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Research Article

Macroeconomic conditions and population health in Iceland

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Demographic Research: Volume 37, Article 25
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Abstract

BACKGROUND
Results from recent research on the impact of economic cycles and population health have been mixed, with results appearing to be context-sensitive.

OBJECTIVE
We examine the long-term relationship between economic conditions and population health in Iceland, which has experienced some economically turbulent times in the last years and decades.

METHODS
We use aggregate annual data for 1981–2014. We use three aggregate indicators of economic activity to proxy the economic cycle: unemployment rate, real GDP per capita, and real GDP. Life expectancy at birth, infant mortality, and total mortality as well as four cause-specific mortality rates were used as outcome measures.

RESULTS
Our results do not suggest a statistically significant relationship between economic conditions and total mortality, infant mortality, or life expectancy. Different responses between causes of death are found, and in some instances between genders, although statistical significance is low. We do, however, find a consistent and statistically significant relationship for females aged 45–64, where economic downturns are associated with lower all-cause mortality.

CONCLUSIONS
For the time period studied we do not find a significant relationship between economic cycles and population health, where health is proxied by mortality rates, life expectancy at birth, and infant mortality. Further studies using less extreme health outcomes, such as morbidity rates, are warranted.

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CONTRIBUTION

This type of study has not been performed using Icelandic data before and provides a comparison to research from other countries where the relationship has been explored more. Additionally, one of the contributions of this paper is to use a variety of economic indicators as proxies for economic cycles in a study examining their relationship with population health.

1. Introduction

Researchers have found mixed results when studying the impact of economic conditions, and economic cycles specifically, on health. As results appear to be sensitive to time, place, data sources, and outcomes, each new study adds a piece to the puzzle. A fully comprehensible pattern is unlikely to be realized in a single study, but will emerge over time. In this analysis we add new information to the currently loose patchwork of results by testing this relationship in a context not examined before. We focus on the long-term relationship between economic cycles and health on a population level in Iceland. As a country with strong data collection agencies and considerable economic volatility, Iceland provides an excellent context for such a study. We use aggregate annual data from 1981–2014 and three different aggregate indicators of economic activity to proxy economic cycles. Outcome variables are life expectancy at birth, infant mortality, and total mortality, as well as four cause-specific mortality rates. We analyse simple regression models between health and economic indicators, as well as distributed lag models where a health indicator is regressed on contemporaneous and lagged values of an economic indicator.

Iceland can be described as an extreme case of a small open economy. It has a population of 330,000 people (229,000 at the beginning of the study period) (Statistics Iceland n.d.-h), and its own currency (the Icelandic krona – ISK). This makes Iceland vulnerable to a range of external shocks, spanning from international price changes of fish to global crises. Iceland's part as a player in the global economy is a small one, but it has developed rapidly from being a community dependent on a single industry (fishing) to an open economy with increasing importance of other diverse sectors. This progression is largely the result of bi- or multilateral trade agreements, most notably The European Free Trade Association (EFTA) in 1970 and the European Economic Area (EEA) in 1994 (EFTA 2015b, 2015a; Central Bank of Iceland 2005). In the following years the Icelandic financial markets liberalized considerably, with the privatization of banks in the 1990s and early 2000s (Central Bank of Iceland 2005). In the first years of the new millennium and leading up to the economic collapse of 2008, Iceland's economy was seemingly blooming and Iceland was considered one of the world's richest nations OECD (2006). However, during the first days of October 2008, the three largest banks in Iceland collapsed, which triggered a system-wide meltdown, accompanied by currency and debt crises (Matthiasson 2008; Central Bank of Iceland 2010). The other most noteworthy economic downturn in the study period is the early 1980s, with hyperinflation, in which the highest inflation rate exceeded 100% in August 1983, although not sustained over a full year (Statistics Iceland n.d.-a).

Changes in the Icelandic economy have thus been volatile, creating substantial variation that can be utilized for research. For instance, a longer-term analysis has been made on the relationship between business cycles and workplace accidents (Ásgeirsdóttir and Tryggvason 2014), and the most recent economic downturn has been the subject of several studies on business cycles and health (Ásgeirsdóttir, Ólafsdóttir, and Ragnarsdóttir 2014; Guðjónsdóttir et al. 2012; Ólafsdóttir, Hrafnkelsson, and Ásgeirsdóttir 2014; Jónsdóttir and Ásgeirsdóttir 2014; Ásgeirsdóttir et al. 2013; Ásgeirsdóttir et al. 2014; Ásgeirsdóttir and Ragnarsdóttir 2014; Eiríksdóttir et al. 2013; Ólafsdóttir and Ásgeirsdóttir 2015; Hauksdóttir et al. 2013; Ásgeirsdóttir et al. 2016; Birgisdóttir, Jónsson, and Ásgeirsdóttir 2017), with the majority of research examining health behaviours (Ólafsdóttir, Hrafnkelsson, and Ásgeirsdóttir 2014; Guðjónsdóttir et al. 2012; Jónsdóttir and Ásgeirsdóttir 2014; Ásgeirsdóttir et al. 2013; Ásgeirsdóttir et al. 2014; Ásgeirsdóttir et al. 2016; Ólafsdóttir and Ásgeirsdóttir 2015).

Because the demographic composition of Iceland's population changed considerably during the study period (Statistics Iceland n.d.-g), the role of migration is studied here as a potential pathway in the relationship between economic cycles and population health. In many countries it is well documented that upon arrival, immigrants are in better health than the natives of the host nation (see, for example, Antecol and Bedard 2006; Ray et al. 2007; Cebolla-Boado and Salazar 2016; Hyman 2001), but that is of course dependent on circumstances in the country of origin. There are several explanations for these findings, but the one most relevant for the current study is that many countries have immigration medical requirements that might deny admissions to individuals with preexisting conditions and/or support self-selection of healthier individuals. On the other hand, net immigration could entail less-healthy individuals seeking health care provided by the state. As the immigration legislation in Iceland requires applicants to acquire a medical exam certificate, this would only apply to individuals migrating from exempt countries (Directorate of Immigration n.d.), or asylum seekers from war-torn countries who might suffer from various conditions associated with such circumstances. In addition, infant mortality has been studied in relation to migrants, and previous research has found that infant mortality rates are dependent on both immigrants' country of origin, as well as the destination country (Naimy et al. 2013; Kinge and Kornstad 2014; Gissler et al. 2009). In contrast to many other economically volatile countries, Iceland is a developed country with a strong data collecting infrastructure, which makes for reliable data. Here, we want to take advantage of this opportunity, to examine good quality data from a western country that, due to its size, happens to provide substantial volatility. To our knowledge, this is the first time series study to examine the relationship between economic cycles and population health in Iceland.

Due to the multitude of determinants of each health condition studied and in accordance with previous research, the relationship could be of either sign a priori, but likely to be small if existing. Furthermore, some diseases cannot reasonably be assumed to be correlated with the state of the economy at all (e.g., genetically determined diseases). We do not find evidence of a statistically significant relationship between economic conditions and total mortality or life expectancy at birth. We do find different responses between causes of death and in some instances between genders, although the statistical significance is generally low. Although results are generally weak, results show a fairly robust statistically significant relationship for females aged 45–64, where economic downturns are associated with lower all-cause mortality.

2. Literature review

The early research focusing on the relationship between business cycles and health, most notably the formative work of Brenner, finds countercyclical variations in mental hospital admissions, infant mortality rates, deaths due to cardiovascular disease, cirrhosis, suicide, and homicide (Brenner 1971, 1973a, 1973b, 1975). However, his statistical analysis has been widely criticized, and these results could not be replicated (Marshall and Funch 1979; Gravelle, Hutchinson, and Stern 1981; Wagstaff 1985; Stern 1983). More recent studies point in the opposite direction – that some major health measures might improve during economic downturns (Ruhm 2000; Neumayer 2004; Gerdtham and Ruhm 2006; Tapia Granados 2008; Tapia Granados and Ionides 2011, 2008). There is also no reason to assume that all types of health are affected in the same way. For example, increasing stress during economic downturns might explain evidence of elevated risk for stroke in harder times (Falconi et al. 2016), mental health deterioration (Charles and DeCicca 2008), and increases in drug abuse (Martin Bassols and Vall Castelló 2016; Colell et al. 2015), as well as a rise in mortality rates due to suicides and homicides, which represent an important exception to the health-improving associations frequently found (Ruhm 2000; Koo and Cox 2008). On the other hand, physical health might improve during downturns because of improved health behaviours such as reductions in smoking and alcohol consumption due to budget constraints (Ásgeirsdóttir et al. 2014), and more sleep due to a lower opportunity cost of sleeping (Ásgeirsdóttir et al. 2014; Antillón, Lauderdale, and Mullahy 2014). Comparably, one does not expect to see much variation in diseases that are mostly genetically determined or take a long time to materialize, such as certain types of cancer, but rather in diseases that are affected by behaviour, lifestyle, and environmental factors.

Ruhm (2000, 2003, 2005, 2007), utilizing US data from 1972 through 2000, shows state-level mortality rates to be procyclical, indicating that recessions are beneficial to population health. He speculates that rising opportunity costs may be an explanation. Using more recent data, from 1976 through 2009, Ruhm (2015) points to a shift over time in the relationship between total mortality and economic conditions; from being procyclical to being unrelated. This shift is however not the same across causes of mortality. Cardiovascular mortality is found to be procyclical throughout the study period.

Examined possible mechanisms for the procyclicality of overall mortality in the United States have mostly been personal income (Ruhm 2000), health behaviours (Ruhm 2003, 2007, 2015), and individual labour market status (Miller et al. 2009). Miller et al. (2009) find that the added deaths related to a rise in the unemployment rate are mostly for age groups that are not likely to be a part of the labour force; only 7% of additional deaths were for the age group 25–64. They furthermore find the largest contributor to procyclical mortality to be motor accidents and cardiovascular deaths. The sufferers of those deaths are mostly not of working age, indicating that work-related stress or substitution between work and health production are not to blame. The authors conclude that individuals' own labour market involvement is not the key mechanism behind the procyclical mortality rate found. Furthermore, people's individual-level economic conditions have been studied to some extent as possible mechanisms, mostly using microdata on personal income. Ruhm (2000) finds that changes in personal income play a negligible part in the relationship between business cycles and health, but he has also pointed to risky behaviours (such as smoking and drinking) as pathways (Ruhm 2003, 2004, 2015). On the other hand, increased income could allow people to consume more health care and partake in healthful activities, i.e., it may have protective effects, especially in countries where health services are privately funded to a considerable extent (Gerdtham and Ruhm 2006).

Consistent with findings in the United States, studies from other industrialized countries frequently find a procyclical relationship between mortality rates and unemployment rates, such as in a study of 23 OECD countries for the time period 1960–1997 (Gerdtham and Ruhm 2006), in Japan (Tapia Granados 2008), Spain (Tapia Granados 2005b), and Canada (Ariizumi and Schirle 2012). However, conflicting results have also been found, with a countercyclical relationship with mortality documented in 13 European Union countries by Economou, Nikolaou, and Theodossiou (2008), and in Sweden by Gerdtham and Johannesson (2005), as well as Svensson (2010, 2007). Stuckler et al. (2009), who examine the impact of changes in unemployment rates on mortality in 26 EU countries in the period 1970–2007, did however not find consistent evidence across the European Union that all-cause mortality rates were affected with changes in the unemployment rate.

Causality concerns always come up in any lengthy time series analyses, and for some relationships the causality is clearly bidirectional (Lorentzen, McMillan, and Wacziarg 2008). The previous literature contains many examples of the relationship between various economic indicators and health running both ways. Although business cycles are not the subject of the following studies mentioned here, they add to our understanding and make it clear that causal inference is by no means straightforward. Studies finding a causal relationship running from various health outcomes to different economic indicators include Bloom, Canning, and Sevilla (2001), who find positive and sizable effects of health on economic growth; Weil (2005), who finds a positive effect of health on a country's output; Ashraf, Lester, and Weil (2008), who find positive effects of exogenous health improvements on output per capita, although relatively small in the long run; and Acemoglu and Johnson (2007), who find that life expectancy at birth has a small effect on real GDP. Causality inference will not be made in this study. In our view, the three and a half decades that this time series spans includes too many turbulent times in Iceland, in both economical and historical sense, to fairly hypothesize as to which direction the relationship holds.

Iceland is a small, open, and volatile economy where business cycles originate from various external sources. It is probable that such factors override any possible effects running from health to business cycles. This is further highlighted by the fact that Iceland has not suffered major health outbreaks such as Ebola or other extremely infectious diseases that affect a large part of a country's population. Our hypothesis, and thus modelling, is therefore that business cycles are a potential source for changes in mortality rates, given the numerous studies indicating such a relationship, as well as a number of hypothesized pathways through which this relationship could work. For this purpose we use credible economic indicators as proxies for economic cycles to assess their impact on mortality rates for the most common causes of death in Iceland.

3. Data

All variables were constructed entirely from publicly available data from three sources; the Directorate of Health website (Directorate of Health n.d.), the Statistics Iceland website (Statistics Iceland n.d.-a, n.d.-b, n.d.-c, n.d.-d, n.d.-e, n.d.-f, n.d.-h); and the Directorate of Labour website (Directorate of Labour n.d.). Our analysis employs Icelandic annual data from 1981 to 2014 and includes economic indicators, labour market statistics, demographic variables, data on life expectancy and the number of survivors in each age cohort (for the whole population as well as separately for males and females), and infant mortality. It also includes age-, gender-, and cause-specific mortality rates for four major causes of death that comprise on average 85% of total mortality in Iceland during the study period.

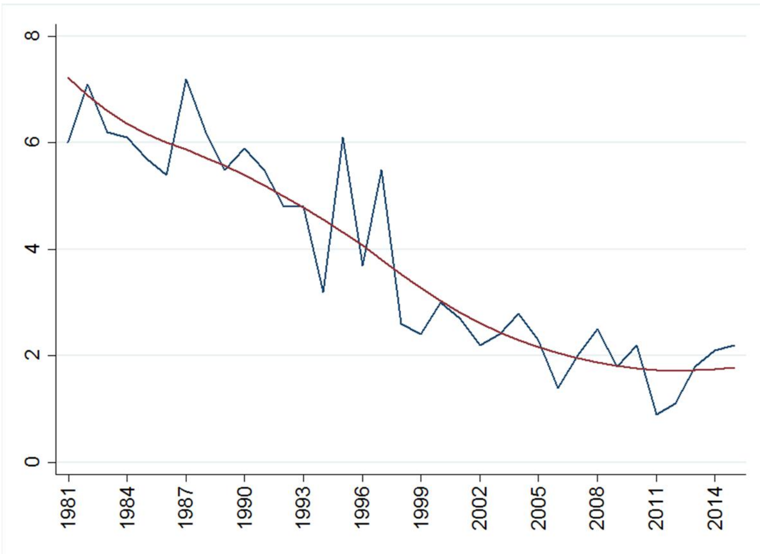
3.1 Dependent variables

Population health is indexed by life expectancy at birth, infant mortality, all-cause mortality, and a variety of age-, gender-, and cause-specific mortality rates. As deaths are rare in the youngest age groups and for the sake of brevity, we focus on the working-age population in our main analysis; i.e., the age groups 20–44 and 45–64. Although the health of the youngest and oldest individuals is perhaps susceptible to changes in the economy, we do not find a statistically significant relationship in our analysis but nonetheless report our results in the Appendix for completeness. The cause-specific mortality rates used in the analyses are neoplasm, diseases of the circulatory system, respiratory diseases, and mortality from external sources, which include traffic accidents and suicides. The study period was 1981–2014, rendering 34 observations in most analyses. Mortality rates are constructed as the number of deaths from the specified cause divided by population in each year, and reported per 1,000. As can be seen in Figure 1, the total mortality rate from all causes trended downwards during the study period, and with further inspection, all but the oldest age group (>84 years) show the same downward trend, which is in accordance with the aging of the Icelandic population (Figure 2). The most widely used indicators for population health are life expectancy at birth and infant mortality. Life expectancy at birth is a good mortality-based summary index of population health and is unaffected by the age structure of the population. According to both indicators, Iceland enjoys very good public health, as life expectancy at birth is among the highest in the world (81 years for men and 83.6 years for women in 2015), and infant mortality the lowest in Europe (1.9 per 1,000 live births) (Statistics Iceland 2016). A clear upward trend is evident in life expectancy at birth and a downward trend in infant mortality during the study period, both clear indicators of improving population health in Iceland (Figure 1).

As a part of our age-specific analysis, we also explore n-year temporary life expectancy at ages that correspond to our age-specific analyses; i.e., at age 20 we use the 25-year temporary life expectancy (which corresponds to age range 20–44). At age 45 we use the 20-year temporary life expectancy (which corresponds to age range 45–64). For the oldest age group we use a cap of 95 years.

Figure 1: Selected health indicators used in the study

a) Infant mortality



b) Life expectancy at birth

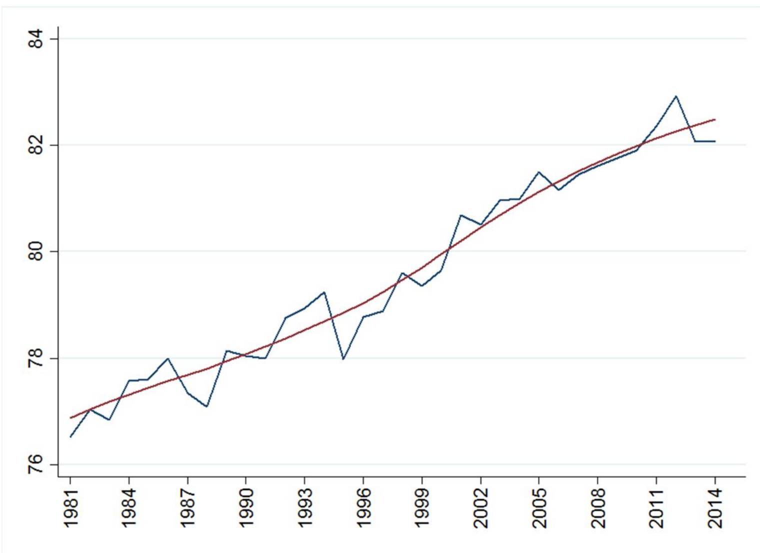
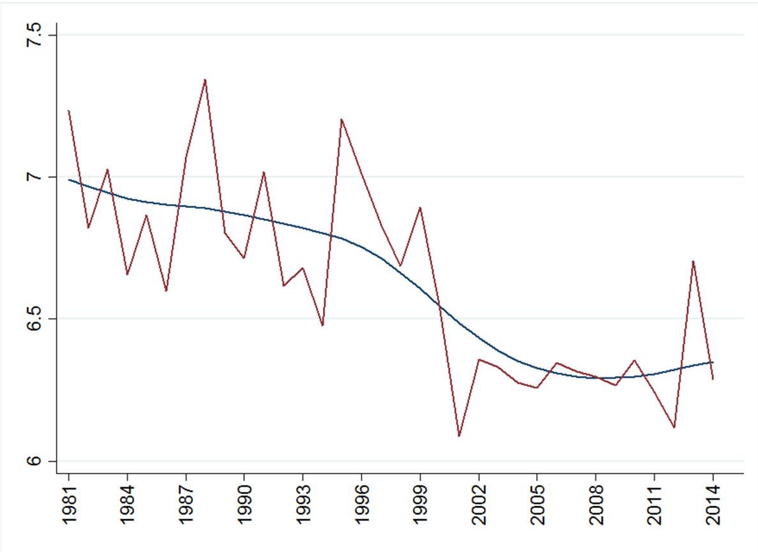


Figure 1: (Continued)

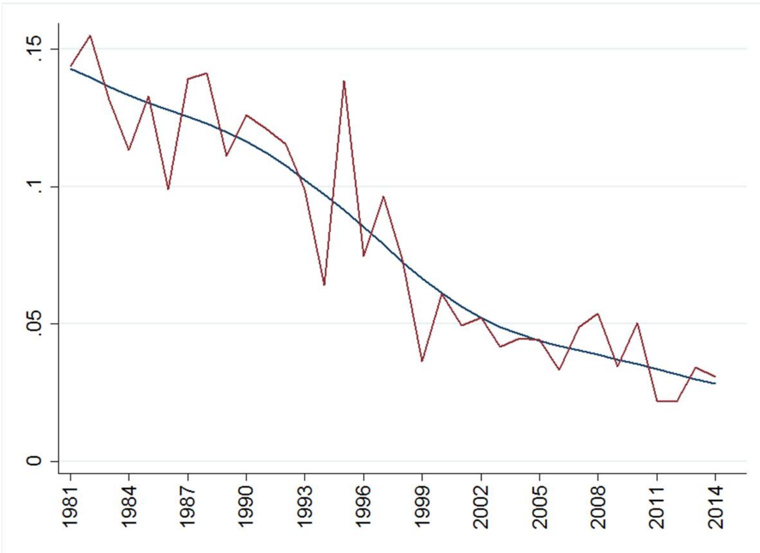
c) Total mortality



Notes: Mortality rates per 1,000 on the y-axis in panels a and c, and life years in panel b, calendar years on the x-axis. The smooth curves are Hodrick–Prescott trends computed with a smoothing parameter γ=100.

