Inequality in Individual Mortality and Economic Conditions Earlier in Life

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Abstract

On average, being born in a recession increases the mortality rate later in life, among cohorts whose life spans have been completed. We analyze to what extent this result varies across social class. We merge individual data records from Dutch registers of birth, marriage, and death certificates, covering an observation window of unprecedented size (1812-2000), including social class and occupation indicators for parents, with historical data on macro-economic outcomes and health indicators. We perform non-parametric tests and estimate duration models. The results indicate that lower social classes suffer disproportionally from being born in recessions. This exacerbates cross-sectional mortality inequality.

Keywords: death, longevity, recession, life expectancy, lifetimes, social inequality, social class.
JEL codes: C41, C81, I12

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1 Introduction

This paper studies the interaction between social class and the business cycle early in life as determinants of individual mortality later in life. In other words, we study whether the mortality rate later in life of individuals from lower backgrounds is more sensitive to being born in a recession than the mortality rate later in life of individuals from higher backgrounds.

There has recently been an increased interest in the effects of cyclical macroeconomic conditions on health and mortality. Most of this literature deals with instantaneous effects of cyclical conditions, using data from relatively recent years (see e.g. Ruhm, 2000, and Dehejia and Lleras-Muney, 2004). Van den Berg, Lindeboom and Portrait (2004) show that being born in a recession causes a higher mortality rate later in life. This finding is consistent with the finding that poor living conditions early in life are associated with susceptibility to a wide range of health problems later in life (see e.g. Case, Fertig and Paxson, 2003, and references therein). It is also consistent with results in the recent demographic literature in which natural experiments are applied to test effects of nutrition and disease exposure in utero and during the first months of life on mortality later in life (see Doblhammer, 2004, for a survey).

It is interesting to know whether the long-run mortality effects of being born in a recession depends on the social class of the family. It is well known that mortality is highly dependent on social class. Individuals with lower backgrounds have higher mortality rates. They may also suffer disproportionally from being born in a recession, for essentially two reasons. First, a recession may hit lower-class individuals harder, for example due to a lack of job security or due to an increased susceptibility to epidemics during recessions. Secondly, bad economic conditions at the individual level may have a stronger effect on mortality for lower-class individuals. In all these cases it may be sensible to target policy at infants born in low social-class families and born in recessions. Their mortality later in life could then be significantly reduced if their conditions are improved upon, for example by way of food, housing, and health provision. Indeed, the government may focus macroeconomic stabilization policies on sectors where lower-class workers are over-represented.

Our data set, called the Historical Sample of the Netherlands (HSN), covers around 14,000 individuals born in three large regions in the Netherlands in the period 1812-1912 and followed up to 2000. It has previously been used by Van den Berg, Lindeboom and Portrait (2004). The data set includes information taken from the standardized individual recordings of vital events (birth, marriage and death) kept by municipalities and provinces, and these also record the social class and occupation of the parents. We merge these with historical time-series data on macro-economic variables, notably GNP, and with external information on the incidence of epidemics. There are no reliable 19th century data on health expenditures and medical innovations, so one can not address their role in the causal chain from economic conditions to health to mortality.

The empirical analysis basically consists of two stages. First, we make non-parametric comparisons between the lifetimes of individuals, notably of those born in a boom and those born in the recession that directly follows the boom, by social class. Here we condition on survival into early childhood, to remove instantaneous effects on infant mortality. Secondly, we estimate duration models for individual mortality, where, for a given individual at a given moment in time, the mortality rate depends on current conditions, conditions earlier in life, social class, other characteristics, and, in particular, on the interaction between conditions early in life and social class.

We use the duration analysis estimates to decompose inequality in mortality across social classes into different components, one being the permanent effect of social class on mortality and one being the class-specific effect of early life cyclical conditions on mortality. Here we also take account of changes in the class composition of newborns over the business cycle. We also interact social class with the effects of contemporaneous economic conditions on mortality. We exploit that the three regions in the data were very different in social structure, climate (humidity) and population density. We also examine interactions with occupational indicators. After all, individuals in certain occupations may actually benefit from a recession. For example, if the recession goes along with high food prices then farmers may benefit.

The paper is organized as follows. Section 2 presents the data and discusses variables that we use in the analyses. Section 3 provides descriptive analyses. Section 4 covers the duration analyses and provides the main results. Section 5 concludes.

