In order to have a wider view of the variations in the gender gap in life expectancy outside of Europe, we include Japan as well as US in the analysis. We truncate the cause-of-death analysis at age 85 due to classification quality and presence of comorbidities. Additionally, we restrict our focus on the short list of the ICD-10 (HCD, 2019). Arriaga's method is used to decompose the gender gap in life expectancy by age and cause of death in each country, following two steps. First, for each country and each year within the last 12-year interval available, the difference in life expectancy is decomposed by the contribution from each age group. Second, the contributions from each separate age group are divided into the contributions from each specific cause of death. In this way, we decompose the difference in life expectancy into ages and causes of death, which enables us to explain life expectancy differentials in terms of contributions of each age and cause.

Findings

Results from the age- and cause-specific decomposition reveal that among the sixteen causes of death neoplasm, heart diseases and external causes are the main drivers of the gender gaps in all the countries. Secondary contributions are given by cerebrovascular diseases, respiratory diseases and diseases of digestive system. Most interesting are the changes in the distributions of age- and cause-specific

contributions over time. In accordance with previous studies, our findings show that for most causes of death, the largest contributions to the gender gap are given by old ages as well as largest gender gaps in mortality shift to older ages over the years.
For all the countries in study, we can identify three different main patterns in the development of age-specific contributions to the gender gap, according to causes of death: A shift of the distribution of age-specific contributions to older ages; a shift to older ages together with a lowering of the distribution of age-specific contributions; and a shift of the distribution to older ages as well as an increasing contribution at older ages. These patterns denote different stages of health transition in cause-related mortality in each country. Overall, shifts to older ages of the distribution of age-specific contributions (first pattern) indicate decreasing differences in mortality at younger ages over time, whereas differences increase at older ages. This might suggest larger reductions in number of deaths for males than for females at younger ages as well as increasing number of deaths for males than for females at older ages. In all countries, the first pattern is observed in the main causes of death, neoplasm and heart disease, through the shift of the largest difference in mortality towards age groups older than 70. These results are partially shown in Figure 1, which highlights the three developing patterns. For each pattern, the age-specific contributions to the gender gap over the 12-year observation period are exemplarily illustrated, according to the three main causes of death in different countries.

Figure 1.



According to the second pattern, shifts to older ages of the main age contributors together with the lowering of the distribution of age-specific contributions might suggest larger improvements in mortality due to a certain cause of death for males than for females, over time. For external causes of death, this occurs in all the countries in study, beside in UK, where distributions of age-specific contributions only shift to older ages. Even though differences due to external causes are spread over all the ages, the highest age-specific contributions according to external causes move to older ages, especially older than 50 years, in many countries. Regarding heart diseases, the second pattern with a shift and a lowering is observed especially for the main age contributors (60+), over the last decade. Exceptions are Japan and Poland, where the distribution of

age-specific contributions just slightly shifts to older ages. Likewise, the second pattern occurs for neoplasm in most of the countries. Only Spain and Czech Republic show the first pattern, since the distribution of age-specific contributions just slightly moves to older ages. Russia and Ukraine indicate the third pattern for neoplasm, since they show an increase in the distributions over time at older ages as well. The third pattern is additionally prominent in Ukraine and Czech Republic regarding heart diseases. Indeed, in Ukraine and Czech Republic the distribution of age-specific contributions increases over time, particularly at older ages. This development might suggest lower reductions in number of deaths for males than for females as well as less improvement for males than for females in cardiovascular-related mortality, especially at older ages.

For all the secondary causes, the distribution of age-specific contributions in most of the countries either only shift to older ages or shift and decrease, suggesting that mortality compression in terms of gender difference as well as larger improvements for male than for females occur for most of the secondary causes. Only distributions of age-specific contributions to the gender gap in mortality due to endocrine, nutritional and metabolic diseases as well as to diseases of the nervous system show a shift towards older ages often together with increasing age-specific contributions, especially at older ages.

Our results indicate that, with mortality delay, premature mortality (e.g. due to external causes) and old-age mortality (e.g. due to cancer and cardiovascular diseases) are shifting towards older ages. Consequently, largest age-specific contributions to the gender gap in mortality, for most of the causes of death, are also shifting towards older ages. These shifts are often followed by lowering in the distributions of age-specific contributions in most of the countries.

In the future analyses, we pay special attention to each age group above 80 separately, to investigate if there are even more specific patterns in the oldest old ages than this study could show. We further focus on the analysis of distributions of relative contributions according to causes of death, by calculating compression indicators and by comparing compression patterns between men and women. The aim is to get a more accurate understanding of the epidemiological changes which are leading to variations about the timing of death and lifespan, taking into account a larger and more comprehensive set of causes of death.

References

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