Figure 2: Age-specific mortality rates for all-cause mortality

a) Ages 0–4



b) Ages 5–9

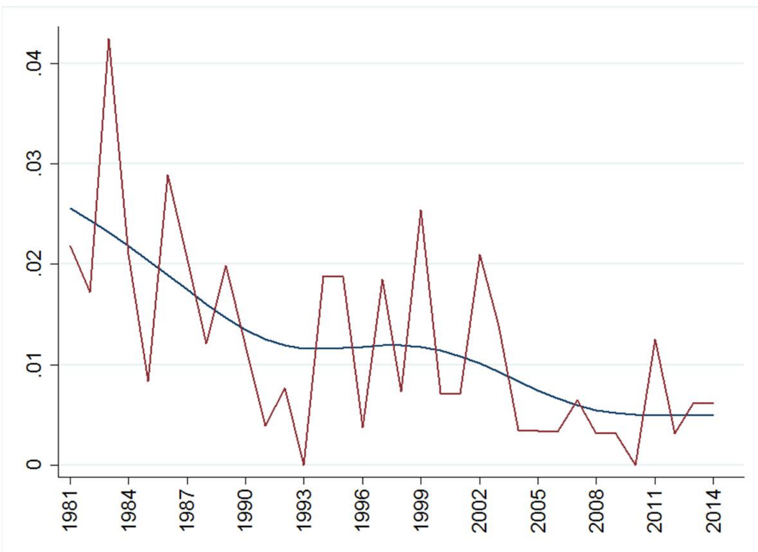
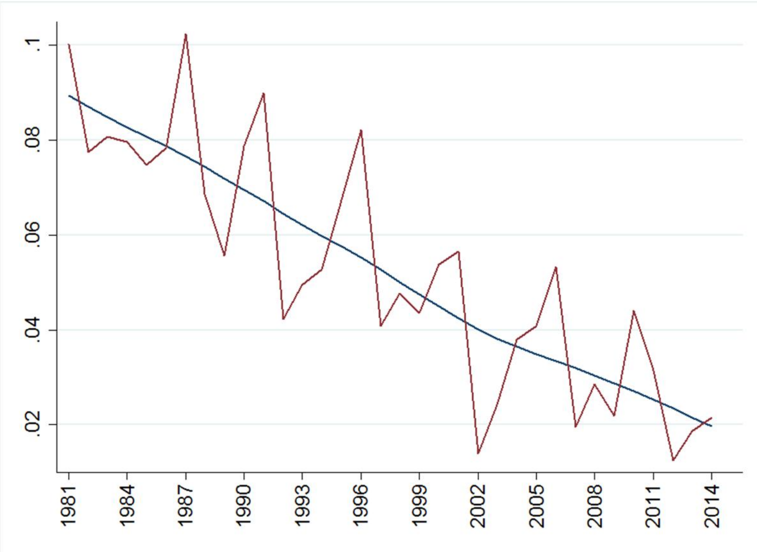


Figure 2: (Continued)

c) Ages 10–19



d) Ages 20–44

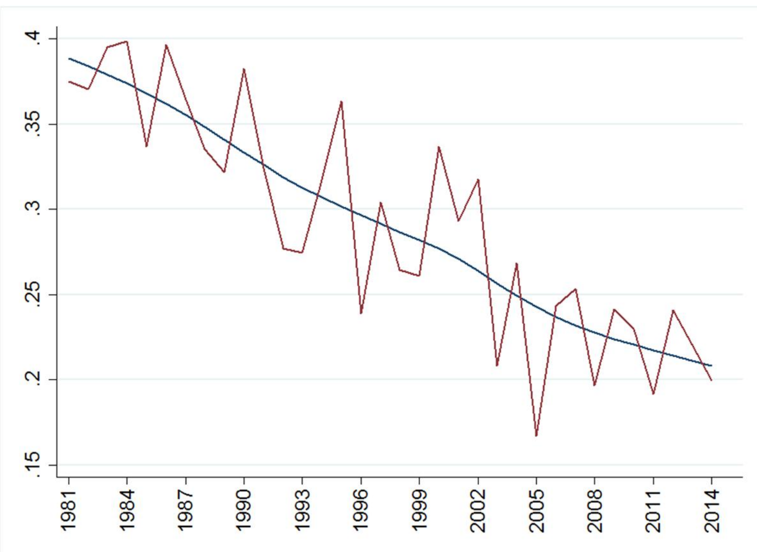
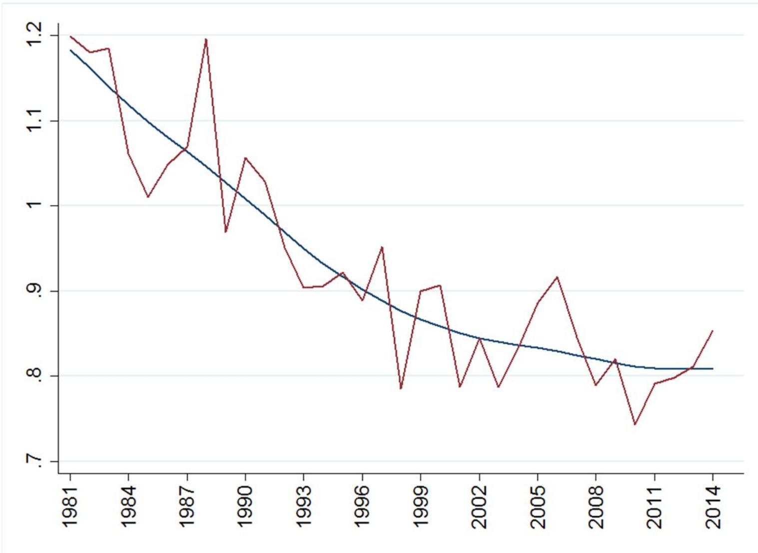


Figure 2: (Continued)

e) Ages 45–64



f) Ages 65–84

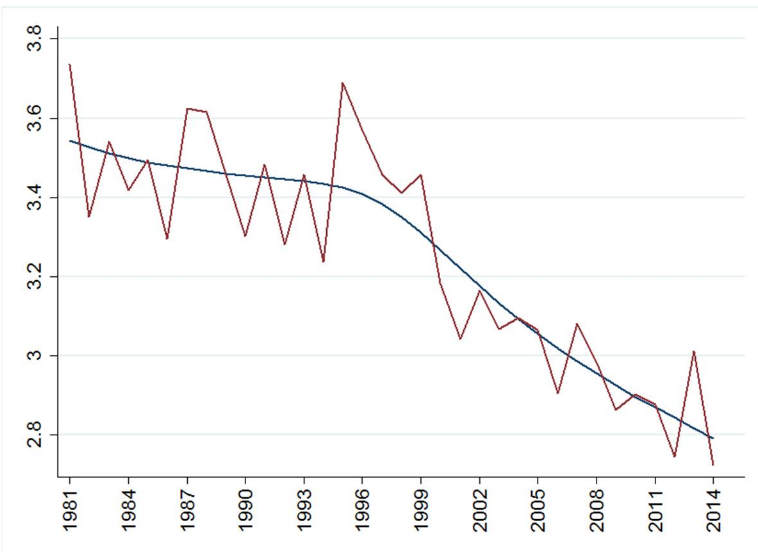
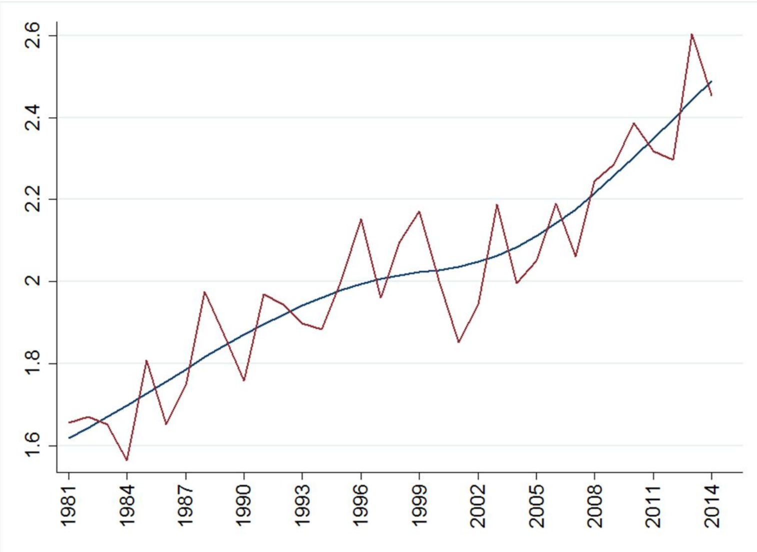


Figure 2: (Continued)

g) Ages 85–95



Notes: Mortality rates per 1,000 on the y-axis, calendar years on the x-axis. The smooth curves are Hodrick–Prescott trends computed with a smoothing parameter γ=100.

3.2 Explanatory variables

The causes and manifestation of economic fluctuations can vary substantially, both between and within countries, as well as between time periods. For this reason, three economic indicators are used as proxies for economic conditions. Although those variables are known to correlate to some extent, the impact and response time between a change in the economy and health might be different when measured with different exposure variables. Those indicators are: the unemployment rate, real GDP per capita, and real GDP. Real prices were based on the consumer price index, using 2014 as a base year and calculated from official data from Statistics Iceland (Statistics Iceland n.d.-a, n.d.-d, n.d.-e).

Unemployment is a natural economic-cycle indicator, and very widely used in the literature to proxy economic conditions (Ruhm 2000, 2003, 2005, 2007; Miller et al. 2009; Eliason and Storrie 2009; Gerdtham and Johannesson 2003). We follow that tradition, with the unemployment rate reported as part of the civilian labour force. The average unemployment rate in each calendar year is used in the analyses.

GDP has two variations that relate to different theoretical hypotheses about the relationship between business cycles and health, and both are used in this study: Real GDP per capita is a broad economic indicator of living standards and is often used for comparison between countries or time periods. Real GDP is an inflation-adjusted measure of the economic cycle and important for different reasons. Although GDP is not a measure of average living standards, it represents the total economic activity within a specific geographical area, which is important if external effects of economic activities, such as pollution and traffic congestion, are the drivers of potential health effects. These can affect the whole population – both the working-age population, who are perhaps most likely to be affected by traffic-related injuries, and the elderly and young children, who are most susceptible to illnesses due to pollution (WHO Regional Office for Europe 2013). For ease of interpretation of coefficients, real GDP and real GDP per capita were scaled to billions of ISK and millions of ISK respectively. A priori, we expect to find similar results for real GDP and real GDP per capita as they are very closely correlated (see Figure 3).

Figure 3: Selected economic indicators used in the study

a) Real GDP (in billions ISK)

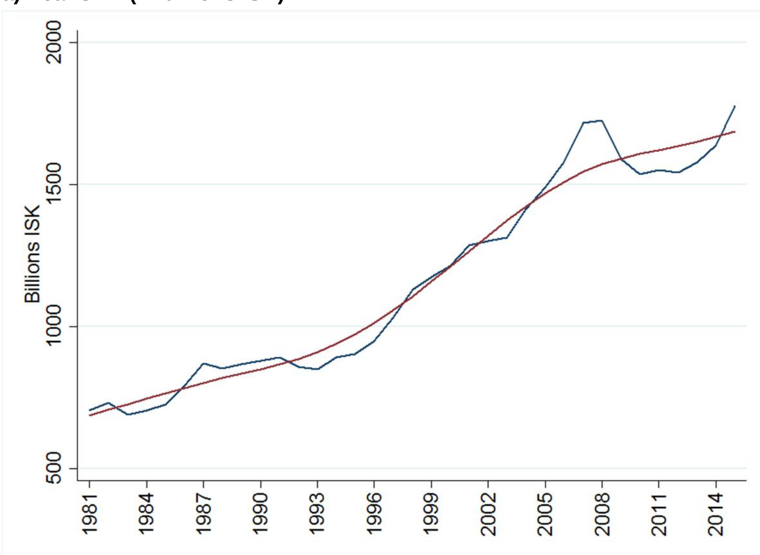
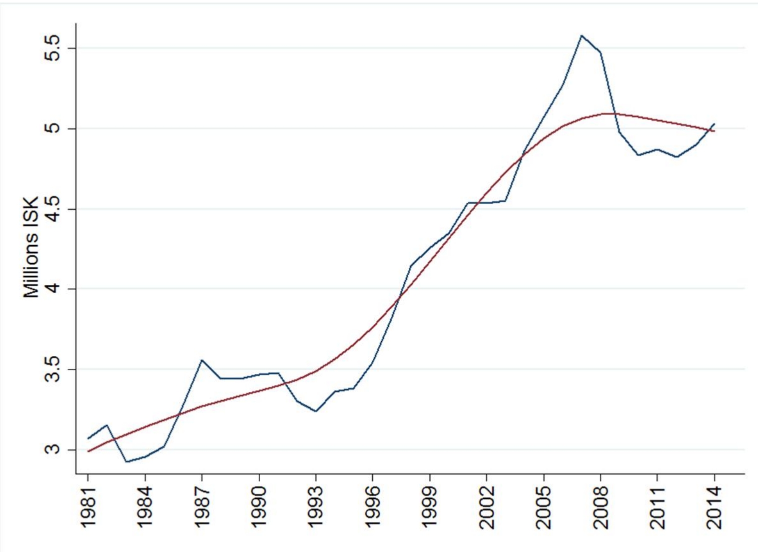
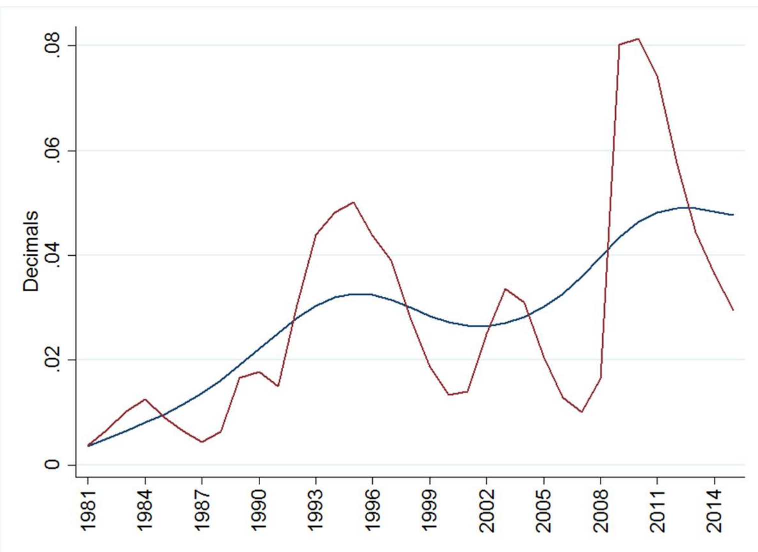


Figure 3: (Continued)

b) Real GDP per capita (in millions ISK)



c) Average yearly unemployment rate



Note: Calendar years on the x-axis. The smooth curves are Hodrick–Prescott trends computed with a smoothing parameter γ=100.

Data on demographics, i.e., the gender-specific age composition of Icelanders in each year, was obtained from Statistics Iceland (Statistics Iceland n.d.-h) and is summarized in the Appendix, along with summary statistics of all variables used in our analyses.

4. Estimation strategy

First, we estimate simple bivariate regression models using the following regression equation:

$$M_t = a + E_t \beta + e_t$$

where *M* is a gender-specific mortality rate for the various mortality categories studied (total and cause-specific), differing across analyses, *E* represents the state of the economy modelled in the different ways described above, making β the coefficient of main interest. A time-invariant intercept is represented with α, and *e* is the disturbance term. The subscript *t* is used to index time.

Results are also reported with age controls added to the regression models, as the age distribution of the population may independently affect cause-specific mortality rates and be correlated with economic conditions. Following an example set in the literature on the composition of demographic factors to include in analyses of this type (Gerdtham and Ruhm 2006; Ruhm 2000, 2015; Ariizumi and Schirle 2012; Tapia Granados 2005b; Neumayer 2004), the total and gender-specific proportion of the population aged 0–14, 65–75, and over 75 are thus included as control variables.

In our analyses of population subgroups, mortality rates for age groups are studied separately, with focus kept on the working-age population in the main text and results for other age groups reported in the Appendix. For the age-specific analyses, age controls are not included in the estimation model. Each model, both unadjusted and age-adjusted, is run for the period 1981–2014. To inform our model selection, i.e., the choice between a bivariate or age-adjusted model, we use both the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) to measure the relative quality of the statistical models we use for our data.

As indicators for both health and the economy have obvious trends, all variables were transformed before the analyses. Two main approaches were used to produce stationary series: a Hodrick–Prescott (HP) nonlinear filter with a smoothing parameter γ=100, as advised for annual data (Backus and Kehoe 1992; Hodrick and Prescott 1997) and used elsewhere in the literature (Tapia Granados and Ionides 2011; Tapia Granados 2008, 2005a; Koo and Cox 2008), and first differences of the variables. Both approaches are commonly used on economic time series data, but they are different in application to the data and offer different interpretation of results. By applying an HP filter to our data, the time series is separated into a long-term trend component and a short-run cyclical component that can subsequently be used in estimations, as it is trend-stationary. Detrending using the smoothing parameter γ=10 was done in sensitivity analyses and yielded similar results. As the smoothing parameter decreases in value, the smoothed series will attribute more of the variations to the long-term trend versus the short-run cyclical component, and hence captures more short-term cyclicality in the relationship between economic cycles and health than in the main analysis using the smoothing parameter γ=100. The first difference of a time series is a series of changes from one period to the next, however; i.e., using our estimation equation, the first difference of M at period t is equal to $M_t – M_{t-1}$, and the resulting time series is difference-stationary.

The presence of a unit root can cause problems in statistical inference when exploring time series models, for example due to nonstationarity. The augmented Dickey–Fuller (ADF) test was used to test for a unit root in the time series used in our analyses. When estimating the original time series, the ADF test fails to reject the hypothesis of unit roots for all economic indicators, life expectancy at birth, infant mortality, and mortality rates. However, transformed time series, both when filtered with the HP filter and when differenced, are stationary, as the ADF rejects the hypothesis of unit roots at high levels of statistical significance.

Second, because the health impact of economic changes could reasonably be assumed to take time to emerge, distributed lag models are estimated with health indicators regressed on contemporaneous and lagged values for up to two years of the economic variables in an attempt to capture the dynamics of the adjustment process. For various diseases, the impact of changes in the economy cannot be expected to lead to death immediately (as mortality data is used in this analysis). Even for diseases such as heart attacks that can certainly result in immediate death, they can also emerge as a response to accumulated effects (American Heart Association 2015), which fact has resulted in a lag of two years being used in the literature, justified on the basis of the medical literature (see, e.g., Ólafsdóttir et al. 2016 and Tapia Granados and Ionides 2008). Cardiovascular disease is the leading cause of death in Iceland and thus the choice of 2 lags appears appropriate here (Directorate of Health n.d.). In this analysis, models with more lags were considered, but based on examples in the literature and the data used, a 2-year lag allows for a reasonably lengthy adjustment period while minimizing the loss of sample size resulting from including additional lags. Furthermore, the AIC and BIC values are used as an objective approach to choose among the lag models, which indicated that models with lags beyond two years were worse suited to our data. However, we acknowledge that mortality rates, even when cause-specific, result from a combination of factors that may take differing times to affect health and subsequent mortality. Thus, the choice of the lags chosen will always be to some extent arbitrary.

In addition to using the HP filter with a smoothing parameter of γ=10, two other factors are studied in the sensitivity analyses: First, an additional economic indicator is used to capture people's living standards. In the Icelandic context the different variations of real GDP used are perhaps not as indicative of people's living standards as in other economies. On the whole, GDP measures economic performance of a country in terms of production. For a small, open economy with its own independent currency and considerable international trade, living standards can depend heavily on imbalances in imports and exports. Indeed the time period under examination has seen some bubbles that were largely due to substantial inflow of resources and crises that are essentially aggregate debt crises. A relevant economic indicator that reflects living standards in such an economy might thus be balance of trade – the difference between a country's imports and exports. The trade balance is a part of the nation's GDP; surpluses add to the GDP, and deficits detract from it. Although this is not a commonly used indicator of business cycles, we felt that a robustness check using this measure of economic conditions was called for. Second, net migration was studied as an additional explanatory variable. The variable consists of both native Icelanders and foreign-born individuals as both immigrants and emigrants. The majority of both immigrants and emigrants are Icelanders in most years. Furthermore, Icelanders are net emigrants in most years while foreign-born individuals are net immigrants. At certain times during the study period variations in net migration were dramatic. This was especially true in the years just before and after the most recent economic collapse in 2008, which saw a change from a mass net immigration to emigration after the collapse. With a population of only 330,000, migration can potentially have a significant impact on the demographic composition, e.g., on average age and educational level. Additionally, one could reasonably imagine that the health status of immigrants and emigrants is different, which could affect the results, especially in the years when the numbers of asylum seekers and refugees from war-torn countries was considerable.

5. Results

Results are reported for β, the coefficient of the state of the economy. Figure 4 shows parameter estimates with HP detrended variables of bivariate models, as well as with age controls. Full numerical results can be found in Table A-2 in the Appendix. Results are presented for the whole population as well as separately for males and females. As autocorrelation of the residuals can be a problem in time series analyses, potentially creating artificially low standard errors, the Durbin–Watson test was performed for all estimations. In our study non-autocorrelation of the residuals is indicated by the

Durbin–Watson test in all but a few estimations using the HP-detrended variables. Conversely, autocorrelation is a problem in analyses using first-differenced variables. Due to this problem, results for the analyses using HP-detrended variables will be our main focus (Figure 4), but for completeness, comparable results with first-differenced variables can be found in the Appendix for the interested reader. The same autocorrelation problem is found for age-specific mortality rates and in lag models using first differenced variables. Due to that problem and for the sake of brevity, only results using HP-detrended variables are presented for those models (Figures 5–7) but full results are reported in the Appendix.

When studying all ages for males, females, and total population, a statistically significant relationship was rarely found between economic conditions and the health outcomes explored (Figure 4). When age controls were added, statistical significance was however found in some instances (Figure 4). The age-specific analyses paint a similar picture of a general low statistical significance of the coefficients of interest, and autocorrelation in some analyses (see Figure 5 and full numerical results for HP-detrended variables in Tables A-3–A-5 in the Appendix). When exploring n-year temporary life expectancy, autocorrelation is a problem, and therefore those results should be interpreted cautiously. For interpretation of the results it should be noted that for real GDP and real GDP per capita, a negative coefficient for mortality rates indicates procyclicality between the economy and population health (better economic conditions associated with lower mortality). The opposite is true when life expectancy at birth is studied – a positive coefficient indicates procyclicality (better economic conditions associated with higher life expectancy). When studying unemployment, a positive coefficient is also an indicator for procyclicality, since a higher unemployment rate indicates worse economic times. In general, one would therefore expect coefficients for real GDP and real GDP per capita to have the same sign, and an opposite sign for unemployment. Indeed, in the majority of estimations that is the case.

5.1 Bivariate and age-adjusted regression models

Results are not robust to additions of age controls, because the coefficient of interest changes in magnitude and very often also changes signs (Figure 4). As statistical significance is generally low, this is not completely unexpected. For all-cause mortality, mortality from neoplasms and life expectancy at birth, the AIC and BIC values indicate that age-controlled models are preferred. For infant mortality, and mortality due to respiratory and circulatory diseases, as well as external causes, unadjusted models are however a better fit for our data. When considering gender-specific mortality rates, the same is found for males, but for females the age-adjusted model is only preferred when all-cause mortality is inspected. Using this criterion we examine the results from

Figure 4. Very seldom are coefficients statistically significant, but procyclicality of health is indicated by the sign of the coefficients for all-cause mortality and respiratory diseases. Mortality due to circulatory diseases, neoplasms, and life expectancy at birth differ between genders, as they both show procyclicality of health for males but countercyclicality for females. Countercyclicality is however indicated for infant mortality and mortality due to external causes.