2 The data

2.1 Individual records

The HSN data are derived from the registers of birth, marriage, and death certificates (see Mandemakers, 2000, for a general description in English). Currently, we have access to a cleansed sample of 13,718 individuals. This is a random sample of individuals born in the provinces of Utrecht, Friesland and Zeeland[1] between 1812 and 1922. The end of the observation window is December 31, 1999. The data provide the timing of vital life events as well as household and family characteristics that are recorded in the above registers, like the occupation of the father, whether or not the father was illiterate, gender, and geographic location.

The individual lifetime durations are observed in days. If the individual is still alive at the end of 1999 then we do not observe the date of death. We therefore restrict attention to individuals born before 1903. We observe dates of death of migrants out of the provinces. For some individuals in the sample born before 1903, the date of death is missing or has not been collected yet. The rate at which this occurs decreases quickly over time, from 21% for those born in 1812-1821 to around 6% for those born in later cohorts. Occasionally, marriage and/or childbirth dates of such individuals are observed, and in that case we right-censor the lifetime duration at the latest of these dates. Otherwise, the lifetime duration is right-censored at zero, and the individual is discarded from the data. Missing values of explanatory variables lead to an additional loss of individuals from the sample. The sample used below contains 9122 individuals.

We map the occupation of the father into a social class code ranging from 1 (lower lower) to 6 (upper upper). These represent occupations like: diker, day laborer, dock worker (1), cow milker, beer brewer, florist (2), potato farmer, barber (3), bailiff, corn dealer, miller (4), factory manager, headmaster, infantry captain (5), and auditor, lawyer, pharmacist, surgeon (6), respectively. The place of residence at birth is translated into a binary urbanization indicator (being 1 iff the individual is born in a city). [2]

2.2 Data on macro-economic conditions, business cycles, and historical events

We merge the individual data records with external information. Most importantly, we use historical time-series data on annual GNP over the observation window. Our choice for GNP instead of obvious alternatives such as GDP is driven by the need for mutually consistent observations for as many years as possible. Figure 1 plots the log annual real per capita GNP over the interval in which

[1] At the time, the Netherlands had 11 provinces. Our three provinces were jointly rather representative of the Netherlands in terms of economic activity. Patterns in aggregate mortality rates in our data are similar to those in national rates.

[2] See e.g. Smits, Horlings and Van Zanden (2000) for aggregate time series on birth and mortality in the 19th century. The national population grew from 2.2 million in 1812 to 3.4 million in 1862 to 6.1 million in 1912.

the sample members are born. Clearly, in addition to the upward trend, there are many cyclical fluctuations. Jacobs and Smits (2001) provide a detailed analysis of GDP movements in the Netherlands in the 19th century. Years with low and negative growth are observed more frequently than in the 20th century. The GDP fluctuations are strongly correlated to the business cycles in the UK and U.S.. We also consider other macro-economic indicators, like the inflation rate (see also Smits, Horlings and van Zanden, 2000) and the share of agricultural production in annual GNP.

Ideally one would like to compare cohorts born in booms to those born in recessions with otherwise identical circumstances throughout life. This is unfeasible due to the steady secular improvements in life conditions over time. In practice one may compare a cohort born in a boom to the cohort born in the subsequent recession, because the latter benefit from secular developments, so that a decrease of expected lifetimes can be attributed to the cyclical effect. More in general, one may relate the mortality rate to the state of the business cycle early in life. To proceed one therefore needs to assign a value of a cyclical indicator to each year. Most results below are based on a trend/cycle decomposition of log annual real per capita GNP using the Hodrick-Prescott filter with smoothing parameter 500. The values of the cyclical terms are very robust with respect to the actual decomposition method and smoothing parameter, and so are the resulting intervals within which the terms are positive or negative. We are therefore in the fortunate position that booms and recessions are clearly identifiable in the data. Moreover, the empirical analysis provides virtually identical results if other decomposition methods are used. Figure 1 displays the cycle and trend as functions of calendar time. Below we occasionally round-off the value of the cyclical term to a binary outcome.

We also use external information on the incidence of epidemics and war because these cause pronounced spikes in the mortality rates. World War II (1940-1945) has been the only war and occupation on Dutch soil since Napoleon. It included the famine of unprecedented severity of the winter of 1944/45, where mortality rates peaked because of malnutrition (Jewish genocide victims were excluded from the data). There are no reliable macro-economic statistics for the World War II period, so we represent it by a separate dummy variable.