Figure 4: Parameter estimates of bivariate and age-adjusted models with 90% confidence intervals using HP-detrended variables.

a) Dependent variable: real GDP

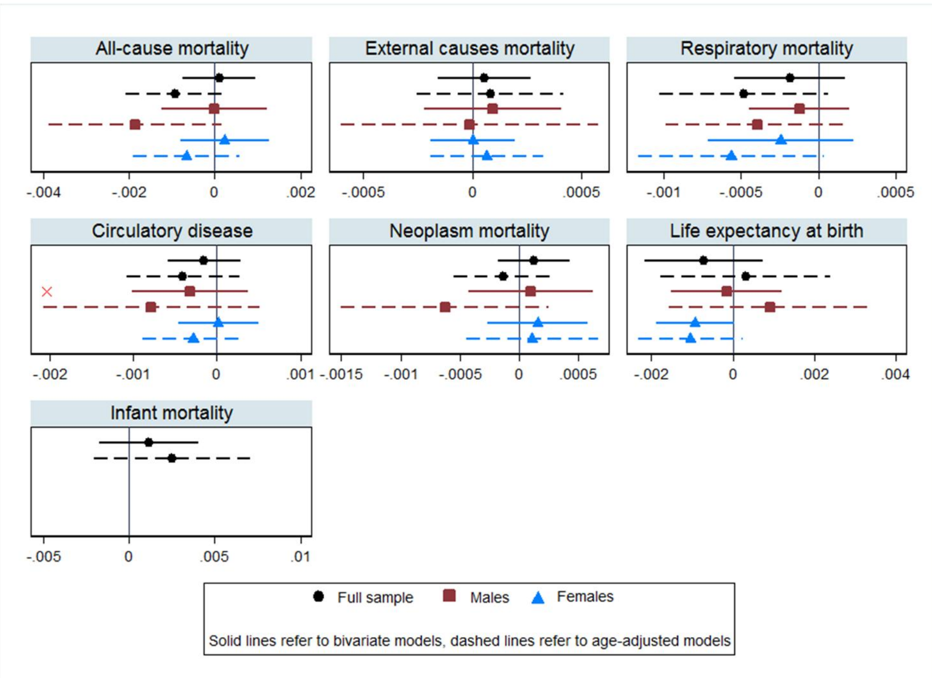


Figure 4: (Continued)

b) Dependent variable: real GDP per capita

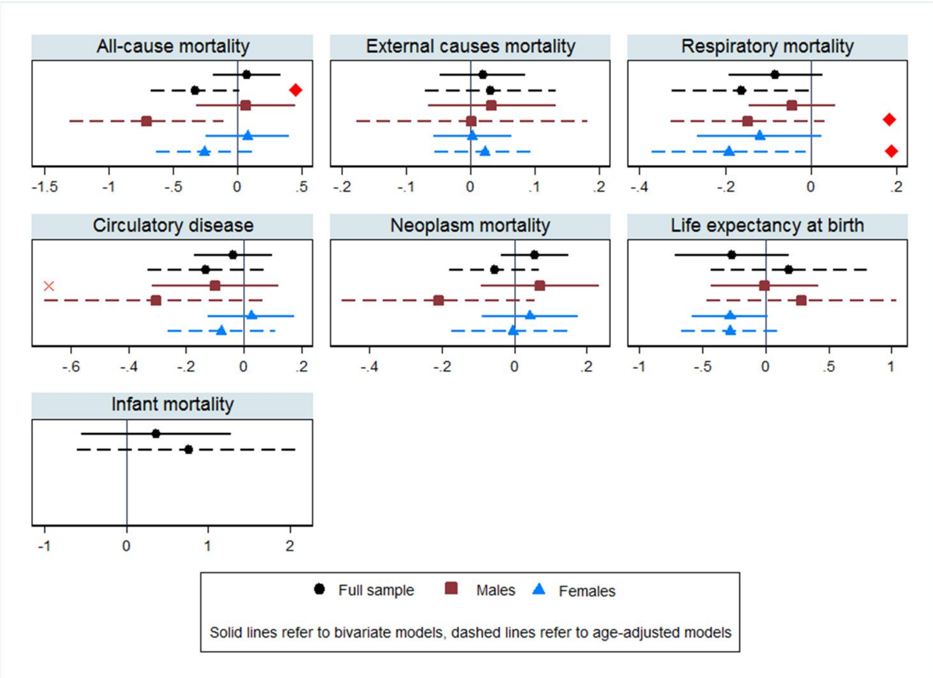
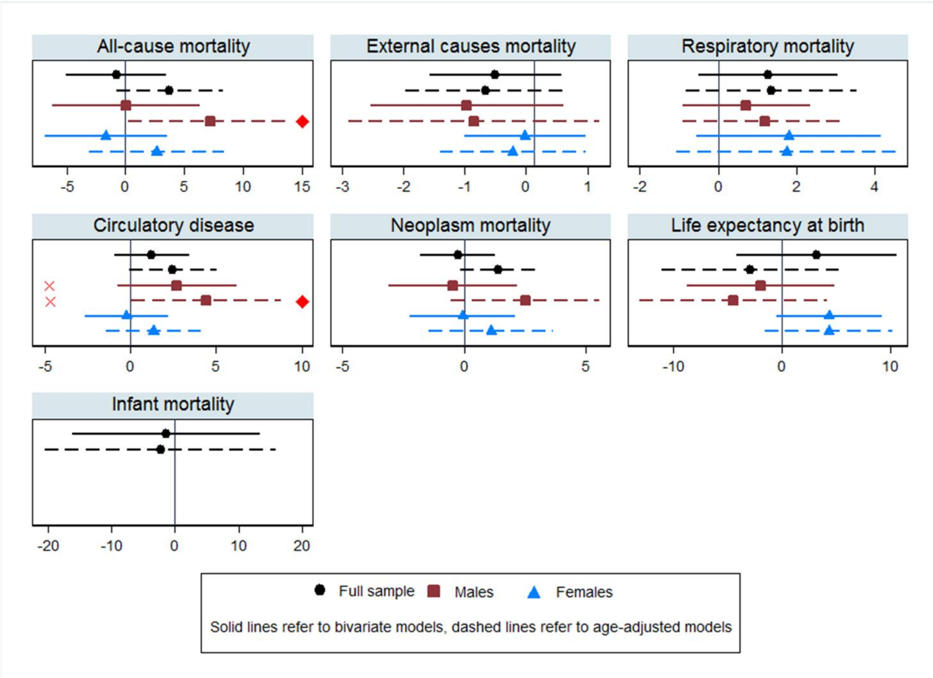


Figure 4: (Continued)

c) Dependent variable: unemployment rate



Notes: N=34.All variables are detrended using HP smoothing parameter γ=100. Economic indicators are dependent variables and health outcomes are independent variables. Additional control variables in the age-adjusted model: Age 15 and under, 65–75, and over 75 (portion of whole population, males, or females). Markers refer to regression coefficients and horizontal lines refer to 90% confidence intervals. X: The Durbin–Watson test rejects the null hypothesis of no serial correlation at $p<0.05$. t $p<0.1$; t t $p<0.05$; t t t $p<0.01$.

Figure 5: Age-specific parameter estimates with 90% confidence intervals using HP-detrended variables.

a) Dependent variable: real GDP

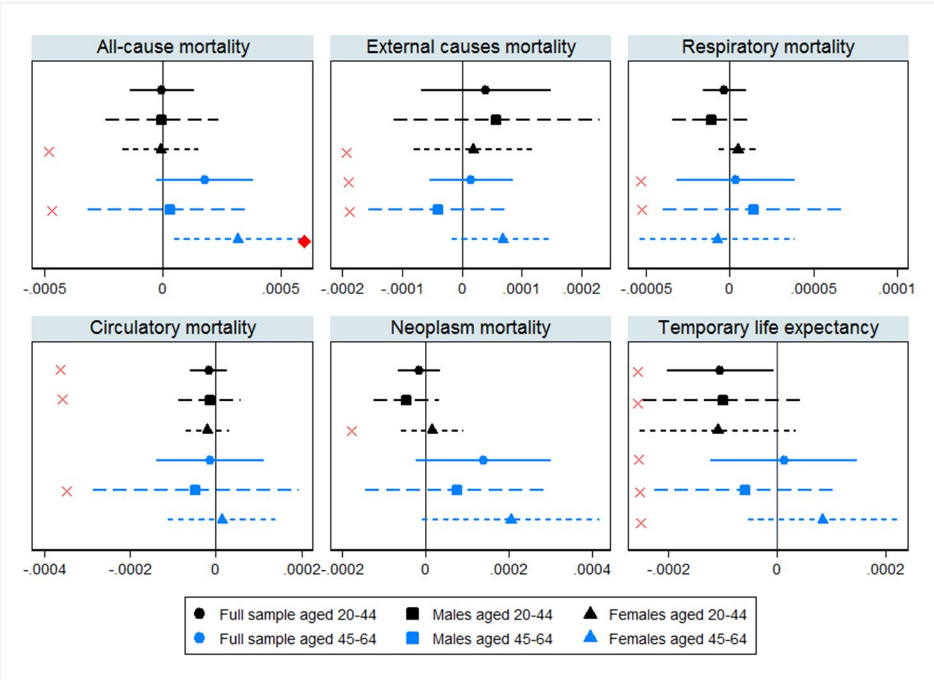


Figure 5: (Continued)

b) Dependent variable: real GDP per capita

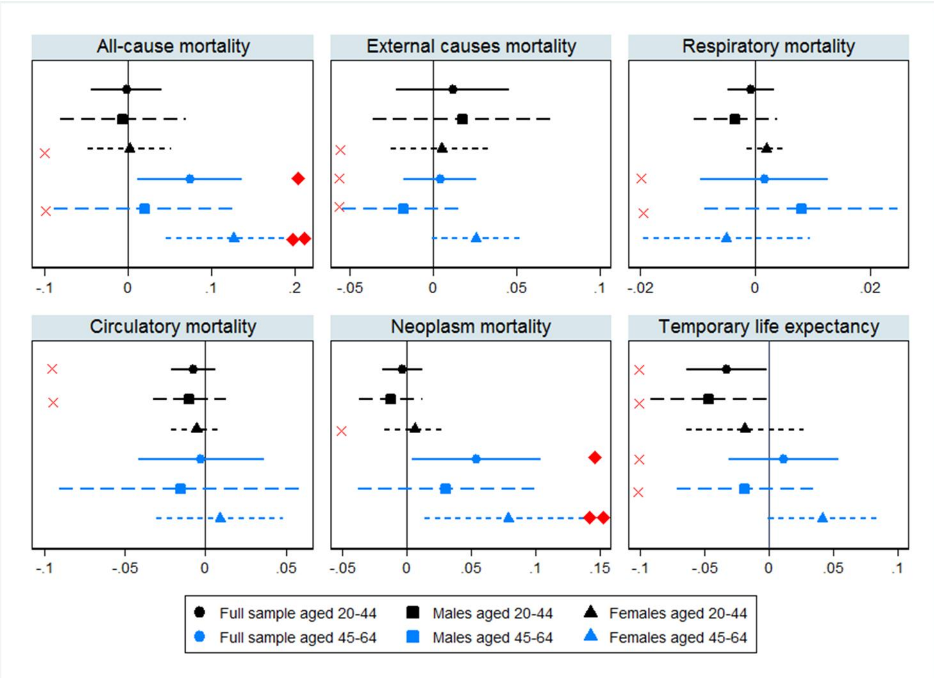
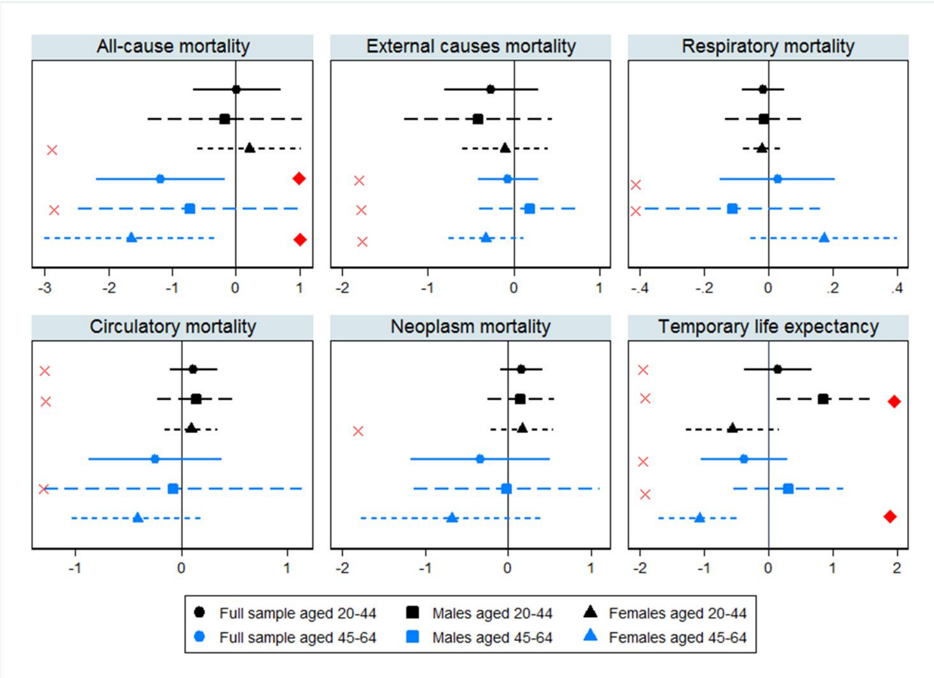


Figure 5: (Continued)

c) Dependent variable: unemployment rate



Notes: All variables are detrended using HP smoothing parameter γ=100. Economic indicators are dependent variables and age-specific health outcomes are independent variables. Markers refer to regression coefficients and horizontal lines refer to 90% confidence intervals. X: The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. t p<0.1; t t p<0.05; t t t p<0.01.

From the age-specific analysis we see that the relationship between economic conditions and all-cause mortality seems to be driven by females, aged 45–64, where all economic indicators show a statistically significant countercyclical relationship with health (Figure 5). A statistically nonsignificant countercyclical relationship is also found for the same age group when studying mortality due to neoplasms, circulatory diseases, and external causes. When examining the size of the effect for all-cause mortality in females we first inspect real GDP per capita. A coefficient of 0.127 indicates that an increase in real GDP per capita by one million ISK is associated with an increase in mortality rate per 1,000 of 0.127 above the trend. Similarly, a coefficient of –1.642 for the unemployment rate indicates that a decrease of 0.01642 in mortality rate per 1,000 below the trend is associated with an increase of one percentage point in unemployment (as the unemployment rate is reported here as a decimal, not a percentage).

5.2 Distributed lag models

Interpreting the sign of the cumulative impact of economic conditions on health (adding up coefficient at lags 0 and 1 in Figure 6 (Tables A-11–A-14 in the Appendix), and lags 0, 1, and 2 in Figure 7 (Tables A-15–A-18 in the Appendix) most of the models suggest procyclicality of health, with the important exceptions of external causes of death, life expectancy, and infant mortality, where countercyclicality is indicated. It is important to note, however, that the relationship is in all but one instance (the relationship between life expectancy and real GDP per capita at lag 1 in Figure 7) found to be statistically nonsignificant when those health indicators are studied. It is also reasonable to assume that mortality due to external causes of death will not display a lagged response to economic conditions, as they are almost by definition more immediate than some of the other causes of death. When estimating models which included lag 0 and lag 1 coefficients, statistical significance was only found in a few of instances, mostly for the lag 0 coefficients. When two lags were included in the models, more statistically significant coefficients were found; mostly for females at lags 1 and 2 in the unadjusted models and at lags 0 and 1 in the age-adjusted models. In none of the models was the relationship between unemployment and health found to be statistically significant.

According to AIC and BIC values, contemporaneous models are however preferred in general to lagged models, both with only one as well as one and two lags. The main exception to this rule is in the case of infant mortality, where models that include one or two lags are preferred to the contemporaneous model. Of those three specifications, the models that include only one lag are the ones best fitted to our data, but even with that specification we do not find a statistically significant relationship.

Similar to contemporaneous models, AIC and BIC values indicate that age-controlled lag models are preferred to unadjusted lag models in the cases of all-cause mortality, life expectancy at birth, and neoplasm mortality for males and in total. Otherwise, unadjusted lag models are preferred to age-adjusted lag models.

Figure 6: Parameter estimates of lag models (1 lag) with 90% confidence intervals using HP-detrended variables

a) Dependent variable: real GDP

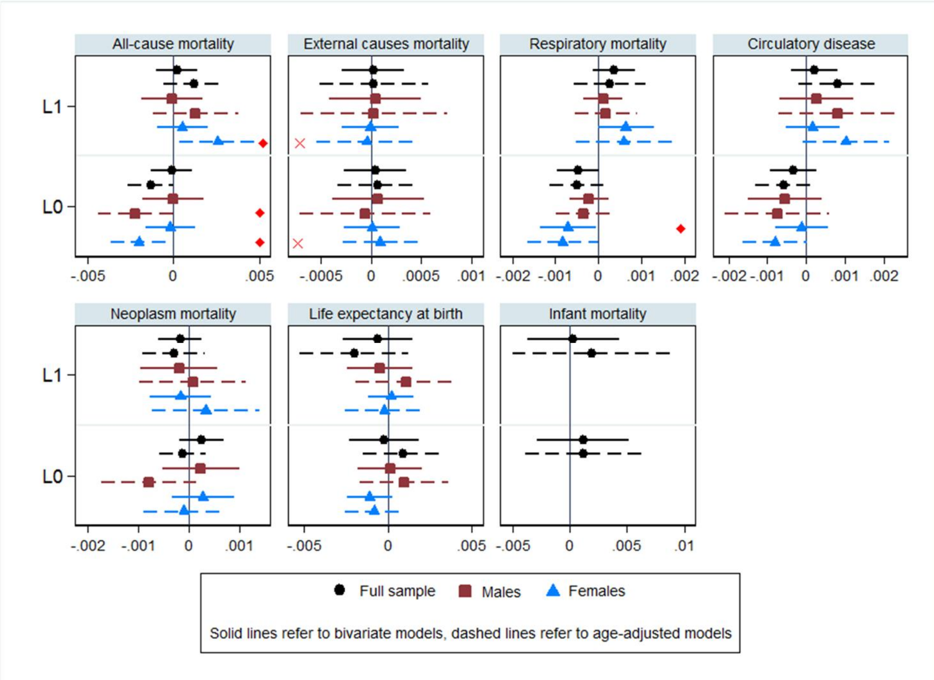


Figure 6: (Continued)

b) Dependent variable: real GDP per capita

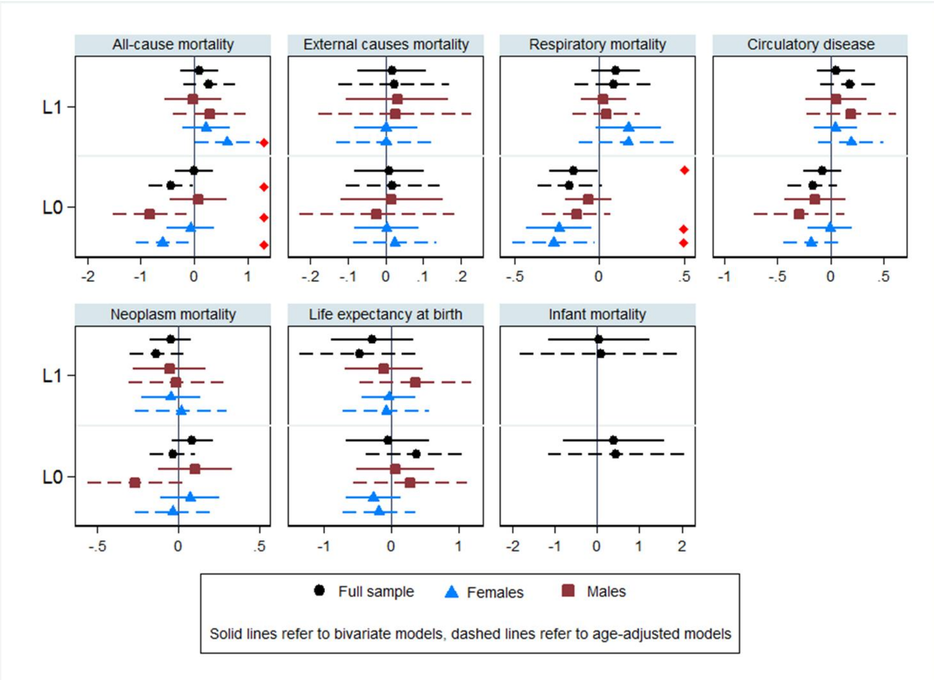
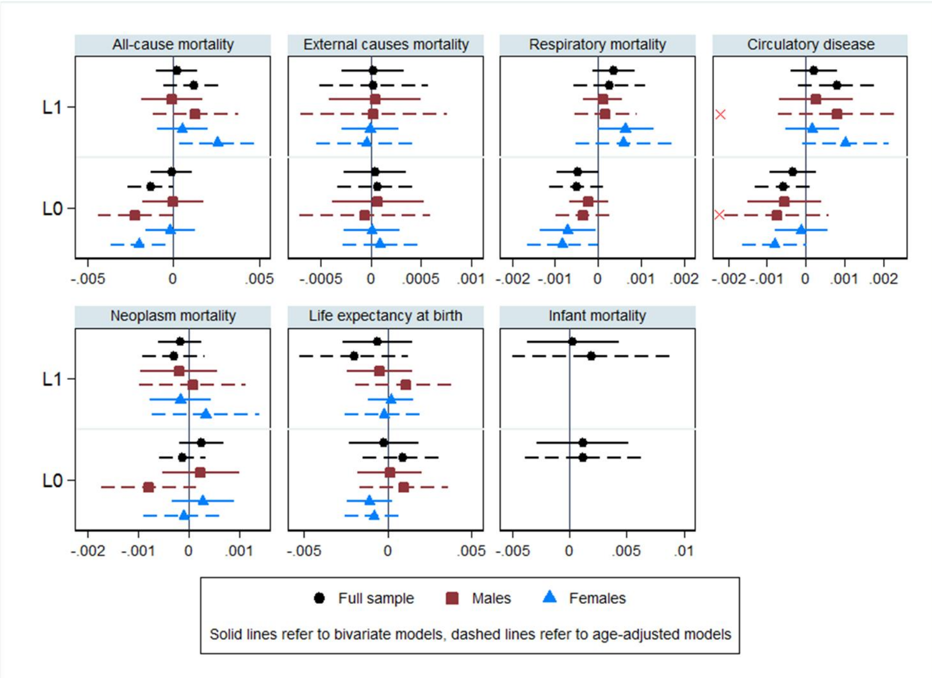


Figure 6: (Continued)

c) Dependent variable: unemployment rate



Notes: All variables are detrended using HP smoothing parameter γ=100. Economic indicators are dependent variables and age-specific health outcomes are independent variables. Markers refer to regression coefficients and horizontal lines refer to 90% confidence intervals. X: The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. t p<0.1; t t p<0.05; t t t p<0.01.

Figure 7: Parameter estimates of lag models (2 lags) with 90% confidence intervals using HP-detrended variables

a) Dependent variable: real GDP

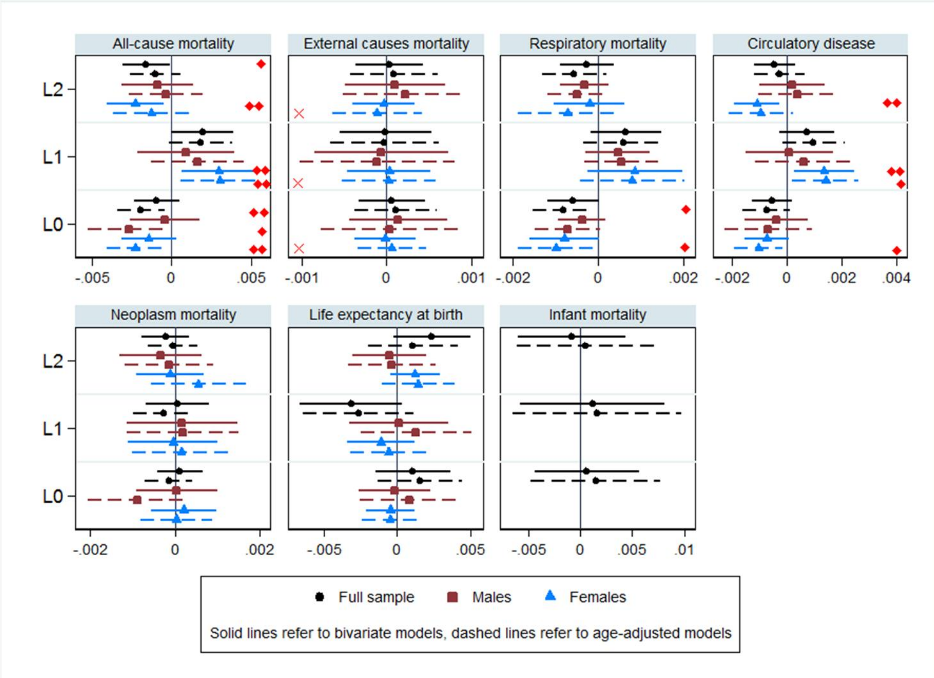


Figure 7: (Continued)

b) Dependent variable: real GDP per capita

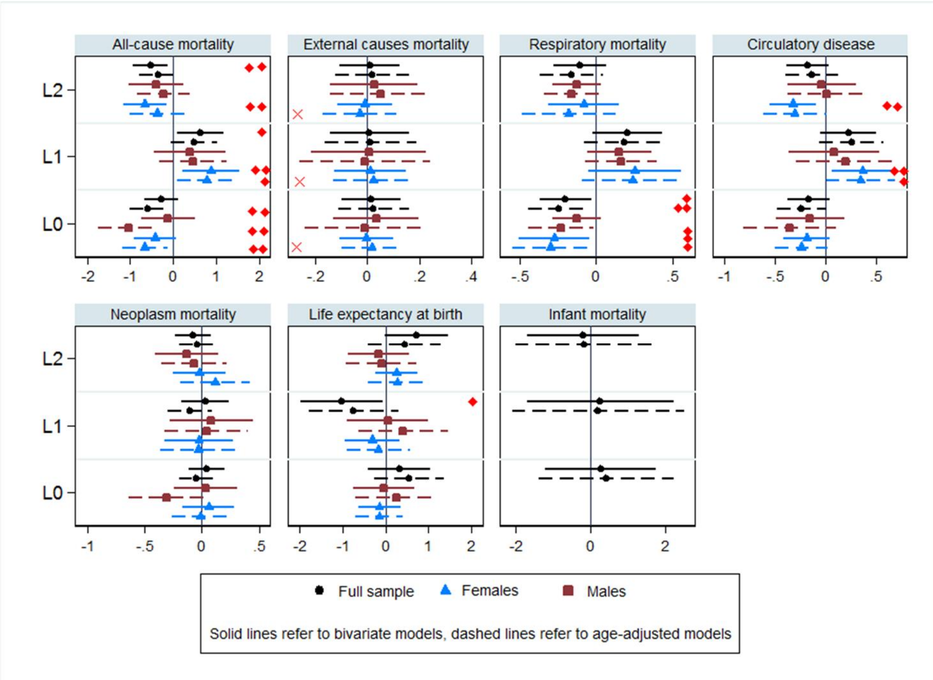
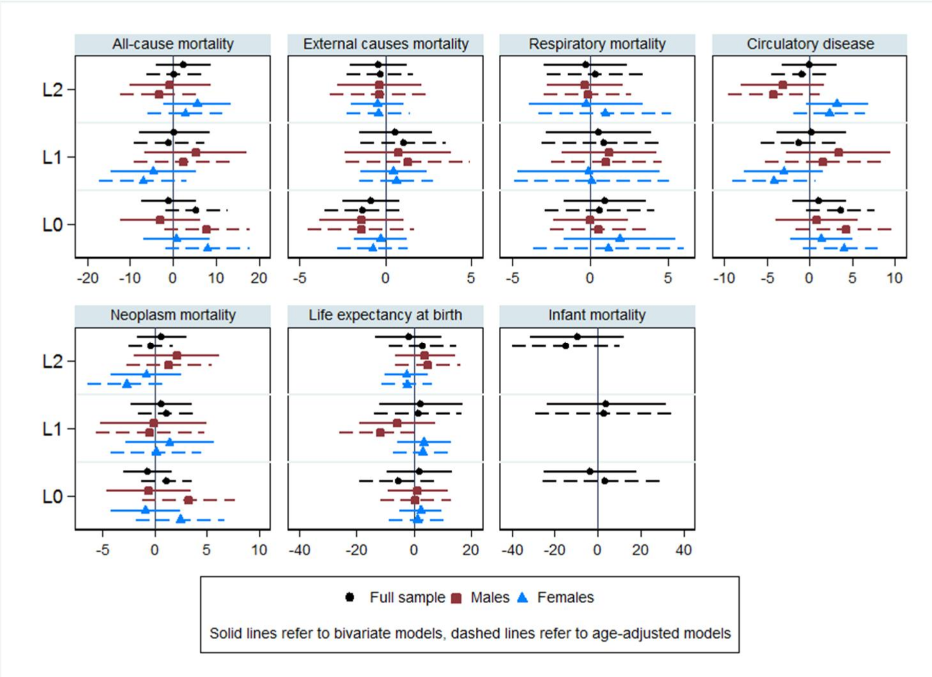


Figure 7: (Continued)

c) Dependent variable: unemployment rate



Notes: All variables are detrended using HP smoothing parameter γ=100. Economic indicators are dependent variables and age-specific health outcomes are independent variables. Markers refer to regression coefficients and horizontal lines refer to 90% confidence intervals. X: The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. t p<0.1; t t p<0.05; t t t p<0.01.

6. Sensitivity analyses

A smoothing parameter γ=10 for the HP filter, instead of γ=100, yielded results similar to the main analyses. In general coefficients were slightly larger in magnitude, but the sign of the relationship was, with a few exceptions, the same and statistical significance was found in fewer instances than in the main analyses. Additionally, autocorrelation was found in the same estimations as in main analyses of all-cause and gender- and age-specific mortality. Similarly for the lag-regression models, coefficients were larger and the direction of the net effect was, with a few exceptions, the same as in the main analyses. However, statistically significant coefficients were found in more instances than before. Even though autocorrelation was found in more series using the smoothing parameter γ=10 than with γ=100, the statistically significant coefficients found in lagged regressions did not suffer from autocorrelation, excluding that as a possible explanation for the change in statistical significance.

The results for the alternative economic indicator, trade balance, are consistent with the main analyses (results available in the Appendix, Table A-27); the relationship is small in magnitude and almost never found to be statistically significant for either gender or any age group studied. The direction of oscillation for each health outcome was in line with the main analyses as well.

A priori the impact of migration on our health outcomes is ambiguous, where one could imagine that net immigration could signal an influx of relatively healthy individuals moving to Iceland, e.g., Icelanders returning home after finishing their studies abroad and foreign-born individuals migrating for work. On the other hand net immigration could entail less healthy individuals seeking health care provided by the state. The addition of net migration as an explanatory variable to the analysis did not affect our main conclusions for the economic indicators much, in terms of the sign of the coefficients or statistical significance (results available in the Appendix, Tables A-28 and A-29). In the majority of estimations the coefficient for net migration was positive if the economic variable indicated procyclicality and negative if it indicated countercyclicality. However, the net-migration coefficient was always very small in magnitude and only statistically significant in one instance, the relationship between unemployment and neoplasm mortality. Autocorrelation of the residuals was found in the same estimations with or without the addition of net migration to the models. Positive coefficients for net migration outnumbered negative ones in our analyses, and of the few that were found to be statistically significant, almost all were positive. In our data a positive net migration denotes immigrants outnumbering emigrants, hence net immigration. Therefore, a positive direction of the relationship signifies that net immigration is associated with worse health outcomes (higher mortality).

7. Discussion

As previously mentioned, the Icelandic economy is a small open one, but during the study period some very drastic systematic changes took place. By examining most of the economic indicators used here it is evident that variations became larger with time, especially around the last economic downturn around 2008–2009. The small size of the economy and the population can certainly be considered an external validity concern. Having said that, this is also what is so conveniently variance-generating, despite the country being a developed western country, in which the health care system and health status rival most western societies and standards of living are also comparable, leading us to conclude that the generalizability and comparability of our results are fairly strong.

Although the reliability of the data used is very high due to Iceland's strong data collection organizations, an important internal validity concern is one regarding omitted variables. As autocorrelation of the error term is evident in many of the models used, it is a reasonable concern. However, our results are based on analyses of various economic indicators that are converted into stationary series by filtering or differencing and covering a number of business cycles, thus making it unlikely that omitted variables bias the results in a significant way with respect to business cycle oscillations. When considering variables that potentially connect the state of the economy with the health outcomes and could be omitted in our analyses, it is difficult to imagine that those would not be inherently a part of fluctuations in the overall economy, which is indexed in our study by real GDP, real GDP per capita, and the unemployment rate. The connecting variables may include those relating to leisure time, such as overtime at work and amount of daily sleep, or variables relating to the overall surroundings, such as pollution or traffic. One can reasonably argue that the economic indicators used in this study capture those factors. A potentially important exception to this might be a variable that captures technological advances in the medical field. Such advances can be assumed to affect the health indicators beneficially to various degrees, but it is hard to imagine that such an innovation would affect mortality rates in a substantial way.

For the time period studied, our overarching results do not show that a consistent statistically significant relationship exists between economic cycles and population health in Iceland, neither concurrently nor with up to a two year lag. Only in some subsets of the population was a statistically significant relationship found, most notably a countercyclical relationship for all-cause mortality in 45–64 years old females. The health indicators studied have different determinants and are thus not expected to display the same relationship with the economy.

The estimated models in this study do not show that the two most widely used indicators of population health – life expectancy at birth and infant mortality – are affected by economic cycles. For life expectancy the results are not robust to different model specifications, but infant mortality fluctuates countercyclically in all models, i.e., increases in better economic conditions, although estimates are never statistically significant. For these specific population health indicators, it is not improbable that the role of factors such as technological advances and policy specifically directed at maternity and infant care are more important than economic cycles and are thus not captured in our models.

Circulatory diseases were the leading cause of death in Iceland during the study period. Different determinants of circulatory health are expected to be affected in different ways by economic conditions and shocks. On one hand one could expect deteriorating economic conditions to affect health negatively due to increased stress or less access to health care due to financial constraints. On the other hand health could be affected positively in worse economic times due to a lower opportunity cost of leisure time, or financial constraints leading to better health behaviours, such as decreased smoking. With the two forces working against each other, the direction of the relationship studied here is hence ambiguous. Although cardiovascular diseases can take years to develop, heart attacks leading to death can be triggered by sudden shocks such as stress. We do not find a statistically significant relationship between economic conditions and mortality from circulatory health in any of the models used, but a different response (nonsignificant) by genders is suggested by our results. This is not surprising since many studies have found that males and females react differently to changes in the economy (Ruhm 2003, 2005; Ásgeirsdóttir et al. 2013, 2014a; Dave and Kelly 2012; Tapia Granados 2005b; Birgisdóttir et al. 2017). Our results are in contrast to some recent literature on the subject where both pro- and countercyclical relationships have been found (Ruhm 2000; Neumayer 2004; Gerdtham and Ruhm 2006; Ruhm 2003, 2005, 2007; Svensson 2010, 2007; Gerdtham and Johannesson 2005).

Mortality due to respiratory diseases was generally found to increase with better economic conditions, although coefficients were small and not statistically significant. A possible explanation for the positive (albeit small) coefficients found might be that a side product of increased economic activity, i.e., increased air pollution, can increase mortality due to respiratory diseases. Furthermore, an Icelandic study found that smoking, one of the most important health behaviours associated with respiratory mortality, decreased during the most recent economic recession (Ásgeirsdóttir et al. 2014), which could lead to decreased mortality due to respiratory diseases during economic downturns (and conversely, increased mortality with better economic conditions).

Mortality from neoplasms can reasonably be assumed to be unrelated to economic conditions. This category includes deaths from multiple sources of neoplasms that have both preventable and unpreventable causes, such as cancer of the skin, lungs, or breasts. Even though many malignant neoplasms are caused by various health behaviours that can be affected by the economy, such as smoking and indoor tanning, in most cases the illness takes some time to materialize and lead to death – more time than we model for in this study. It is therefore not surprising that no relationship was found for this health indicator.

Mortality from external causes of death, which include deaths from traffic accidents, is consistently found to show the opposite sign from other causes of death, namely that mortality rises with an expanding economy and decreases in a recession. This is in accordance with results from previous research (Tapia Granados 2008, 2005b;

Ruhm 2000) and one explanation for the findings is that business and recreational driving increases during economic expansion, leading to a larger volume of traffic, and therefore increased probability of traffic accidents.

The sensitivity analyses further showed that a limited relationship exists between population health and the state of the economy. By using a lower smoothing parameter when detrending the time series, very similar results were found as in the main analyses. For the age-specific analyses the strongest relationship was still found for the age group 45–64, where the sign of the coefficients point to countercyclicality of health. The addition of net migration as an explanatory variable did not affect our main results. The sign of the coefficient was mostly positive and generally followed the cyclicality of the health outcomes; being negative when countercyclicality of health was indicated and positive when procyclicality was indicated. The results varied between diseases, genders, and age groups, as in the main analyses.

The main proxy for economic cycles in previous literature is the unemployment rate and is therefore the most applicable for comparisons. On a micro level, unemployment is perhaps the variable which has the potential to have the most immediate impact on a person's health. On an aggregate level our results did not show unemployment to have a statistically significant impact except on for males, where an increase in the unemployment rate is associated with higher all-cause mortality. Furthermore, breaking down cause-specific mortality rates into age groups, a rise in the unemployment rate is found to have a statistically negative significant impact on all-cause mortality for women 45 to 64 years old, and on the 45–64-year-old population as a whole. This is not a surprising finding, as this age group is part of the working-age population. This is also in line with research suggesting that worse economic conditions, as proxied by unemployment, might be beneficial to population health. However, statistical significance of these results was not robust to alternative model specifications, although the direction of the relationship remained stable. In the Icelandic economy the unemployment rate has historically been very low, all but to the point of full employment, and thus other economic indicators were explored as proxies for economic cycles. One of the main contributions of this paper is to use a variety of economic indicators used as proxies and to compare the results found by each of them. We find that for the dataset used here, the other proxies used are as valid as the unemployment rate and their consistency across analyses is no less than that of the unemployment rate. Since the economic indicators all capture different aspects of the economic cycle, using them together, as is done here, provides a more comprehensive analysis than often found in the literature.

Microdata has been used to study the short-term impacts of the 2008 downturn, yielding results that point to better health behaviours but higher stress and hypertension of Icelanders during the post-2008 crisis (Ásgeirsdóttir, Ólafsdóttir, and Ragnarsdóttir

2014; Ólafsdóttir, Hrafnkelsson, and Ásgeirsdóttir 2014; Ásgeirsdóttir et al. 2014, 2013; Hauksdóttir et al. 2013; McClure et al. 2012; Birgisdóttir et al. 2017). On a macro level it is still unclear how health was affected in the long run, but combined with research using microdata our understanding of the relationship between economic cycles and health improves. The use of economic variables other than unemployment rates (the most frequently used measure of the economic cycle in the literature) also adds to the emerging picture. Independently, both micro and macro studies provide a limited view on the relationship. The bulk of research on the relationship between business cycles and health stems from North America, in particular from the United States. We add to the literature by using Icelandic aggregate data for various economic indicators and health indicators for mortality data and population health in a time series setting. The most recent economic downturn, which started at the end of 2008, is represented in our data, which ends in 2014, but it is quite likely that data for following years contains more information on the health consequences of one of the sharpest declines in recent economic history. This data is awaited for future research on the subject. Furthermore, a time series analysis using Icelandic individual-level data could further shed light on the relationship between economic cycles and health and possible underlying mechanisms. Such data would allow for an analysis on the effects of economic cycles on specific groups of the population, e.g., groups that are vulnerable due to their socioeconomic status or unsecure employment. Moreover, future studies using other indicators for economic activity, such as GDP growth, and indicators for economic inequality, such as the Gini coefficient, are well warranted.

8. Acknowledgements

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Appendix

This Appendix contains result tables from sensitivity analyses as well as additional tables that were not included in the main article for the sake of brevity.

First, we summarize all variables used in the analysis in Table A-1.

Second, we include numerical results that correspond to Figures 4 through 7 in the main article. Those results can be found in Tables A-2, A-3–A-5, A-11–A-14, and A-15–A-18.

Third, results tables from analyses where all variables have been first differenced are included here, but autocorrelation was a problem in these analyses. Tables A-6 and A-7 show parameter estimates of bivariate and age-adjusted models, respectively. Tables A-8–A-10 show age-specific analyses, and Tables A-19–A-26 show lag models.

Three additional analyses were performed in the sensitivity analysis: 1) An alternative economic indicator, the trade balance, was used (Table A-27); 2) net immigration was added as an explanatory variable (Tables A-28 and A-29); and 3) variables were detrended with a Hodrick–Prescott (HP) smoothing parameter γ=10 instead of γ=100 as was done in the main estimations (Tables A-30 and A-31).

Table A-1: Summary statistics

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
Economic indicators			Cause-specific mortality rate		
Unemployment	0.028	0.022	Neoplasm	1.784	0.104
Real GDP (billions ISK)	1,400.656	426.131	Neoplasm males	1.864	0.153
Real GDP per capita (millions ISK)	4.979	1.017	Neoplasm females	1.704	0.125
Population health indicators			Circulatory diseases	2.743	0.428
Life expectancy at birth	79.567	1.891	Circulatory diseases males	2.943	0.553
Infant mortality	3.856	1.937	Circulatory diseases females	2.541	0.331
Overall mortality	6.628	0.343	Respiratory disease	0.684	0.168
Overall mortality males	6.888	0.550	Respiratory disease males	0.593	0.142
Overall mortality females	6.365	0.288	Respiratory disease females	0.776	0.211
Overall mortality			External causes	0.435	0.076
0–4 years	0.080	0.043	External causes males	0.605	0.127
5–9 years	0.012	0.010	External causes females	0.265	0.056
10–19 years	0.053	0.025	Neoplasm mortality rate by age groups		
20–44 years	0.291	0.067	0–4 years	0.002	0.002
45–64 years	0.930	0.132	5–9 years	0.002	0.004
65–84 years	3.252	0.281	10–19 years	0.005	0.005
85 years and older	2.009	0.251	20–44 years	0.067	0.019
Demographics			45–64 years	0.414	0.048
Number of males	138,642	15,184	65–84 years	1.029	0.086
Number of females	137,205	14,735	85 years and older	0.265	0.055
Males portion of population	0.503	0.002	Circulatory diseases mortality rate by age groups		
Females portion of population	0.497	0.002	0–4 years	0.002	0.003
Age group 0–14 $^{\alpha}$	0.237	0.021	5–9 years	0.000	0.001
Age group 15–64$^{\alpha}$	0.650	0.013	10–19 years	0.002	0.003
Age group 65–74 $^{\alpha}$	0.062	0.004	20–44 years	0.031	0.014
Age group 75 and over $^{\alpha}$	0.050	0.006	45–64 years	0.286	0.121
Age group 0–14 $^{\alpha}$	0.241	0.022	65–84 years	1.403	0.345
			85 years and older	1.020	0.074

Table A-1: (Continued)

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
			Respiratory disease mortality rate by age groups		
			0–4 years	0.001	0.002
			5–9 years	0.000	0.001
			10–19 years	0.001	0.001
			20–44 years	0.003	0.003
			45–64 years	0.032	0.009
			65–84 years	0.318	0.077
			85 years and older	0.329	0.096
			External causes mortality by age groups		
			0–4 years	0.007	0.007
			5–9 years	0.006	0.006
			10–19 years	0.037	0.021
			20–44 years	0.152	0.041
			45–64 years	0.107	0.018
			65–84 years	0.085	0.020
			85 years and older	0.041	0.024

Notes: Summary statistics represent the data for the period 1981–2014, N=34. Means are unweighted. Mortality rates are reported per 1,000. Unemployment is reported in decimals. [α]Portion of population.

Table A-2: Parameter estimates of bivariate and age-adjusted models with HP-detrended variables

Bivariate model	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
All ages: both genders						
All-cause mortality	0.000	(0.001)	0.075	(0.156)	–0.768	(2.525)
Neoplasm mortality	0.000	(0.000)	0.056	(0.056)	–0.248	(0.909)
Circulatory mortality	–0.000	(0.000)	–0.037	(0.081)	1.249	(1.288)
Respiratory mortality	–0.000	(0.000)	–0.082	(0.065)	1.269	(1.049)
External causes mortality	0.000	(0.000)	0.019	(0.040)	–0.499	(0.633)
Infant mortality	0.001	(0.002)	0.360	(0.537)	–1.417	(8.719)
Life expectancy at birth	–0.001	(0.001)	–0.266	(0.268)	3.217	(4.353)
All ages: males						
All-cause mortality	–0.000	(0.001)	0.070	(0.229)	0.069	(3.690)
Neoplasm mortality	0.000	(0.000)	0.070	(0.096)	–0.466	(1.565)
Circulatory mortality	$–0.000^{\beta}$	(0.000)	$–0.100^{\beta}$	(0.129)	2.717^{β}	(2.046)
Respiratory mortality	–0.000	(0.000)	–0.044	(0.060)	0.724	(0.961)
External causes mortality	0.000	(0.000)	0.034	(0.058)	–0.966	(0.930)
Life expectancy at birth	–0.000	(0.001)	–0.005	(0.251)	–1.926	(4.034)
All ages: females						
All-cause mortality	0.000	(0.001)	0.082	(0.191)	–1.650	(3.069)
Neoplasm mortality	0.000	(0.000)	0.043	(0.079)	–0.054	(1.275)
Circulatory mortality	0.000	(0.000)	0.027	(0.089)	–0.228	(1.429)
Respiratory mortality	–0.000	(0.000)	–0.120	(0.086)	1.813	(1.390)
External causes mortality	0.000	(0.000)	0.003	(0.036)	–0.018	(0.581)
Life expectancy at birth	–0.001	(0.001)	–0.283	(0.177)	4.349	(2.862)
Age-adjusted model						
All ages: both genders						
All-cause mortality	–0.001	(0.001)	–0.326	(0.202)	3.769	(2.670)
Neoplasm mortality	–0.000	(0.000)	–0.055	(0.073)	1.407	(0.930)
Circulatory mortality	–0.000	(0.000)	–0.132	(0.118)	2.478	(1.516)
Respiratory mortality	–0.000	(0.000)	–0.163*	(0.095)	1.357	(1.284)
External causes mortality	0.000	(0.000)	0.032	(0.060)	–0.654	(0.777)
Infant mortality	0.003	(0.003)	0.764	(0.806)	–2.282	(10.720)
Life expectancy at birth	0.000	(0.001)	0.186	(0.366)	–2.905	(4.791)
All ages: males						
All-cause mortality	–0.002	(0.001)	–0.703*	(0.354)	7.258*	(4.119)
Neoplasm mortality	–0.001	(0.001)	–0.210	(0.156)	2.510	(1.792)
Circulatory mortality	–0.001	(0.001)	–0.303	(0.229)	$4.430^{*\beta}$	(2.574)
Respiratory mortality	–0.000	(0.000)	–0.147	(0.106)	1.204	(1.237)
External causes mortality	0.000	(0.000)	0.002	(0.106)	–0.855	(1.206)
Life expectancy at birth	0.001	(0.001)	0.284	(0.444)	–4.441	(5.068)
All ages: females						
All–cause mortality	–0.001	(0.001)	–0.254	(0.220)	2.665	(3.365)
Neoplasm mortality	0.000	(0.000)	–0.004	(0.100)	1.106	(1.496)
Circulatory mortality	–0.000	(0.000)	–0.077	(0.109)	1.347	(1.641)
Respiratory mortality	–0.001	(0.000)	–0.191*	(0.106)	1.757	(1.653)
External causes mortality	0.000	(0.000)	0.023	(0.046)	–0.217	(0.702)
Life expectancy at birth	–0.001	(0.001)	–0.279	(0.230)	4.343	(3.461)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. Additional control variables in the age-adjusted model: Age 15 and under, 65–75, and over 75 (portion of whole population, males, or females). $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-3: Age-specific parameter estimates with standard errors (S.E.) using HP-detrended variables

Full sample	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
All-cause mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	0.009	(0.012)	–0.021	(0.189)
Aged 5–9	0.000	(0.000)	–0.002	(0.005)	0.026	(0.087)
Aged 10–19	0.000	(0.000)	0.008	(0.010)	–0.057	(0.160)
Aged 20–44	–0.000	(0.000)	–0.001	(0.025)	0.013	(0.405)
Aged 45–64	0.000	(0.000)	0.074*	(0.037)	–1.180*	(0.597)
Aged 65–84	0.000	(0.000)	0.028	(0.093)	–0.116	(1.486)
Aged 85 and over	–0.000	(0.000)	–0.040	(0.069)	0.568	(1.120)
Neoplasm mortality						
Aged 0–4	0.000**	(0.000)	0.003**	(0.002)	–0.030	(0.026)
Aged 5–9	0.000$^{\beta}$	(0.000)	0.000$^{\beta}$	(0.003)	–0.013$^{\beta}$	(0.046)
Aged 10–19	0.000	(0.000)	0.002	(0.004)	0.026	(0.059)
Aged 20–44	–0.000	(0.000)	–0.003	(0.009)	0.159	(0.147)
Aged 45–64	0.000	(0.000)	0.054*	(0.029)	–0.339	(0.494)
Aged 65–84	0.000	(0.000)	0.007	(0.049)	–0.323	(0.787)
Aged 85 and over	–0.000	(0.000)	–0.008	(0.022)	0.271	(0.357)
Circulatory mortality						
Aged 0–4	0.000	(0.000)	–0.001	(0.002)	0.004	(0.039)
Aged 5–9	0.000	(0.000)	0.000	(0.000)	0.009	(0.006)
Aged 10–19	0.000	(0.000)	–0.001	(0.002)	0.003	(0.030)
Aged 20–44	–0.000$^{\beta}$	(0.000)	–0.008$^{\beta}$	(0.008)	0.117$^{\beta}$	(0.130)
Aged 45–64	–0.000	(0.000)	–0.003	(0.023)	–0.249	(0.372)
Aged 65–84	–0.000	(0.000)	–0.002	(0.052)	0.390	(0.831)
Aged 85 and over	–0.000	(0.000)	–0.022	(0.040)	0.975	(0.621)
Respiratory mortality						
Aged 0–4	0.000	(0.000)	0.001	(0.002)	–0.021	(0.026)
Aged 5–9	0.000	(0.000)	0.000	(0.001)	–0.001	(0.011)
Aged 10–19	0.000	(0.000)	0.000	(0.001)	0.017	(0.017)
Aged 20–44	–0.000	(0.000)	–0.001	(0.002)	–0.017	(0.039)
Aged 45–64	0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.007)	0.030$^{\beta}$	(0.106)
Aged 65–84	–0.000	(0.000)	–0.025	(0.033)	0.598	(0.521)
Aged 85 and over	–0.000	(0.000)	–0.059	(0.041)	0.663	(0.672)

Table A-4: (Continued)

Full sample	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
External causes mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	–0.006$^{\beta}$	(0.004)	0.066$^{\beta}$	(0.071)
Aged 5–9	0.000	(0.000)	–0.003	(0.004)	0.052	(0.059)
Aged 10–19	0.000	(0.000)	0.010	(0.008)	–0.156	(0.134)
Aged 20–44	0.000	(0.000)	0.012	(0.020)	–0.260	(0.321)
Aged 45–64	0.000$^{\beta}$	(0.000)	0.004$^{\beta}$	(0.013)	–0.065$^{\beta}$	(0.207)
Aged 65–84	0.000	(0.000)	0.004	(0.013)	–0.141	(0.203)
Aged 85 and over	–0.000	(0.000)	–0.003	(0.009)	0.005	(0.153)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000$^{\beta}$	(0.000)	0.019$^{\beta}$	(0.016)	–0.124$^{\beta}$	(0.273)
Aged 5 (for 5 years)	0.000 $^{\beta}$	(0.000)	0.017$^{\beta}$	(0.023)	–0.080$^{\beta}$	(0.368)
Aged 10 (for 10 years)	0.000*** $^{\beta}$	(0.000)	0.034**$^{\beta}$	(0.014)	–0.134	(0.251)
At age 20 (for 25 years)	–0.000$^{\beta}$	(0.000)	–0.028$^{\beta}$	(0.019)	0.147$^{\beta}$	(0.316)
At age 45 (for 20 years)	0.000$^{\beta}$	(0.000)	0.013$^{\beta}$	(0.024)	–0.381$^{\beta}$	(0.394)
Aged 65 (for 20 years)	–0.000	(0.000)	–0.003	(0.054)	–0.414	(0.846)
Aged 85 (for 10 years)	0.000**	(0.000)	0.142***$^{\beta}$	(0.044)	–2.317***$^{\beta}$	(0.718)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-5: Age-specific parameter estimates for males with standard errors (S.E.) using HP-detrended variables

Males	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	0.000$^{\beta}$	(0.019)	0.153$^{\beta}$	(0.310)
Aged 5–9	0.000	(0.000)	0.000	(0.008)	0.004	(0.130)
Aged 10–19	0.000	(0.000)	0.018	(0.016)	–0.245	(0.258)
Aged 20–44	–0.000	(0.000)	–0.006	(0.044)	–0.176	(0.711)
Aged 45–64	0.000$^{\beta}$	(0.000)	0.021$^{\beta}$	(0.064)	–0.722$^{\beta}$	(1.029)
Aged 65–84	–0.000	(0.001)	0.038	(0.136)	0.733	(2.200)
Aged 85 and over	–0.000	(0.000)	–0.001	(0.076)	0.320	(1.228)
Neoplasm mortality						
Aged 0–4	0.000**	(0.000)	0.004**	(0.002)	–0.028	(0.034)
Aged 5–9	0.000	(0.000)	–0.001	(0.004)	0.009	(0.059)
Aged 10–19	0.000	(0.000)	0.004	(0.005)	0.021	(0.085)
Aged 20–44	–0.000	(0.000)	–0.012	(0.015)	0.148	(0.236)
Aged 45–64	0.000	(0.000)	0.031	(0.041)	–0.017	(0.659)
Aged 65–84	0.000	(0.000)	0.045	(0.060)	–0.976	(0.952)
Aged 85 and over	–0.000	(0.000)	–0.000	(0.032)	0.377	(0.512)

Table A-6: (Continued)

Males	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Circulatory mortality						
Aged 0–4	0.000	(0.000)	0.001	(0.002)	0.017	(0.033)
Aged 5–9	0.000	(0.000)	–0.001	(0.001)	0.018	(0.012)
Aged 10–19	0.000	(0.000)	–0.002	(0.003)	0.017	(0.047)
Aged 20–44	–0.000[β]	(0.000)	–0.010[β]	(0.013)	0.141[β]	(0.216)
Aged 45–64	–0.000[β]	(0.000)	–0.015	(0.044)	–0.079[β]	(0.717)
Aged 65–84	–0.000	(0.000)	–0.067	(0.078)	1.864	(1.223)
Aged 85 and over	–0.000	(0.000)	–0.006	(0.046)	0.739	(0.725)
Respiratory mortality						
Aged 0–4	0.000	(0.000)	0.002	(0.002)	–0.041	(0.036)
Aged 5–9	0.000	(0.000)	0.000	(0.001)	–0.002	(0.022)
Aged 10–19	0.000	(0.000)	0.002	(0.001)	–0.018	(0.021)
Aged 20–44	–0.000	(0.000)	–0.003	(0.004)	–0.014	(0.070)
Aged 45–64	0.000[β]	(0.000)	0.008[β]	(0.010)	–0.111[β]	(0.160)
Aged 65–84	0.000	(0.000)	0.001	(0.039)	0.403	(0.626)
Aged 85 and over	–0.000	(0.000)	–0.053	(0.039)	0.508	(0.634)
External causes mortality						
Aged 0–4	0.000	(0.000)	–0.007	(0.007)	0.116	(0.121)
Aged 5–9	0.000	(0.000)	–0.001	(0.005)	0.033	(0.080)
Aged 10–19	0.000	(0.000)	0.017	(0.013)	–0.325	(0.206)
Aged 20–44	0.000	(0.000)	0.018	(0.032)	–0.411	(0.510)
Aged 45–64	–0.000[β]	(0.000)	–0.018[β]	(0.022)	0.192[β]	(0.350)
Aged 65–84	0.000	(0.000)	0.016	(0.018)	–0.410	(0.278)
Aged 85 and over	0.000	(0.000)	0.009	(0.011)	–0.162	(0.182)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000[β]	(0.000)	0.011[β]	(0.018)	–0.109[β]	(0.289)
Aged 5 (for 5 years)	0.000[β]	(0.000)	0.020[β]	(0.027)	0.139[β]	(0.441)
Aged 10 (for 10 years)	0.000**[β]	(0.000)	0.045**[β]	(0.021)	–0.196[β]	(0.366)
At age 20 (for 25 years)	–0.000[β]	(0.000)	–0.041[β]	(0.028)	0.856*[β]	(0.435)
At age 45 (for 20 years)	–0.000[β]	(0.000)	–0.017[β]	(0.030)	0.313[β]	(0.494)
Aged 65 (for 20 years)	0.000	(0.000)	0.108	(0.094)	–1.896	(1.459)
Aged 85 (for 10 years)	0.000	(0.000)	0.123*	(0.073)	–3.402***[β]	(1.092)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. [λ]Omitted estimations due to no observations. [β]The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-7: Age-specific parameter estimates for females with standard errors (S.E.) using HP-detrended variables

Females	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality						
Aged 0–4	0.000	(0.000)	0.018	(0.012)	–0.196	(0.201)
Aged 5–9	0.000	(0.000)	–0.004	(0.006)	0.048	(0.103)
Aged 10–19	0.000	(0.000)	–0.003	(0.011)	0.133	(0.171)
Aged 20–44	–0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.030)	0.209$^{\beta}$	(0.478)
Aged 45–64	0.000*	(0.000)	0.127**	(0.048)	–1.642*	(0.803)
Aged 65–84	0.000	(0.000)	0.016	(0.120)	–0.973	(1.921)
Aged 85 and over	–0.000	(0.000)	–0.073	(0.100)	0.772	(1.617)
Neoplasm mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.002)	–0.031$^{\beta}$	(0.036)
Aged 5–9	0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.003)	–0.034$^{\beta}$	(0.055)
Aged 10–19	0.000	(0.000)	0.001	(0.004)	0.033	(0.062)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.006$^{\beta}$	(0.014)	0.168$^{\beta}$	(0.222)
Aged 45–64	0.000	(0.000)	0.079**	(0.038)	–0.679	(0.647)
Aged 65–84	0.000	(0.000)	–0.031	(0.077)	0.335	(1.237)
Aged 85 and over	–0.000	(0.000)	–0.015	(0.030)	0.155	(0.487)
Circulatory mortality						
Aged 0–4	0.000	(0.000)	–0.002	(0.004)	–0.008	(0.067)
Aged 5–9	ʌ		ʌ		ʌ	
Aged 10–19	0.000	(0.000)	–0.001	(0.002)	–0.012	(0.036)
Aged 20–44	–0.000	(0.000)	–0.005	(0.009)	0.093	(0.149)
Aged 45–64	0.000	(0.000)	0.009	(0.023)	–0.412	(0.369)
Aged 65–84	0.000	(0.000)	0.061	(0.057)	–1.088	(0.911)
Aged 85 and over	–0.000	(0.000)	–0.033	(0.062)	1.198	(0.982)
Respiratory mortality						
Aged 0–4	0.000	(0.000)	0.000	(0.002)	0.000	(0.025)
Aged 5–9	ʌ		ʌ		ʌ	
Aged 10–19	0.000	(0.000)	–0.002	(0.002)	0.053*	(0.027)
Aged 20–44	0.000	(0.000)	0.002	(0.002)	–0.021	(0.034)
Aged 45–64	–0.000	(0.000)	–0.005	(0.009)	0.173	(0.135)
Aged 65–84	–0.000	(0.000)	–0.052	(0.044)	0.797	(0.714)
Aged 85 and over	–0.000	(0.000)	–0.063	(0.054)	0.811	(0.881)

Table A-8: (Continued)

Females	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
External causes mortality						
Aged 0–4	0.000	(0.000)	–0.004	(0.004)	0.014	(0.073)
Aged 5–9	0.000	(0.000)	–0.004	(0.006)	0.070	(0.092)
Aged 10–19	0.000	(0.000)	0.003	(0.009)	0.015	(0.145)
Aged 20–44	0.000^{β}	(0.000)	0.005^{β}	(0.018)	-0.102^{β}	(0.293)
Aged 45–64	0.000	(0.000)	0.026	(0.016)	–0.322	(0.256)
Aged 65–84	–0.000	(0.000)	–0.009	(0.014)	0.131	(0.229)
Aged 85 and over	-0.000^{β}	(0.000)	-0.015^{β}	(0.014)	0.175^{β}	(0.227)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000^{β}	(0.000)	0.028^{β}	(0.022)	-0.140^{β}	(0.360)
Aged 5 (for 5 years)	–0.000	(0.000)	0.014	(0.026)	–0.300	(0.418)
Aged 10 (for 10 years)	0.000	(0.000)	0.022	(0.025)	–0.072	(0.405)
At age 20 (for 25 years)	–0.000	(0.000)	–0.016	(0.027)	–0.561	(0.425)
At age 45 (for 20 years)	0.000^{β}	(0.000)	0.044	(0.024)	–1.075**	(0.369)
Aged 65 (for 20 years)	$-0.000^{***\beta}$	(0.000)	$-0.114^{***\beta}$	(0.035)	1.068^{β}	(0.636)
Aged 85 (for 10 years)	$0.001^{***\beta}$	(0.000)	$0.160^{***\beta}$	(0.044)	–1.232	(0.830)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. $^{\lambda}$Omitted estimations due to no observations. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-9: Parameter estimates with standard errors (S.E.) of bivariate models using first-differenced variables

	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
All ages: both genders						
All-cause mortality	–0.000$^{\beta}$	(0.001)	–0.132$^{\beta}$	(0.252)	–1.689$^{\beta}$	(4.011)
Neoplasm mortality	0.000	(0.000)	0.076	(0.082)	–0.370$^{\beta}$	(1.320)
Circulatory mortality	–0.000$^{\beta}$	(0.000)	–0.112$^{\beta}$	(0.140)	0.870$^{\beta}$	(2.239)
Respiratory mortality	–0.000	(0.000)	–0.166	(0.099)	0.127	(1.646)
External causes mortality	–0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.072)	–0.603$^{\beta}$	(1.142)
Infant mortality	0.001$^{\alpha\beta}$	(0.002)	0.399$^{\alpha\beta}$	(0.952)	–3.311$^{\alpha\beta}$	(15.190)
Life expectancy at birth	0.000$^{\alpha\beta}$	(0.001)	0.100$^{\alpha\beta}$	(0.424)	2.728$^{\alpha\beta}$	(6.740)
All ages: males						
All-cause mortality	–0.000$^{\beta}$	(0.001)	–0.071$^{\beta}$	(0.386)	–1.043$^{\beta}$	(6.142)
Neoplasm mortality	0.000	(0.000)	0.031	(0.143)	0.201$^{\beta}$	(2.283)
Circulatory mortality	–0.000$^{\beta}$	(0.001)	–0.107$^{\beta}$	(0.235)	1.368$^{\beta}$	(3.738)
Respiratory mortality	–0.000$^{\beta}$	(0.000)	–0.091$^{\beta}$	(0.099)	–0.515$^{\beta}$	(1.600)
External causes mortality	–0.000$^{\beta}$	(0.000)	0.001$^{\beta}$	(0.103)	–0.907$^{\beta}$	(1.635)
Life expectancy at birth	0.001	(0.001)	0.244	(0.358)	–4.286	(5.693)
All ages: females						
All-cause mortality	–0.001	(0.001)	–0.189	(0.308)	–2.428	(4.913)
Neoplasm mortality	0.000$^{\beta}$	(0.000)	0.124	(0.130)	–1.000$^{\beta}$	(2.095)
Circulatory mortality	–0.000	(0.000)	–0.118	(0.142)	0.364	(2.287)
Respiratory mortality	–0.001$^{\beta}$	(0.000)	–0.241*	(0.125)	0.769	(2.102)
External causes mortality	0.000$^{\beta}$	(0.000)	0.001$^{\beta}$	(0.066)	–0.290$^{\beta}$	(1.053)
Life expectancy at birth	–0.000	(0.001)	–0.038	(0.246)	1.852	(3.896)

Notes: N=33 for estimations except when otherwise specified. All variables are first-differenced. Standard errors in parentheses.$^{\alpha}$N=34. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-10: Parameter estimates with standard errors (S.E.) of age-adjusted models using first-differenced variables

	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
All ages: both genders						
All-cause mortality	–0.002*$^{\beta}$	(0.001)	–0.545*	(0.266)	3.974$^{\beta}$	(4.374)
Neoplasm mortality	0.000$^{\beta}$	(0.000)	0.012$^{\beta}$	(0.097)	1.507$^{\beta}$	(1.477)
Circulatory mortality	–0.001$^{\beta}$	(0.001)	–0.244$^{\beta}$	(0.166)	2.455$^{\beta}$	(2.638)
Respiratory mortality	–0.001*	(0.000)	–0.267**	(0.120)	0.659	(2.021)
External causes mortality	0.000$^{\beta}$	(0.000)	0.003$^{\beta}$	(0.091)	–0.812$^{\beta}$	(1.408)
Infant mortality	0.002$^{\alpha\beta}$	(0.004)	0.480$^{\alpha\beta}$	(1.192)	–0.264$^{\alpha\beta}$	(18.610)
Life expectancy at birth	0.002$^{\alpha\beta}$	(0.002)	0.552$^{\alpha\beta}$	(0.495)	–4.841$^{\alpha\beta}$	(7.818)
All ages: males						
All-cause mortality	–0.002$^{\beta}$	(0.002)	–0.587$^{\beta}$	(0.484)	4.246$^{\beta}$	(7.108)
Neoplasm mortality	–0.000$^{\beta}$	(0.001)	–0.053	(0.197)	1.604	(2.819)
Circulatory mortality	–0.001$^{\beta}$	(0.001)	–0.299$^{\beta}$	(0.317)	3.019$^{\beta}$	(4.598)
Respiratory mortality	–0.000$^{\beta}$	(0.001)	–0.132$^{\beta}$	(0.138)	–0.797$^{\beta}$	(2.020)
External causes mortality	–0.000$^{\beta}$	(0.001)	–0.073$^{\beta}$	(0.144)	–0.366$^{\beta}$	(2.081)
Life expectancy at birth	0.001	(0.002)	0.343	(0.500)	–6.352	(7.159)
All ages: females						
All-cause mortality	–0.002*	(0.001)	–0.613**	(0.285)	5.382	(5.063)
Neoplasm mortality	0.000	(0.000)	0.044	(0.140)	1.578	(2.340)
Circulatory mortality	–0.001*	(0.000)	–0.281*	(0.145)	3.020	(2.526)
Respiratory mortality	–0.001**	(0.000)	–0.344**	(0.135)	1.891	(2.484)
External causes mortality	0.000$^{\beta}$	(0.000)	0.026$^{\beta}$	(0.075)	–0.868$^{\beta}$	(1.255)
Life expectancy at birth	–0.000	(0.001)	0.006	(0.280)	0.724	(4.691)

Notes: N=33 for estimations except when otherwise specified. All variables are first-differenced. Standard errors in parentheses. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of whole population, males, or females).$^{\alpha}$N=34. $^{\beta}$ The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-11: Age-specific parameter estimates with standard errors (S.E.) using first-differenced variables

Full sample	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	0.008$^{\beta}$	(0.021)	–0.171$^{\beta}$	(0.340)
Aged 5–9	0.000$^{\beta}$	(0.000)	–0.003$^{\beta}$	(0.010)	0.061$^{\beta}$	(0.153)
Aged 10–19	0.000	(0.000)	0.0120	(0.016)	–0.221	(0.254)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.0004$^{\beta}$	(0.045)	0.409$^{\beta}$	(0.712)
Aged 45–64	0.000$^{\beta}$	(0.000)	–0.002$^{\beta}$	(0.065)	–0.507$^{\beta}$	(1.023)
Aged 65–84	0.000$^{\beta}$	(0.001)	0.003$^{\beta}$	(0.156)	–1.057$^{\beta}$	(2.483)
Aged 85 and over	–0.001$^{\beta}$	(0.000)	–0.151$^{\beta}$	(0.117)	–0.204$^{\beta}$	(1.906)
Neoplasm mortality						
Aged 0–4	0.000$^{\beta}$**	(0.000)	0.005$^{\beta}$**	(0.002)	–0.077**	(0.036)
Aged 5–9	0.000$^{\beta}$	(0.000)	–0.004$^{\beta}$	(0.005)	0.002$^{\beta}$	(0.086)
Aged 10–19	0.000$^{\beta}$	(0.000)	0.004$^{\beta}$	(0.006)	0.001$^{\beta}$	(0.091)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.009$^{\beta}$	(0.016)	0.199$^{\beta}$	(0.246)
Aged 45–64	0.000$^{\beta}$	(0.000)	0.024$^{\beta}$	(0.047)	0.368	(0.754)
Aged 65–84	0.000$^{\beta}$	(0.000)	0.047$^{\beta}$	(0.081)	–1.266$^{\beta}$	(1.275)
Aged 85 and over	–0.000	(0.000)	–0.009	(0.034)	0.403	(0.529)
Circulatory mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	–0.002$^{\beta}$	(0.004)	0.000$^{\beta}$	(0.068)
Aged 5–9	0.000$^{\beta}$	(0.000)	0.000$^{\beta}$	(0.001)	0.005$^{\beta}$	(0.010)
Aged 10–19	0.000	(0.000)	–0.003	(0.003)	0.009	(0.046)
Aged 20–44	0.000$^{\beta}$	(0.000)	–0.007$^{\beta}$	(0.016)	0.345$^{\beta}$	(0.239)
Aged 45–64	–0.000$^{\beta}$	(0.000)	–0.022$^{\beta}$	(0.042)	–0.542$^{\beta}$	(0.664)
Aged 65–84	–0.000$^{\beta}$	(0.000)	–0.027$^{\beta}$	(0.086)	0.081$^{\beta}$	(1.375)
Aged 85 and over	–0.000$^{\beta}$	(0.000)	–0.053$^{\beta}$	(0.064)	0.973$^{\beta}$	(1.010)
Respiratory mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	0.002$^{\beta}$	(0.003)	–0.058$^{\beta}$	(0.046)
Aged 5–9	0.000$^{\beta}$	(0.000)	0.000$^{\beta}$	(0.001)	–0.002$^{\beta}$	(0.018)
Aged 10–19	0.000$^{\beta}$	(0.000)	–0.000$^{\beta}$	(0.002)	0.035$^{\beta}$	(0.026)
Aged 20–44	0.000	(0.000)	0.000	(0.004)	–0.030	(0.061)
Aged 45–64	0.000$^{\beta}$	(0.000)	–0.006$^{\beta}$	(0.013)	0.143$^{\beta}$	(0.207)
Aged 65–84	–0.000	(0.000)	–0.067	(0.051)	0.476	(0.836)
Aged 85 and over	–0.000	(0.000)	–0.096	(0.064)	–0.436	(1.044)

Table A-12: (Continued)

Full sample	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
External causes mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	–0.006$^{\beta}$	(0.008)	0.055$^{\beta}$	(0.129)
Aged 5–9	0.000$^{\beta}$	(0.000)	–0.001$^{\beta}$	(0.006)	0.079$^{\beta}$	(0.095)
Aged 10–19	0.000$^{\beta}$	(0.000)	0.013$^{\beta}$	(0.014)	–0.292	(0.221)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.009$^{\beta}$	(0.035)	–0.175$^{\beta}$	(0.552)
Aged 45–64	0.000$^{\beta}$	(0.000)	–0.007$^{\beta}$	(0.024)	–0.055$^{\beta}$	(0.380)
Aged 65–84	0.000	(0.000)	0.003	(0.021)	–0.086	(0.327)
Aged 85 and over	0.000$^{\beta}$	(0.000)	–0.009$^{\beta}$	(0.017)	–0.128$^{\beta}$	(0.271)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000	(0.000)	0.034$^{\beta}$	(0.026)	–0.227	(0.436)
Aged 5 (for 5 years)	–0.000$^{\beta}$	(0.000)	–0.008$^{\beta}$	(0.029)	0.408$^{\beta}$	(0.469)
Aged 10 (for 10 years)	0.000	(0.000)	0.011	(0.022)	0.431$^{\beta}$	(0.341)
Aged 20 (for 25 years)	–0.000$^{\beta}$	(0.000)	–0.024$^{\beta}$	(0.025)	0.108$^{\beta}$	(0.411)
Aged 45 (for 20 years)	0.000$^{\beta}$	(0.000)	0.025$^{\beta}$	(0.036)	–0.690$^{\beta}$	(0.577)
Aged 65 (for 20 years)	0.000$^{\beta}$	(0.000)	0.040$^{\beta}$	(0.065)	–0.943$^{\beta}$	(1.044)
Aged 85 (for 10 years)	0.000**$^{\beta}$	(0.000)	0.130**$^{\beta}$	(0.058)	–1.825*$^{\beta}$	(0.959)

Notes: N=33. Standard errors in parentheses. All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-13: Age-specific parameter estimates for males with standard errors (S.E.) using first-differenced variables

Males	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality						
Aged 0–4	0.000^{β}	(0.000)	–0.004^{β}	(0.036)	–0.015^{β}	(0.568)
Aged 5–9	0.000	(0.000)	–0.002	(0.013)	0.036	(0.207)
Aged 10–19	0.000^{β}	(0.000)	0.020^{β}	(0.029)	–0.449^{β}	(0.455)
Aged 20–44	–0.000^{β}	(0.000)	–0.027^{β}	(0.073)	0.146^{β}	(1.165)
Aged 45–64	–0.000^{β}	(0.000)	–0.140^{β}	(0.116)	0.368^{β}	(1.895)
Aged 65–84	0.000^{β}	(0.001)	0.108^{β}	(0.229)	–0.901^{β}	(3.659)
Aged 85 and over	–0.000^{β}	(0.000)	–0.027^{β}	(0.133)	–0.228^{β}	(2.120)
Neoplasm mortality						
Aged 0–4	0.000**	(0.000)	0.007**	(0.003)	–0.083*	(0.048)
Aged 5–9	0.000^{β}	(0.000)	–0.006^{β}	(0.006)	0.018^{β}	(0.102)
Aged 10–19	0.000^{β}	(0.000)	0.003^{β}	(0.009)	–0.012^{β}	(0.137)
Aged 20–44	–0.000^{β}	(0.000)	–0.016^{β}	(0.023)	0.133^{β}	(0.373)
Aged 45–64	–0.000	(0.000)	–0.038	(0.062)	1.091	(0.965)
Aged 65–84	0.000^{β}	(0.000)	0.102^{β}	(0.096)	–1.821^{β}	(1.521)
Aged 85 and over	–0.000^{β}	(0.000)	–0.022^{β}	(0.054)	0.876^{β}	(0.845)
Circulatory mortality						
Aged 0–4	0.000	(0.000)	0.001	(0.003)	0.046	(0.051)
Aged 5–9	0.000^{β}	(0.000)	0.000^{β}	(0.001)	0.010^{β}	(0.021)
Aged 10–19	0.000^{β}	(0.000)	–0.004^{β}	(0.005)	0.022^{β}	(0.075)
Aged 20–44	0.000^{β}	(0.000)	–0.015^{β}	(0.026)	0.547^{β}	(0.395)
Aged 45–64	–0.000^{β}	(0.000)	–0.052^{β}	(0.082)	–0.376^{β}	(1.312)
Aged 65–84	–0.000^{β}	(0.000)	–0.060^{β}	(0.130)	1.026^{β}	(2.066)
Aged 85 and over	0.000^{β}	(0.000)	0.024^{β}	(0.076)	0.092^{β}	(1.207)
Respiratory mortality						
Aged 0–4	0.000^{β}	(0.000)	0.003^{β}	(0.004)	–0.109^{β}*	(0.063)
Aged 5–9	0.000^{β}	(0.000)	0.000^{β}	(0.002)	–0.004^{β}	(0.037)
Aged 10–19	0.000^{β}	(0.000)	0.004^{β}*	(0.002)	–0.018^{β}	(0.035)
Aged 20–44	0.000^{β}	(0.000)	–0.001^{β}	(0.007)	–0.054	(0.110)
Aged 45–64	0.000^{β}	(0.000)	0.002^{β}	(0.018)	–0.036^{β}	(0.293)
Aged 65–84	–0.000^{β}	(0.000)	–0.024^{β}	(0.070)	–0.140^{β}	(1.108)
Aged 85 and over	–0.000^{β}	(0.000)	–0.076^{β}	(0.062)	–0.155^{β}	(1.005)

Table A-14: (Continued)

Males	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
External causes mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	–0.005$^{\beta}$	(0.013)	0.081$^{\beta}$	(0.213)
Aged 5–9	0.000$^{\beta}$	(0.000)	0.001$^{\beta}$	(0.008)	0.071$^{\beta}$	(0.131)
Aged 10–19	0.000$^{\beta}$	(0.000)	0.018$^{\beta}$	(0.024)	–0.526$^{\beta}$	(0.365)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.010$^{\beta}$	(0.053)	–0.385$^{\beta}$	(0.837)
Aged 45–64	–0.000$^{\beta}$	(0.000)	–0.055$^{\beta}$	(0.042)	0.351$^{\beta}$	(0.676)
Aged 65–84	0.000	(0.000)	0.021	(0.026)	–0.217	(0.418)
Aged 85 and over	0.000$^{\beta}$	(0.000)	0.010$^{\beta}$	(0.019)	–0.281$^{\beta}$	(0.304)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000$^{\beta}$	(0.000)	0.048$^{\beta}$	(0.029)	–0.665$^{\beta}$	(0.473)
Aged 5 (for 5 years)	–0.000$^{\beta}$	(0.000)	–0.014$^{\beta}$	(0.037)	0.801$^{\beta}$	(0.576)
Aged 10 (for 10 years)	0.000	(0.000)	0.003	(0.033)	0.814$^{\beta}$	(0.519)
Aged 20 (for 25 years)	–0.000	(0.000)	–0.040	(0.043)	0.922	(0.683)
Aged 45 (for 20 years)	0.000$^{\beta}$	(0.000)	0.009$^{\beta}$	(0.046)	–0.207$^{\beta}$	(0.743)
Aged 65 (for 20 years)	0.000$^{\beta}$	(0.000)	0.125$^{\beta}$	(0.113)	–2.397$^{\beta}$	(1.804)
Aged 85 (for 10 years)	0.001$^{*\beta}$	(0.000)	0.166$^{*\beta}$	(0.095)	–3.650$^{**\beta}$	(1.464)

Notes: N=33. Standard errors in parentheses. All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-15: Age-specific parameter estimates for females with standard errors (S.E.) using first-differenced variables

Females	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality						
Aged 0–4	0.000^{β}	(0.000)	0.020^{β}	(0.022)	–0.326^{β}	(0.346)
Aged 5–9	0.000^{β}	(0.000)	–0.003^{β}	(0.011)	0.086^{β}	(0.176)
Aged 10–19	0.000^{β}	(0.000)	0.004^{β}	(0.018)	0.012^{β}	(0.282)
Aged 20–44	0.000^{β}	(0.000)	0.027^{β}	(0.054)	0.678^{β}	(0.857)
Aged 45–64	0.000^{β}	(0.000)	0.137^{β}	(0.082)	–1.398^{β}	(1.335)
Aged 65–84	–0.000	(0.001)	–0.104	(0.186)	–1.217	(2.973)
Aged 85 and over	–0.001^{β}	(0.001)	–0.270^{β}	(0.171)	–0.263^{β}	(2.831)
Neoplasm mortality						
Aged 0–4	0.000^{β}	(0.000)	0.003^{β}	(0.004)	–0.070^{β}	(0.065)
Aged 5–9	0.000^{β}	(0.000)	–0.001^{β}	(0.007)	–0.014^{β}	(0.105)
Aged 10–19	0.000^{β}	(0.000)	0.005^{β}	(0.006)	0.015^{β}	(0.099)
Aged 20–44	0.000^{β}	(0.000)	0.035^{β}	(0.025)	0.265^{β}	(0.408)
Aged 45–64	0.000^{β}	(0.000)	0.087^{β}	(0.065)	–0.388^{β}	(1.064)
Aged 65–84	0.000	(0.000)	–0.010	(0.124)	–0.714	(1.976)
Aged 85 and over	0.000^{β}	(0.000)	0.006^{β}	(0.048)	–0.094^{β}	(0.758)
Circulatory mortality						
Aged 0–4	0.000^{β}	(0.000)	–0.004^{β}	(0.008)	–0.047^{β}	(0.121)
Aged 5–9	^{λ}		^{λ}		^{λ}	
Aged 10–19	0.000	(0.000)	–0.001	(0.003)	–0.004	(0.048)
Aged 20–44	0.000^{β}	(0.000)	0.002^{β}	(0.016)	0.137^{β}	(0.256)
Aged 45–64	0.000^{β}	(0.000)	0.008^{β}	(0.039)	–0.701^{β}	(0.606)
Aged 65–84	–0.000	(0.000)	0.005	(0.083)	–0.864	(1.311)
Aged 85 and over	–0.000^{β}	(0.000)	–0.126^{β}	(0.105)	1.832^{β}	(1.676)
Respiratory mortality						
Aged 0–4	0.000^{β}	(0.000)	0.001^{β}	(0.003)	–0.007^{β}	(0.042)
Aged 5–9	^{λ}		^{λ}		^{λ}	
Aged 10–19	0.000^{β}	(0.000)	–0.004^{β}	(0.003)	0.089^{β*}	(0.047)
Aged 20–44	0.000	(0.000)	0.0010	(0.003)	–0.007	(0.050)
Aged 45–64	0.000^{β}	(0.000)	–0.014^{β}	(0.015)	0.326^{β}	(0.235)
Aged 65–84	–0.000	(0.000)	–0.109	(0.065)	1.109	(1.062)
Aged 85 and over	–0.000	(0.000)	–0.115	(0.087)	–0.742	(1.420)

Table A-16: (Continued)

Females	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
External causes mortality						
Aged 0–4	0.000$^{\beta}$	(0.000)	–0.007$^{\beta}$	(0.008)	0.029$^{\beta}$	(0.129)
Aged 5–9	0.000$^{\beta}$	(0.000)	–0.003$^{\beta}$	(0.009)	0.087$^{\beta}$	(0.143)
Aged 10–19	0.000	(0.000)	0.008	(0.014)	–0.055	(0.230)
Aged 20–44	0.000$^{\beta}$	(0.000)	0.006$^{\beta}$	(0.034)	0.049$^{\beta}$	(0.544)
Aged 45–64	0.000$^{\beta}$	(0.000)	0.042$^{\beta}$	(0.028)	–0.467$^{\beta}$	(0.449)
Aged 65–84	0.000$^{\beta}$	(0.000)	–0.016$^{\beta}$	(0.025)	0.044$^{\beta}$	(0.398)
Aged 85 and over	–0.000$^{\beta}$	(0.000)	–0.028$^{\beta}$	(0.026)	0.030$^{\beta}$	(0.414)
Temporary life expectancy						
Aged 0 (for 5 years)	0.000	(0.000)	0.021	(0.033)	0.210	(0.530)
Aged 5 (for 5 years)	–0.000$^{\beta}$	(0.000)	–0.001$^{\beta}$	(0.031)	0.015$^{\beta}$	(0.500)
Aged 10 (for 10 years)	0.000$^{\beta}$	(0.000)	0.020$^{\beta}$	(0.032)	0.048$^{\beta}$	(0.518)
Aged 20 (for 25 years)	–0.000$^{\beta}$	(0.000)	–0.008$^{\beta}$	(0.030)	–0.705$^{\beta}$	(0.475)
Aged 45 (for 20 years)	0.000$^{\beta}$	(0.000)	0.040$^{\beta}$	(0.033)	–1.174**$^{\beta}$	(0.498)
Aged 65 (for 20 years)	–0.000$^{\beta}$	(0.000)	–0.045$^{\beta}$	(0.052)	0.510$^{\beta}$	(0.851)
Aged 85 (for 10 years)	0.000$^{\beta}$	(0.000)	0.095$^{\beta}$	(0.061)	0.001$^{\beta}$	(1.020)

Notes: N=33. Standard errors in parentheses. All variables are first-differenced. $^{\lambda}$Omitted estimations due to no observations. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-17: Parameter estimates of unadjusted lag models with HP-detrended variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Real GDP (billions ISK)	All–cause mortality	–0.000	(0.001)	0.000	(0.001)
	Neoplasm mortality	0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.000	(0.000)	0.000	(0.000)
	Respiratory mortality	–0.000	(0.000)	0.000	(0.000)
	External causes	0.000	(0.000)	0.000	(0.000)
	Infant mortality	0.001	(0.002)	0.000	(0.002)
	Life expectancy	–0.000	(0.001)	–0.001	(0.001)
Real GDP per capita (millions ISK)	All–cause mortality	–0.003	(0.210)	0.097	(0.210)
	Neoplasm mortality	0.089	(0.076)	–0.046	(0.076)
	Circulatory mortality	–0.079	(0.105)	0.047	(0.105)
	Respiratory mortality	–0.152*	(0.086)	0.096	(0.085)
	External causes	0.009	(0.054)	0.017	(0.054)
	Infant mortality	0.397	(0.705)	0.054	(0.703)
	Life expectancy	–0.057	(0.361)	–0.289	(0.361)
Unemployment rate	All–cause mortality	–2.317	(3.187)	2.595	(3.224)
	Neoplasm mortality	–1.001	(1.159)	1.244	(1.172)
	Circulatory mortality	1.097	(1.597)	0.274	(1.615)
	Respiratory mortality	1.056	(1.338)	0.364	(1.353)
	External causes	–0.630	(0.823)	0.215	(0.833)
	Infant mortality	1.316	(10.830)	–4.666	(10.960)
	Life expectancy	2.754	(5.598)	0.730	(5.663)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. The Durbin–Watson test does not reject the null hypothesis of no serial correlation in all estimations. *p<0.1; **p<0.05;***p<0.01.

Table A-18: Gender-specific parameter estimates of unadjusted lag models with HP-detrended variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Males					
Real GDP (billions ISK)	All-cause mortality	0.000	(0.001)	–0.000	(0.001)
	Neoplasm mortality	0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.001)	0.000	(0.001)
	Respiratory mortality	–0.000	(0.000)	0.000	(0.000)
	External causes	0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.000	(0.001)	–0.000	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	0.070	(0.311)	–0.022	(0.311)
	Neoplasm mortality	0.106	(0.132)	–0.050	(0.132)
	Circulatory mortality	–0.150	(0.169)	0.049	(0.169)
	Respiratory mortality	–0.065	(0.079)	0.023	(0.079)
	External causes	0.016	(0.080)	0.030	(0.080)
	Life expectancy	0.054	(0.341)	–0.114	(0.341)
Unemployment rate	All-cause mortality	–2.770	(4.679)	4.734	(4.733)
	Neoplasm mortality	–1.574	(2.012)	1.831	(2.035)
	Circulatory mortality	2.331	(2.540)	0.673	(2.569)
	Respiratory mortality	0.145	(1.203)	0.972	(1.217)
	External causes	–1.232	(1.207)	0.437	(1.221)
	Life expectancy	–0.593	(5.187)	–2.176	(5.247)
Females					
Real GDP (billions ISK)	All-cause mortality	–0.000	(0.001)	0.001	(0.001)
	Neoplasm mortality	0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.000	(0.000)	0.000	(0.000)
	Respiratory mortality	–0.001*	(0.000)	0.001	(0.000)
	External causes	0.000	(0.000)	–0.000	(0.000)
	Life expectancy	–0.001	(0.001)	0.000	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	–0.074	(0.257)	0.216	(0.256)
	Neoplasm mortality	0.075	(0.108)	–0.044	(0.108)
	Circulatory mortality	–0.007	(0.121)	0.044	(0.121)
	Respiratory mortality	–0.239**	(0.113)	0.172	(0.112)
	External causes	0.002	(0.050)	0.001	(0.050)
	Life expectancy	–0.270	(0.239)	–0.043	(0.238)
Unemployment rate	All-cause mortality	–1.904	(3.951)	0.558	(3.997)
	Neoplasm mortality	–0.467	(1.655)	0.681	(1.674)
	Circulatory mortality	–0.154	(1.850)	–0.114	(1.872)
	Respiratory mortality	1.988	(1.795)	–0.281	(1.816)
	External causes	–0.033	(0.757)	0.024	(0.766)
	Life expectancy	3.756	(3.665)	1.011	(3.708)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. The Durbin–Watson test does not reject the null hypothesis of no serial correlation in all estimations. *p<0.1; **p<0.05;***p<0.01.

Table A-19: Parameter estimates of age-adjusted lag models with HP-detrended variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Real GDP (billions ISK)	All-cause mortality	–0.001	(0.001)	0.001	(0.001)
	Neoplasm mortality	–0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.000)	0.001	(0.001)
	Respiratory mortality	–0.001	(0.000)	0.000	(0.000)
	External causes	0.000	(0.000)	0.000	(0.000)
	Infant mortality	0.001	(0.003)	0.002	(0.004)
	Life expectancy	0.001	(0.001)	–0.002	(0.002)
Real GDP per capita (millions ISK)	All-cause mortality	–0.441*	(0.241)	0.274	(0.286)
	Neoplasm mortality	–0.033	(0.080)	–0.131	(0.096)
	Circulatory mortality	–0.172	(0.137)	0.181	(0.162)
	Respiratory mortality	–0.175	(0.113)	0.085	(0.134)
	External causes	0.019	(0.072)	0.023	(0.086)
	Infant mortality	0.445	(0.940)	0.095	(1.118)
	Life expectancy	0.372	(0.438)	–0.474	(0.521)
Unemployment rate	All-cause mortality	3.786	(4.112)	0.008	(4.043)
	Neoplasm mortality	1.150	(1.304)	0.974	(1.282)
	Circulatory mortality	3.087	(2.261)	–1.403	(2.223)
	Respiratory mortality	0.018	(1.915)	1.358	(1.883)
	External causes	–1.240	(1.186)	0.836	(1.166)
	Infant mortality	7.266	(15.650)	–7.314	(15.380)
	Life expectancy	–4.986	(7.356)	2.926	(7.232)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). $^{\beta}$ The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-20: Gender-specific parameter estimates of age-adjusted lag models with HP-detrended variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Males					
Real GDP (billions ISK)	All-cause mortality	–0.002*	(0.001)	0.001	(0.001)
	Neoplasm mortality	–0.001	(0.001)	0.000	(0.001)
	Circulatory mortality	–0.001	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.000	(0.000)	0.000	(0.000)
	External causes	–0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.001	(0.002)	0.001	(0.002)
Real GDP per capita (millions ISK)	All-cause mortality	–0.830**	(0.402)	0.278	(0.397)
	Neoplasm mortality	–0.265	(0.172)	–0.009	(0.170)
	Circulatory mortality	–0.296	(0.251)	0.195	(0.248)
	Respiratory mortality	–0.135	(0.119)	0.043	(0.118)
	External causes	–0.023	(0.121)	0.025	(0.119)
	Life expectancy	0.280	(0.493)	0.354	(0.488)
Unemployment rate	All-cause mortality	6.786	(5.675)	0.973	(5.585)
	Neoplasm mortality	2.591	(2.375)	0.765	(2.337)
	Circulatory mortality$^{\beta}$	4.346	(3.435)	–1.040	(3.381)
	Respiratory mortality	0.169	(1.653)	1.116	(1.627)
	External causes	–1.463	(1.643)	1.125	(1.617)
	Life expectancy	–0.521	(6.648)	–8.025	(6.543)
Females					
Real GDP (billions ISK)	All-cause mortality	–0.002*	(0.001)	0.003*	(0.001)
	Neoplasm mortality	–0.000	(0.000)	0.000	(0.001)
	Circulatory mortality	–0.001	(0.000)	0.001	(0.001)
	Respiratory mortality	–0.001	(0.000)	0.001	(0.001)
	External causes$^{\beta}$	0.000	(0.000)	–0.000	(0.000)
	Life expectancy	–0.000	(0.001)	–0.001	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	–0.598*	(0.294)	0.605*	(0.352)
	Neoplasm mortality	–0.031	(0.138)	0.020	(0.166)
	Circulatory mortality	–0.185	(0.150)	0.193	(0.180)
	Respiratory mortality	–0.271*	(0.144)	0.171	(0.173)
	External causes	0.024	(0.065)	0.001	(0.078)
	Life expectancy	–0.186	(0.313)	–0.080	(0.375)
Unemployment rate	All-cause mortality	7.207	(5.498)	–5.100	(4.948)
	Neoplasm mortality	2.741	(2.421)	–1.454	(2.178)
	Circulatory mortality	3.760	(2.672)	–2.754	(2.404)
	Respiratory mortality	0.670	(2.715)	0.883	(2.443)
	External causes	–0.546	(1.167)	0.345	(1.050)
	Life expectancy	2.302	(5.619)	1.240	(5.057)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). $^{\beta}$ The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-21: Parameter estimates of unadjusted lag models (2 lags) with HP-detrended variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Real GDP (billions ISK)	All-cause mortality	–0.001	(0.001)	0.002	(0.001)	–0.002*	(0.001)
	Neoplasm mortality	0.000	(0.000)	0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.000)	0.001	(0.001)	–0.000	(0.000)
	Respiratory mortality	–0.001	(0.000)	0.001	(0.000)	–0.000	(0.000)
	External causes	0.000	(0.000)	–0.000	(0.000)	0.000	(0.000)
	Infant mortality	0.001	(0.003)	0.001	(0.004)	–0.001	(0.003)
	Life expectancy	0.001	(0.001)	–0.003	(0.002)	0.002	(0.002)
Real GDP per capita (millions ISK)	All-cause mortality	–0.272	(0.237)	0.632*	(0.314)	–0.525**	(0.239)
	Neoplasm mortality	0.046	(0.092)	0.030	(0.121)	–0.076	(0.092)
	Circulatory mortality	–0.166	(0.123)	0.229	(0.163)	–0.178	(0.124)
	Respiratory mortality	–0.200*	(0.101)	0.203	(0.134)	–0.104	(0.102)
	External causes	0.014	(0.067)	0.008	(0.088)	0.008	(0.067)
	Infant mortality	0.275	(0.865)	0.264	(1.147)	–0.209	(0.874)
	Life expectancy	0.320	(0.424)	–1.018*	(0.562)	0.717	(0.428)
Unemployment rate	All-cause mortality	–1.075	(3.750)	0.336	(4.773)	2.426	(3.794)
	Neoplasm mortality	–0.691	(1.366)	0.651	(1.739)	0.672	(1.382)
	Circulatory mortality	1.148	(1.867)	0.219	(2.376)	0.014	(1.889)
	Respiratory mortality	0.963	(1.551)	0.576	(1.974)	–0.278	(1.569)
	External causes	–0.826	(0.979)	0.582	(1.246)	–0.406	(0.991)
	Infant mortality	–3.447	(12.780)	4.099	(16.270)	–9.541	(12.940)
	Life expectancy	1.831	(6.670)	2.437	(8.490)	–1.870	(6.749)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. The Durbin–Watson test does not reject the null hypothesis of no serial correlation in all estimations. *p<0.1; **p<0.05;***p<0.01.

Table A-22: Gender-specific parameter estimates of unadjusted lag models (2 lags) with HP-detrended variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Males							
Real GDP (billions ISK)	All-cause mortality	–0.000	(0.001)	0.001	(0.002)	–0.001	(0.001)
	Neoplasm mortality	0.000	(0.001)	0.000	(0.001)	–0.000	(0.001)
	Circulatory mortality	–0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
	Respiratory mortality	–0.000	(0.000)	0.000	(0.000)	–0.000	(0.000)
	External causes	0.000	(0.000)	–0.000	(0.000)	0.000	(0.000)
	Life expectancy	–0.000	(0.001)	0.000	(0.002)	–0.001	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	–0.119	(0.368)	0.387	(0.488)	–0.398	(0.372)
	Neoplasm mortality	0.034	(0.161)	0.083	(0.213)	–0.131	(0.162)
	Circulatory mortality	–0.149	(0.199)	0.087	(0.264)	–0.035	(0.201)
	Respiratory mortality	–0.126	(0.093)	0.152	(0.123)	–0.127	(0.094)
	External causes	0.033	(0.098)	0.005	(0.129)	0.026	(0.099)
	Life expectancy	–0.039	(0.418)	0.048	(0.554)	–0.161	0.423)
Unemployment rate	All-cause mortality	–2.998	(5.483)	5.264	(6.980)	–0.707	(5.548)
	Neoplasm mortality	–0.547	(2.362)	–0.090	(3.007)	2.126	(2.390)
	Circulatory mortality	0.900	(2.823)	3.425	(3.593)	–3.133	(2.856)
	Respiratory mortality	0.030	(1.400)	1.218	(1.782)	–0.308	(1.417)
	External causes	–1.382	(1.431)	0.732	(1.821)	–0.342	(1.448)
	Life expectancy	1.285	(6.135)	–5.697	(7.809)	3.909	(6.208)
Females							
Real GDP (billions ISK)	All-cause mortality	–0.001	(0.001)	0.003**	(0.001)	–0.002**	(0.001)
	Neoplasm mortality	0.000	(0.000)	–0.000	(0.001)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.000)	0.001**	(0.001)	–0.001**	(0.000)
	Respiratory mortality	–0.001	(0.000)	0.001	(0.001)	–0.000	(0.000)
	External causes	–0.000	(0.000)	0.000	(0.000)	–0.000	(0.000)
	Life expectancy	–0.000	(0.001)	–0.001	(0.001)	0.001	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	–0.424	(0.291)	0.880**	(0.386)	–0.654**	(0.294)
	Neoplasm mortality	0.060	(0.132)	–0.024	(0.175)	–0.020	(0.133)
	Circulatory mortality	–0.183	(0.135)	0.372**	(0.180)	–0.324**	(0.137)
	Respiratory mortality	–0.274*	(0.135)	0.255	(0.179)	–0.080	(0.137)
	External causes	–0.005	(0.061)	0.010	(0.080)	–0.010	(0.061)
	Life expectancy	–0.145	(0.287)	–0.307	(0.380)	0.258	(0.290)
Unemployment rate	All-cause mortality	0.821	(4.594)	–4.624	(5.848)	5.589	(4.649)
	Neoplasm mortality	–0.884	(1.958)	1.433	(2.493)	–0.802	(1.982)
	Circulatory mortality	1.398	(2.117)	–3.012	(2.695)	3.204	(2.143)
	Respiratory mortality	1.915	(2.096)	–0.099	(2.668)	–0.251	(2.121)
	External causes	–0.273	(0.893)	0.459	(1.137)	–0.465	(0.904)
	Life expectancy	2.420	(4.324)	3.443	(5.503)	–2.618	(4.375)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. The Durbin–Watson test does not reject the null hypothesis of no serial correlation in all estimations. *p<0.1; **p<0.05;***p<0.01.

Table A-23: Parameter estimates of age-adjusted lag models (2 lags) with HP-detrended variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Real GDP (billions ISK)	All-cause mortality	–0.002**	(0.001)	0.002	(0.001)	–0.001	(0.001)
	Neoplasm mortality	–0.000	(0.000)	–0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.001)	0.001	(0.001)	–0.000	(0.001)
	Respiratory mortality	–0.001*	(0.000)	0.001	(0.001)	–0.001	(0.000)
	External causes	0.000	(0.000)	–0.000	(0.000)	0.000	(0.000)
	Infant mortality	0.001	(0.004)	0.002	(0.005)	0.000	(0.004)
	Life expectancy	0.002	(0.002)	–0.003	(0.002)	0.001	(0.002)
Real GDP per capita (millions ISK)	All-cause mortality	–0.601**	(0.245)	0.483	(0.314)	–0.355	(0.254)
	Neoplasm mortality	–0.048	(0.089)	–0.107	(0.114)	–0.040	(0.092)
	Circulatory mortality	–0.234	(0.146)	0.260	(0.186)	–0.135	(0.151)
	Respiratory mortality	–0.244**	(0.117)	0.182	(0.150)	–0.164	(0.122)
	External causes	0.024	(0.081)	0.011	(0.130)	0.019	(0.083)
	Infant mortality	0.415	(1.046)	0.196	(1.337)	–0.156	(1.082)
	Life expectancy	0.551	(0.477)	–0.742	(0.609)	0.447	(0.493)
Unemployment rate	All-cause mortality	5.430	(4.246)	–0.910	(4.772)	0.141	(3.731)
	Neoplasm mortality	1.190	(1.419)	1.157	(1.595)	–0.357	(1.247)
	Circulatory mortality	3.651	(2.357)	–1.196	(2.649)	–0.866	(2.071)
	Respiratory mortality	0.615	(2.039)	0.864	(2.292)	0.334	(1.792)
	External causes	–1.329	(1.295)	1.053	(1.455)	–0.301	(1.138)
	Infant mortality	3.335	(16.780)	3.078	(18.860)	–14.710	(14.750)
	Life expectancy	–5.511	(7.926)	1.464	(8.908)	3.031	(6.965)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). $^{\beta}$ The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-24: Gender-specific parameter estimates of age-adjusted lag models (2 lags) with HP-detrended variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Males							
Real GDP (billions ISK)	All-cause mortality	–0.003*	(0.002)	0.002	(0.002)	–0.000	(0.001)
	Neoplasm mortality	–0.001	(0.001)	0.000	(0.001)	–0.000	(0.001)
	Circulatory mortality	–0.001	(0.001)	0.001	(0.001)	0.000	(0.001)
	Respiratory mortality	–0.001	(0.000)	0.001	(0.001)	–0.000	(0.000)
	External causes	0.000	(0.000)	–0.000	(0.001)	0.000	(0.000)
	Life expectancy	0.001	(0.002)	0.001	(0.002)	–0.000	(0.002)
Real GDP per capita (millions ISK)	All-cause mortality	–1.038**	(0.420)	0.465	(0.456)	–0.213	(0.359)
	Neoplasm mortality	–0.306	(0.196)	0.042	(0.213)	–0.067	(0.167)
	Circulatory mortality	–0.351	(0.268)	0.204	(0.291)	0.015	(0.229)
	Respiratory mortality	–0.231*	(0.126)	0.163	(0.137)	–0.159	(0.108)
	External causes	–0.010	(0.136)	–0.009	(0.148)	0.053	(0.116)
	Life expectancy	0.265	(0.561)	0.411	(0.610)	–0.094	(0.480)
Unemployment rate	All-cause mortality	7.928	(5.787)	2.429	(6.727)	–3.178	(5.302)
	Neoplasm mortality	3.290	(2.613)	–0.414	(3.038)	1.393	(2.394)
	Circulatory mortality	4.275	(3.415)	1.566	(3.970)	–4.151	(3.129)
	Respiratory mortality	0.530	(1.784)	1.041	(2.073)	–0.142	(1.634)
	External causes	–1.411	(1.816)	1.330	(2.111)	–0.369	(1.664)
	Life expectancy	0.593	(7.289)	–11.650	(8.473)	5.031	(6.677)
Females							
Real GDP (billions ISK)	All-cause mortality	–0.002**	(0.001)	0.003**	(0.001)	–0.001	(0.001)
	Neoplasm mortality	0.000	(0.000)	0.000	(0.001)	0.001	(0.001)
	Circulatory mortality	–0.001*	(0.001)	0.001*	(0.001)	–0.001	(0.001)
	Respiratory mortality	–0.001*	(0.001)	0.001	(0.001)	–0.001	(0.001)
	External causes $^{\beta}$	0.000	(0.000)	0.000	(0.000)	–0.000	(0.000)
	Life expectancy	–0.000	(0.001)	–0.001	(0.002)	0.001	(0.001)
Real GDP per capita (millions ISK)	All-cause mortality	–0.660**	(0.306)	0.779*	(0.406)	–0.372	(0.373)
	Neoplasm mortality	–0.011	(0.146)	–0.033	(0.193)	0.117	(0.178)
	Circulatory mortality	–0.240	(0.151)	0.350*	(0.201)	–0.303	(0.185)
	Respiratory mortality	–0.298*	(0.148)	0.240	(0.196)	–0.180	(0.181)
	External causes $^{\beta}$	0.017	(0.068)	0.023	(0.091)	–0.029	(0.083)
	Life expectancy	–0.149	(0.325)	–0.170	(0.430)	0.273	(0.395)
Unemployment rate	All-cause mortality	7.992	(5.732)	–7.020	(5.918)	2.857	(5.084)
	Neoplasm mortality	2.463	(2.483)	0.152	(2.564)	–2.690	(2.202)
	Circulatory mortality	4.000	(2.771)	–4.152	(2.861)	2.343	(2.458)
	Respiratory mortality	1.197	(2.804)	0.107	(2.895)	0.988	(2.487)
	External causes	–0.734	(1.214)	0.645	(1.253)	–0.394	(1.077)
	Life expectancy	1.254	(5.815)	2.985	(6.003)	–2.331	(5.157)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=100. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). $^{\beta}$ The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-25: Parameter estimates of unadjusted lag models (1 lag) with first-differenced variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)
	Neoplasm mortality	0.000	(0.000)	0.000	(0.000)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.001*	(0.000)	0.001	(0.000)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)
	Infant mortality$^{\beta}$	0.001	(0.004)	0.000	(0.004)
	Life expectancy	0.001	(0.002)	–0.002	(0.002)
Real GDP per capita (millions ISK)	Overall mortality$^{\beta}$	–0.290	(0.269)	0.400	(0.269)
	Neoplasm mortality	0.089	(0.090)	–0.033	(0.091)
	Circulatory mortality$^{\beta}$	–0.175	(0.152)	0.158	(0.152)
	Respiratory mortality$^{\beta}$	–0.233**	(0.105)	0.168	(0.105)
	External causes$^{\beta}$	–0.004	(0.080)	0.015	(0.080)
	Infant mortality	0.400	(1.040)	0.002	(1.043)
	Life expectancy	0.370	(0.454)	–0.682	(0.455)
Unemployment rate	Overall mortality$^{\beta}$	–2.126	(4.219)	1.654	(4.248)
	Neoplasm mortality$^{\beta}$	–0.575	(1.385)	0.773	(1.394)
	Circulatory mortality$^{\beta}$	0.748	(2.360)	0.462	(2.377)
	Respiratory mortality	–0.137	(1.726)	1.001	(1.738)
	External causes$^{\beta}$	–0.739	(1.201)	0.515	(1.210)
	Infant mortality$^{\beta}$	–3.859	(15.810)	1.611	(15.920)
	Life expectancy$^{\beta}$	2.197	(7.115)	1.866	(7.164)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are first-differenced $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-26: Gender-specific parameter estimates of unadjusted lag models (1 lag) with first-differenced variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Males					
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)
	Neoplasm mortality	0.000	(0.001)	–0.000	(0.001)
	Circulatory mortality$^{\beta}$	–0.000	(0.001)	0.000	(0.001)
	Respiratory mortality$^{\beta}$	–0.000	(0.000)	0.000	(0.000)
	External causes$^{\beta}$	–0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.001	(0.001)	–0.000	(0.001)
Real GDP per capita (millions ISK)	Overall mortality$^{\beta}$	–0.156	(0.425)	0.216	(0.426)
	Neoplasm mortality	0.022	(0.159)	0.021	(0.159)
	Circulatory mortality$^{\beta}$	–0.135	(0.259)	0.073	(0.260)
	Respiratory mortality$^{\beta}$	–0.132	(0.108)	0.103	(0.109)
	External causes$^{\beta}$	–0.007	(0.114)	0.020	(0.114)
	Life expectancy	0.285	(0.397)	–0.103	(0.398)
Unemployment rate	Overall mortality$^{\beta}$	–2.420	(6.408)	5.209	(6.453)
	Neoplasm mortality	0.157	(2.407)	0.167	(2.424)
	Circulatory mortality$^{\beta}$	0.640	(3.911)	2.752	(3.938)
	Respiratory mortality$^{\beta}$	–0.924	(1.664)	1.545	(1.676)
	External causes$^{\beta}$	–1.100	(1.719)	0.730	(1.731)
	Life expectancy	–3.372	(5.992)	–3.339	(6.034)
Females					
Real GDP (billions ISK)	Overall mortality	–0.001	(0.001)	0.002	(0.001)
	Neoplasm mortality	0.001	(0.000)	–0.000	(0.000)
	Circulatory mortality	–0.001	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001*	(0.000)
	External causes$^{\beta}$	–0.000	(0.000)	0.000	(0.000)
	Life expectancy	–0.000	(0.000)	–0.001	(0.001)
Real GDP per capita (millions ISK)	Overall mortality	–0.420	(0.324)	0.584*	(0.325)
	Neoplasm mortality	0.159	(0.143)	–0.089	(0.144)
	Circulatory mortality	–0.214	(0.151)	0.243	(0.151)
	Respiratory mortality	–0.334**	(0.132)	0.235*	(0.132)
	External causes$^{\beta}$	–0.002	(0.073)	0.009	(0.074)
	Life expectancy	0.041	(0.270)	–0.201	(0.271)
Unemployment rate	Overall mortality	–1.924	(5.170)	–1.907	(5.206)
	Neoplasm mortality	–1.376	(2.194)	1.423	(2.209)
	Circulatory mortality	0.852	(2.388)	–1.844	(2.405)
	Respiratory mortality	0.656	(2.216)	0.427	(2.231)
	External causes$^{\beta}$	–0.376	(1.109)	0.325	(1.116)
	Life expectancy	1.090	(4.081)	2.966	(4.109)

Notes: N=33 for all estimations. Standard errors in parentheses. All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-27: Parameter estimates of age-adjusted lag models (1 lag) with first-differenced variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.002**	(0.001)	0.002**	(0.001)
	Neoplasm mortality$^{\beta}$	0.000	(0.000)	–0.000	(0.000)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001	(0.001)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)
	Infant mortality$^{\beta}$	0.001	(0.004)	0.001	(0.005)
	Life expectancy$^{\beta}$	0.002	(0.002)	–0.004*	(0.002)
Real GDP per capita (millions ISK)	Overall mortality	–0.634**	(0.255)	0.627**	(0.304)
	Neoplasm mortality$^{\beta}$	0.021	(0.099)	–0.065	(0.118)
	Circulatory mortality$^{\beta}$	–0.284*	(0.165)	0.282	(0.196)
	Respiratory mortality	–0.296**	(0.119)	0.204	(0.142)
	External causes$^{\beta}$	–0.002	(0.094)	0.029	(0.112)
	Infant mortality$^{\beta}$	0.338	(1.220)	0.137	(1.451)
	Life expectancy$^{\beta}$	0.672	(0.490)	–1.038*	(0.583)
Unemployment rate	Overall mortality$^{\beta}$	4.566	(4.642)	–2.107	(4.835)
	Neoplasm mortality$^{\beta}$	1.276	(1.566)	0.820	(1.630)
	Circulatory mortality$^{\beta}$	2.906	(2.794)	–1.604	(2.909)
	Respiratory mortality	0.327	(2.141)	1.181	(2.230)
	External causes$^{\beta}$	–1.027	(1.493)	0.763	(1.555)
	Infant mortality$^{\beta}$	0.713	(19.590)	2.322	(20.400)
	Life expectancy$^{\beta}$	–5.882	(8.363)	5.041	(8.709)

Notes: N=33 for all estimations. Standard errors in parentheses. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-28: Gender-specific parameter estimates of age-adjusted lag models (1 lag) with first-differenced variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.
Males					
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.002	(0.002)	0.002	(0.002)
	Neoplasm mortality	–0.000	(0.001)	0.000	(0.001)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.000	(0.000)	0.001	(0.001)
	External causes$^{\beta}$	–0.000	(0.001)	0.000	(0.001)
	Life expectancy	0.001	(0.002)	0.000	(0.002)
Real GDP per capita (millions ISK)	Overall mortality	–0.652	(0.477)	0.715	(0.498)
	Neoplasm mortality	–0.064	(0.200)	0.129	(0.208)
	Circulatory mortality$^{\beta}$	–0.322	(0.320)	0.257	(0.334)
	Respiratory mortality	–0.151	(0.136)	0.217	(0.142)
	External causes$^{\beta}$	–0.074	(0.147)	0.014	(0.154)
	Life expectancy	0.347	(0.510)	0.139	(0.532)
Unemployment rate	Overall mortality$^{\beta}$	5.067	(6.455)	0.104	(6.736)
	Neoplasm mortality	1.547	(2.565)	–1.057	(2.677)
	Circulatory mortality$^{\beta}$	3.348	(4.173)	1.000	(4.355)
	Respiratory mortality$^{\beta}$	–0.695	(1.834)	1.104	(1.914)
	External causes$^{\beta}$	0.005	(1.896)	0.715	(1.979)
	Life expectancy	–4.513	(6.398)	–7.524	(6.667)
Females					
Real GDP (billions ISK)	Overall mortality	–0.003**	(0.001)	0.003**	(0.001)
	Neoplasm mortality	0.000	(0.001)	0.000	(0.001)
	Circulatory mortality	–0.001**	(0.001)	0.001	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001	(0.001)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.000	(0.001)	–0.001	(0.001)
Real GDP per capita (millions ISK)	Overall mortality	–0.814***	(0.293)	0.651*	(0.345)
	Neoplasm mortality	0.064	(0.153)	–0.065	(0.180)
	Circulatory mortality	–0.359**	(0.153)	0.254	(0.180)
	Respiratory mortality	–0.410***	(0.143)	0.214	(0.168)
	External causes$^{\beta}$	0.024	(0.082)	0.009	(0.097)
	Life expectancy	0.106	(0.303)	–0.264	(0.357)
Unemployment rate	Overall mortality	9.231	(6.024)	–8.185	(5.860)
	Neoplasm mortality	2.860	(2.844)	–1.591	(2.766)
	Circulatory mortality	4.475	(3.046)	–3.472	(2.962)
	Respiratory mortality	2.220	(3.048)	–0.389	(2.965)
	External causes$^{\beta}$	–1.588	(1.518)	1.308	(1.477)
	Life expectancy	–1.438	(5.744)	2.628	(5.587)

Notes: N=33 for all estimations. Standard errors in parentheses. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at $p<0.05$. *$p<0.1$; **$p<0.05$;***$p<0.01$.

Table A-29: Parameter estimates of unadjusted lag models (2 lags) with first-differenced variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.001	(0.001)	0.002	(0.001)	–0.001	(0.001)
	Neoplasm mortality	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)	0.000	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001*	(0.000)	0.000	(0.000)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Infant mortality$^{\beta}$	0.001	(0.004)	0.001	(0.004)	–0.001	(0.004)
	Life expectancy$^{\beta}$	0.002	(0.002)	–0.003	(0.002)	0.001	(0.002)
Real GDP per capita (millions ISK)	Overall mortality	–0.367	(0.271)	0.570*	(0.296)	–0.349	(0.272)
	Neoplasm mortality	0.072	(0.094)	–0.001	(0.103)	–0.063	(0.095)
	Circulatory mortality$^{\beta}$	–0.205	(0.151)	0.229	(0.165)	–0.147	(0.152)
	Respiratory mortality	–0.255**	(0.106)	0.220*	(0.115)	–0.107	(0.106)
	External causes$^{\beta}$	0.002	(0.085)	0.002	(0.093)	0.026	(0.085)
	Infant mortality$^{\beta}$	0.309	(1.089)	0.143	(1.187)	–0.275	(1.092)
	Life expectancy	0.483	(0.471)	–0.924*	(0.514)	0.495	(0.473)
Unemployment rate	Overall mortality$^{\beta}$	–1.803	(4.310)	1.263	(4.465)	1.043	(4.401)
	Neoplasm mortality$^{\beta}$	–0.583	(1.430)	0.736	(1.481)	0.209	(1.460)
	Circulatory mortality$^{\beta}$	0.857	(2.350)	0.421	(2.435)	–0.108	(2.400)
	Respiratory mortality	–0.115	(1.744)	1.057	(1.807)	–0.351	(1.781)
	External causes$^{\beta}$	–0.832	(1.256)	0.683	(1.301)	–0.581	(1.282)
	Infant mortality$^{\beta}$	–6.688	(16.040)	6.132	(16.620)	–14.700	(16.380)
	Life expectancy$^{\beta}$	2.287	(7.405)	1.518	(7.671)	1.502	(7.562)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-30: Gender-specific parameter estimates of unadjusted lag models (2 lags) with first-differenced variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Males							
Real GDP (billions ISK)	Overall mortality[β]	–0.001	(0.002)	0.001	(0.002)	–0.001	(0.002)
	Neoplasm mortality	0.000	(0.001)	0.000	(0.001)	–0.001	(0.001)
	Circulatory mortality[β]	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
	Respiratory mortality[β]	–0.001	(0.000)	0.001	(0.000)	0.000	(0.000)
	External causes[β]	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.001	(0.001)	–0.000	(0.002)	–0.000	(0.001)
Real GDP per capita (millions ISK)	Overall mortality[β]	–0.232	(0.436)	0.392	(0.475)	–0.363	(0.437)
	Neoplasm mortality	–0.025	(0.165)	0.115	(0.180)	–0.189	(0.165)
	Circulatory mortality[β]	–0.139	(0.257)	0.101	(0.280)	–0.063	(0.257)
	Respiratory mortality[β]	–0.158	(0.108)	0.163	(0.118)	–0.125	(0.108)
	External causes[β]	0.001	(0.122)	0.003	(0.133)	0.033	(0.122)
	Life expectancy	0.278	(0.422)	–0.082	(0.461)	–0.046	(0.424)
Unemployment rate	Overall mortality[β]	–2.400	(6.533)	5.488	(6.768)	–1.472	(6.672)
	Neoplasm mortality	0.533	(2.468)	–0.566	(2.557)	2.625	(2.520)
	Circulatory mortality[β]	0.407	(3.757)	3.493	(3.893)	–3.072	(3.837)
	Respiratory mortality[β]	–0.915	(1.670)	1.630	(1.730)	–0.457	(1.705)
	External causes[β]	–1.151	(1.802)	0.831	(1.867)	–0.360	(1.840)
	Life expectancy	–2.641	(6.220)	–4.574	(6.444)	4.134	(6.352)
Females							
Real GDP (billions ISK)	Overall mortality	–0.002	(0.001)	0.003*	(0.001)	–0.001	(0.001)
	Neoplasm mortality	0.001	(0.001)	0.000	(0.001)	0.000	(0.001)
	Circulatory mortality	–0.001*	(0.001)	0.001**	(0.001)	–0.001	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001*	(0.001)	0.000	(0.000)
	External causes[β]	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.000	(0.001)	–0.001	(0.001)	0.001	(0.001)
Real GDP per capita (millions ISK)	Overall mortality	–0.499	(0.339)	0.749*	(0.369)	–0.337	(0.340)
	Neoplasm mortality	0.173	(0.151)	–0.120	(0.165)	0.064	(0.152)
	Circulatory mortality	–0.271*	(0.155)	0.358**	(0.169)	–0.233	(0.155)
	Respiratory mortality	–0.352**	(0.136)	0.279*	(0.149)	–0.090	(0.137)
	External causes[β]	0.002	(0.078)	–0.001	(0.085)	0.019	(0.078)
	Life expectancy	0.085	(0.286)	–0.285	(0.311)	0.171	(0.286)
Unemployment rate	Overall mortality	–1.294	(5.368)	–2.977	(5.561)	3.589	(5.482)
	Neoplasm mortality	–1.773	(2.247)	2.091	(2.328)	–2.234	(2.295)
	Circulatory mortality	1.308	(2.447)	–2.678	(2.536)	2.903	(2.500)
	Respiratory mortality	0.691	(2.278)	0.456	(2.360)	–0.250	(2.326)
	External causes[β]	–0.511	(1.152)	0.560	(1.194)	–0.797	(1.177)
	Life expectancy	1.094	(4.271)	3.018	(4.425)	–0.274	(4.362)

Notes: N=32 for all estimations. Standard errors in parentheses. All variables are first-differenced. [β]The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-31: Parameter estimates of age-adjusted lag models (2 lags) with first-differenced variables (full sample)

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.002**	(0.001)	0.002*	(0.001)	0.000	(0.001)
	Neoplasm mortality$^{\beta}$	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)	0.000	(0.001)
	Respiratory mortality	–0.001**	(0.000)	0.001	(0.001)	0.000	(0.000)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Infant mortality$^{\beta}$	0.002	(0.005)	0.003	(0.005)	0.002	(0.005)
	Life expectancy$^{\beta}$	0.002	(0.002)	–0.003	(0.002)	0.000	(0.002)
Real GDP per capita (millions ISK)	Overall mortality	–0.665**	(0.267)	0.574*	(0.313)	–0.123	(0.286)
	Neoplasm mortality$^{\beta}$	0.015	(0.105)	–0.044	(0.123)	–0.024	(0.113)
	Circulatory mortality$^{\beta}$	–0.312*	(0.169)	0.237	(0.198)	–0.107	(0.181)
	Respiratory mortality	–0.324**	(0.122)	0.176	(0.143)	–0.113	(0.131)
	External causes$^{\beta}$	0.011	(0.101)	0.026	(0.118)	0.051	(0.108)
	Infant mortality$^{\beta}$	0.384	(1.284)	0.407	(1.506)	0.158	(1.377)
	Life expectancy$^{\beta}$	0.698	(0.524)	–0.998	(0.615)	0.105	(0.562)
Unemployment rate	Overall mortality$^{\beta}$	4.667	(4.683)	–1.333	(4.924)	–0.801	(4.300)
	Neoplasm mortality$^{\beta}$	1.232	(1.606)	0.693	(1.689)	–0.245	(1.475)
	Circulatory mortality$^{\beta}$	2.975	(2.758)	–0.991	(2.901)	–0.784	(2.533)
	Respiratory mortality	0.393	(2.132)	1.581	(2.242)	–0.227	(1.958)
	External causes$^{\beta}$	–1.052	(1.550)	0.818	(1.630)	–0.509	(1.423)
	Infant mortality$^{\beta}$	–0.691	(19.590)	2.131	(20.600)	–18.590	(17.990)
	Life expectancy$^{\beta}$	–5.800	(8.580)	3.907	(9.023)	4.307	(7.879)

Notes: N=32 for all estimations. Standard errors in parentheses. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-32: Gender-specific parameter estimates of age-adjusted lag models (2 lags) with first-differenced variables

Explanatory variable	Dependent variable	Lag 0	S.E.	Lag 1	S.E.	Lag 2	S.E.
Males							
Real GDP (billions ISK)	Overall mortality$^{\beta}$	–0.002	(0.002)	0.002	(0.002)	–0.001	(0.002)
	Neoplasm mortality	–0.001	(0.001)	0.001	(0.001)	–0.001	(0.001)
	Circulatory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)	0.000	(0.001)
	Respiratory mortality$^{\beta}$	–0.001	(0.001)	0.001	(0.001)	0.000	(0.000)
	External causes	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
	Life expectancy	0.001	(0.002)	0.000	(0.002)	–0.000	(0.002)
Real GDP per capita (millions ISK)	Overall mortality$^{\beta}$	–0.753	(0.515)	0.696	(0.507)	–0.255	(0.475)
	Neoplasm mortality	–0.137	(0.217)	0.165	(0.214)	–0.186	(0.201)
	Circulatory mortality$^{\beta}$	–0.352	(0.330)	0.209	(0.325)	–0.074	(0.305)
	Respiratory mortality$^{\beta}$	–0.193	(0.144)	0.213	(0.142)	–0.105	(0.133)
	External causes	–0.056	(0.164)	0.007	(0.161)	0.048	(0.151)
	Life expectancy	0.342	(0.567)	0.121	(0.557)	–0.011	(0.523)
Unemployment rate	Overall mortality$^{\beta}$	3.947	(7.418)	1.360	(7.728)	–2.034	(6.689)
	Neoplasm mortality	2.105	(2.956)	–1.568	(3.079)	2.561	(2.665)
	Circulatory mortality$^{\beta}$	2.524	(4.512)	1.833	(4.701)	–3.137	(4.069)
	Respiratory mortality$^{\beta}$	–0.984	(2.073)	1.281	(2.159)	–0.616	(1.869)
	External causes$^{\beta}$	–0.529	(2.230)	1.079	(2.323)	–0.312	(2.011)
	Life expectancy	–4.935	(7.380)	–10.310	(7.688)	3.971	(6.655)
Females							
Real GDP (billions ISK)	Overall mortality	–0.003**	(0.001)	0.003*	(0.001)	0.000	(0.001)
	Neoplasm mortality	0.000	(0.001)	0.000	(0.001)	0.001*	(0.001)
	Circulatory mortality	–0.001**	(0.001)	0.001*	(0.001)	–0.001	(0.001)
	Respiratory mortality	–0.001**	(0.001)	0.001	(0.001)	0.000	(0.001)
	External causes$^{\beta}$	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
	Life expectancy	0.000	(0.001)	–0.001	(0.001)	0.000	(0.001)
Real GDP per capita (millions ISK)	Overall mortality	–0.806**	(0.307)	0.640*	(0.373)	0.172	(0.367)
	Neoplasm mortality	0.066	(0.148)	–0.058	(0.180)	0.334*	(0.177)
	Circulatory mortality	–0.383**	(0.158)	0.301	(0.192)	–0.152	(0.189)
	Respiratory mortality	–0.394**	(0.146)	0.174	(0.178)	–0.089	(0.175)
	External causes$^{\beta}$	0.023	(0.087)	0.011	(0.105)	0.007	(0.103)
	Life expectancy	0.131	(0.317)	–0.320	(0.386)	0.010	(0.379)
Unemployment rate	Overall mortality	8.158	(5.697)	–6.192	(5.314)	–1.011	(5.234)
	Neoplasm mortality	2.391	(2.437)	–0.192	(2.273)	–4.778**	(2.239)
	Circulatory mortality	4.591	(2.796)	–4.033	(2.608)	1.386	(2.569)
	Respiratory mortality	1.419	(2.781)	0.957	(2.594)	–0.272	(2.555)
	External causes$^{\beta}$	–1.231	(1.440)	0.972	(1.343)	–0.417	(1.323)
	Life expectancy	–1.683	(5.352)	4.218	(4.992)	1.365	(4.918)

Notes: N=32 for all estimations. Standard errors in parentheses. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are first-differenced. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-33: Trade balance parameter estimates and standard errors (S.E.) with unadjusted and age-adjusted models using HP-detrended variables

	Unadjusted model		Age-adjusted model	
	Trade balance (fixed prices-millions ISK)	S.E.	Trade balance (fixed prices-millions ISK)	S.E.
All ages: both genders				
Overall mortality	–0.000	(0.000)	0.000	(0.000)
Neoplasm mortality	0.000	(0.000)	0.000	(0.000)
Circulatory mortality	0.000	(0.000)	0.000	(0.000)
Respiratory mortality	–0.000	(0.000)	–0.000	(0.000)
External causes mortality	–0.000	(0.000)	–0.000	(0.000)
Infant mortality	–0.000	(0.000)	–0.000	(0.000)
Life expectancy at birth	0.000	(0.000)	–0.000	(0.000)
All ages: males				
Overall mortality	0.000	(0.000)	0.000	(0.000)
Neoplasm mortality	0.000	(0.000)	0.000	(0.000)
Circulatory mortality	0.000$^{\beta}$	(0.000)	0.000*	(0.000)
Respiratory mortality	0.000	(0.000)	–0.000	(0.000)
External causes mortality	–0.000	(0.000)	–0.000	(0.000)
Life expectancy	0.000	(0.000)	0.000	(0.000)
All ages: females				
Overall mortality	–0.000	(0.000)	–0.000	(0.000)
Neoplasm mortality	–0.000	(0.000)	0.000	(0.000)
Circulatory mortality	–0.000	(0.000)	0.000	(0.000)
Respiratory mortality	–0.000	(0.000)	–0.000	(0.000)
External causes mortality	–0.000	(0.000)	–0.000	(0.000)
Life expectancy	0.000**	(0.000)	0.000*	(0.000)

Notes: N=33 for all estimations. Standard errors in parentheses. Additional control variables in age-adjusted model: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are detrended using HP smoothing parameter γ=100. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at $p<0.05$. *$p<0.1$; **$p<0.05$;***$p<0.01$.

Table A-34: Net immigration parameter estimates with unadjusted models using HP-detrended variables

	Real GDP (billions ISK)	Net immigration	Real GDP per capita (millions ISK)	Net immigration	Unemployment rate	Net immigration
All ages: both genders						
Overall mortality	–0.000	0.000	–0.037	0.000	3.681	0.000
Neoplasm mortality	0.000	0.000	0.069	–0.000	0.170	0.000
Circulatory mortality	–0.000	–0.000	–0.005	–0.000	1.604	0.000
Respiratory mortality	–0.000	0.000	–0.114	0.000	2.906	0.000
External causes	–0.000	0.000	–0.007	0.000	–0.033	0.000
Infant mortality	0.002	–0.000	0.642	–0.000	–5.908	–0.000
Life expectancy at birth	–0.000	–0.000	–0.192	–0.000	0.294	–0.000
All ages: males						
Overall mortality	–0.000	0.000	0.009	0.000	3.232	0.000
Neoplasm mortality	0.000	0.000	0.074	–0.000	–0.186	0.000
Circulatory mortality	-0.000^{β}	0.000	-0.056^{β}	–0.000	3.009^{β}	0.000
Respiratory mortality	–0.000	–0.000	–0.078	0.000	2.182	0.000
External causes	0.000	0.000	–0.002	0.000	–0.403	0.000
Life expectancy	–0.000	0.000	–0.083	0.000	–1.509	0.000
All ages: females						
Overall mortality	–0.000	0.000	–0.196	0.000	5.885	0.000
Neoplasm mortality	–0.000	0.000	–0.043	0.000	4.218*	0.000**
Circulatory mortality	–0.000	0.000	0.023	0.000	0.273	0.000
Respiratory mortality	–0.000	–0.000	–0.163	0.000	3.643	0.000
External causes	0.000	–0.000	0.036	–0.000	–1.031	–0.000
Life expectancy	–0.001	–0.000	–0.152	–0.000	1.325	–0.000

Notes: N=34 for all estimations. Dependent variable (economic indicator) on left side of column, explanatory variable (net immigration) on right side of column. All variables are detrended using HP smoothing parameter γ=100. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-35: Net immigration parameter estimates with age-adjusted models using HP-detrended variables

	Real GDP (billions ISK)	Net immigration	Real GDP per capita (millions ISK)	Net immigration	Unemployment rate	Net immigration
All ages: both genders						
Overall mortality	–0.001	0.000	–0.360	0.000	5.782	0.000
Neoplasm mortality	0.000	–0.000	–0.009	–0.000	1.477	0.000
Circulatory mortality	0.000	–0.000	–0.018	–0.000	0.965	–0.000
Respiratory mortality	–0.001*	0.000	–0.241**	0.000	3.358	0.000
External causes	–0.000	0.000	–0.023	0.000	0.423^{β}	0.000
Infant mortality	0.004	–0.000	1.081	–0.000	–3.263	–0.000
Life expectancy at birth	0.000	–0.000	0.241	–0.000	–6.420	–0.000
All ages: males						
Overall mortality	–0.002	–0.000	–0.677	–0.000	7.991	0.000
Neoplasm mortality	–0.000	–0.000	–0.153	–0.000	1.988	–0.000
Circulatory mortality	–0.000	–0.000	–0.166	–0.000	3.272^{β}	–0.000
Respiratory mortality	–0.001	0.000	–0.220*	0.000	2.811	0.000
External causes	–0.000	0.000	–0.087	0.000	0.301	0.000
Life expectancy	0.001	–0.000	0.340	–0.000	–7.832	–0.000
All ages: females						
Overall mortality	–0.001	0.000	–0.362	0.000	4.851	0.000
Neoplasm mortality	0.000	0.000	–0.047	0.000	4.389*	0.000
Circulatory mortality	–0.000	–0.000	0.008	–0.000	–0.393	–0.000
Respiratory mortality	–0.001	0.000	–0.277*	0.000	3.045	0.000
External causes	0.000	–0.000	0.053	–0.000	–0.963	–0.000
Life expectancy	–0.001	–0.000	–0.112	–0.000	1.133	–0.000

Notes: N=34 for all estimations. Dependent variable (economic indicator) on left side of column, explanatory variable (net immigration) on right side of column. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of male or female population). All variables are detrended using HP smoothing parameter γ=100. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-36: Parameter estimates of bivariate models with HP-detrended variables

All ages: both genders	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
Overall mortality	0.000	(0.001)	0.121	(0.245)	–2.035	(3.124)
Neoplasm mortality	0.000	(0.000)	0.113	(0.082)	–0.496	(1.076)
Circulatory mortality	–0.000	(0.000)	–0.044	(0.131)	1.208^{β}	(1.672)
Respiratory mortality	–0.000	(0.000)	–0.135	(0.101)	0.501	(1.322)
External causes mortality	0.000^{β}	(0.000)	0.030^{β}	(0.067)	$–0.726^{\beta}$	(0.856)
Infant mortality	0.001^{β}	(0.003)	0.457^{β}	(0.866)	$–0.435^{\beta}$	(11.140)
Life expectancy at birth	–0.001	(0.001)	–0.446	(0.423)	3.728	(5.469)
All ages: males						
Overall mortality	0.000	(0.001)	0.121	(0.371)	–0.246	(4.764)
Neoplasm mortality	0.000	(0.000)	0.084	(0.150)	–0.175	(1.927)
Circulatory mortality	$–0.000^{\beta}$	(0.001)	$–0.114^{\beta}$	(0.214)	2.922^{β}	(2.704)
Respiratory mortality	–0.000	(0.000)	–0.064	(0.095)	0.111	(1.203)
External causes mortality	0.000	(0.000)	0.053	(0.098)	$–1.446^{\beta}$	(1.238)
Life expectancy	0.000	(0.001)	0.106	(0.393)	–3.045	(5.005)
All ages: females						
Overall mortality	0.000	(0.001)	0.125	(0.309)	–3.893	(3.903)
Neoplasm mortality	0.000	(0.000)	0.143	(0.128)	–0.856	(1.659)
Circulatory mortality	0.000	(0.000)	0.026	(0.144)	–0.506	(1.847)
Respiratory mortality	–0.001	(0.000)	–0.206	(0.133)	0.882	(1.754)
External causes mortality	$–0.000^{\beta}$	(0.000)	0.004^{β}	(0.061)	0.023^{β}	(0.780)
Life expectancy	–0.001	(0.001)	–0.419	(0.260)	4.823	(3.362)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=10. $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.

Table A-37: Parameter estimates of age-adjusted models with using HP-detrended variables

	Real GDP (billions ISK)	S.E.	Real GDP per capita (millions ISK)	S.E.	Unemployment rate	S.E.
All ages: both genders						
Overall mortality	–0.002	(0.001)	–0.536*	(0.295)	3.770	(3.453)
Neoplasm mortality	0.000	(0.000)	–0.051	(0.109)	1.534	(1.207)
Circulatory mortality	–0.001	(0.001)	–0.198	(0.180)	3.000$^{\beta}$	(2.005)
Respiratory mortality	–0.001	(0.001)	–0.264*	(0.143)	0.813	(1.707)
External causes mortality	0.000$^{\beta}$	(0.000)	0.057$^{\beta}$	(0.099)	–1.122$^{\beta}$	(1.102)
Infant mortality	0.002$^{\beta}$	(0.004)	0.533$^{\beta}$	(1.261)	3.208$^{\beta}$	(14.290)
Life expectancy at birth	0.001	(0.002)	0.383	(0.580)	–4.851	(6.542)
All ages: males, with age controls						
Overall mortality	–0.003	(0.002)	–1.022*	(0.554)	6.202	(5.682)
Neoplasm mortality	–0.001	(0.001)	–0.261	(0.247)	2.349	(2.448)
Circulatory mortality	–0.001$^{\beta}$	(0.001)	–0.425$^{\beta}$	(0.360)	4.603$^{\beta}$	(3.548)
Respiratory mortality	–0.000	(0.001)	–0.193	(0.165)	0.101	(1.667)
External causes mortality	0.000	(0.001)	–0.008	(0.175)	–1.427	(1.715)
Life expectancy	0.001	(0.002)	0.361	(0.687)	–6.959	(6.708)
All ages: females, with age controls						
Overall mortality	–0.001	(0.001)	–0.436	(0.312)	3.265	(4.135)
Neoplasm mortality	0.000	(0.001)	0.068	(0.152)	0.787	(1.969)
Circulatory mortality	–0.001	(0.001)	–0.163	(0.156)	2.401	(2.010)
Respiratory mortality	–0.001*	(0.001)	–0.310*	(0.157)	1.675	(2.141)
External causes mortality	0.000$^{\beta}$	(0.000)	0.037$^{\beta}$	(0.073)	–0.531$^{\beta}$	(0.940)
Life expectancy	–0.001	(0.001)	–0.320	(0.310)	3.366	(4.044)

Notes: N=34. Standard errors in parentheses. All variables are detrended using HP smoothing parameter γ=10. Additional control variables: Age 15 and under, 65–75, and over 75 (portion of whole population, males, or females). $^{\beta}$The Durbin–Watson test rejects the null hypothesis of no serial correlation at p<0.05. *p<0.1; **p<0.05;***p<0.01.