The price to be paid for the fact that the observation window is of unprecedented size concerns the absence of a number of variables that are often used in the mortality literature but that are unobserved in the 19th century records. Notably, we do not observe the individual's cause of death and aggregate amounts of health expenditures and numbers of medical innovations.

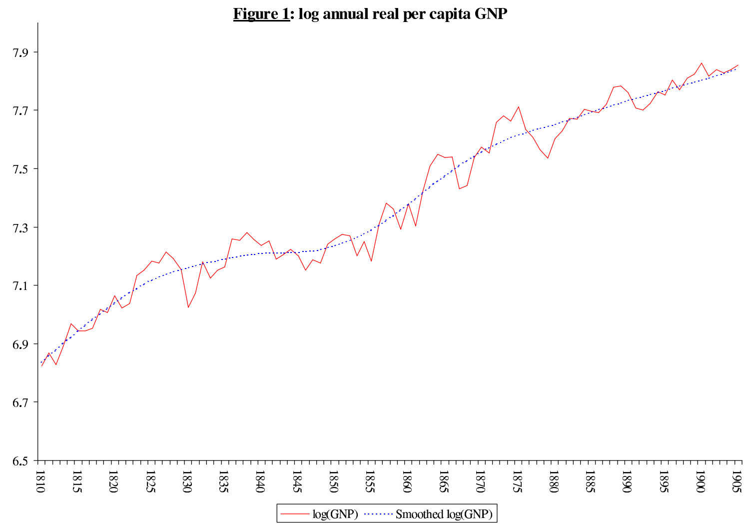

Figure 1: *log annual real per capital GNP.*

3 Descriptive analyses

In Table 1 we give statistics on the available sample. The first rows reports the total number of observations in the sample, followed by the percentage of uncensored observations. For those people with uncensored lifetimes, subsequent rows give moments of the variables like the percentage of females, of individuals whose father is not illiterate, of the percentage share of agriculture in the GNP at birth, of the logarithm of GNP[3] itself, and of the lifetimes of men, women, and of both genders.

One may argue that a simple regression of the average (log) lifetime in a birth year cohort on the cyclical indicator of the business cycle at birth is informative on the effect of conditions early in life on mortality later in life. Such a regression can be carried out for each social class separately, and the estimated values of the class-specific regression coefficients can then be compared to infer how the relationship varies by class.

However, there are some caveats. First, average lifetimes in a birth cohort contain a trend over time that may distort the results. This can be remedied by detrending the time series of average log lifetimes among those born in a year by way of a decomposition along the lines of the previous subsection. We use exactly the same decomposition method for the average conditional log lifetimes

[3]In the table, and in subsequent computations, annual real per capita GNP is measured in 1,000 Euros with 1995 as a base year.

Table 1: Descriptive statistics

		Social class					
	Total	1	2	3	4	5	6
Number of individuals	9122	3488	1444	2157	1758	182	93
% censored	19.458	17.403	18.767	21.419	21.331	20.330	24.731
Of the uncensored observations:							
% female	49.163	48.421	48.167	50.973	48.301	58.621	50.000
% father not illiterate	85.246	72.440	88.747	94.395	95.589	98.621	100.000
% share of agriculture	24.341	24.466	24.106	24.208	24.474	23.853	24.714
in GNP	(3.35)	(3.36)	(3.38)	(3.36)	(3.26)	(3.13)	(3.53)
Log(GNP) at birth	7.424	7.426	7.416	7.447	7.403	7.436	7.356
	(0.27)	(0.26)	(0.28)	(0.27)	(0.27)	(0.28)	(0.25)
Lifetime duration	39.431	37.808	39.663	40.055	41.926	39.308	38.141
	[37.517]	[31.650]	[38.062]	[40.849]	[49.320]	[26.913]	[29.634]
	(35.55)	(35.76)	(35.06)	(35.75)	(35.24)	(35.18)	(34.82)
Lifetime duration	38.086	37.033	37.816	38.226	40.796	30.514	41.743
men	[32.361]	[27.262]	[31.343]	[32.268]	[47.203]	[18.631]	[36.367]
	(35.18)	(35.58)	(34.90)	(34.90)	(35.06)	(32.57)	(34.17)
Lifetime duration	40.821	38.634	41.652	41.814	43.136	45.515	34.538
women	[41.511]	[33.725]	[44.381]	[46.296]	[51.381]	[56.597]	[28.211]
	(35.88)	(35.94)	(35.14)	(36.49)	(35.42)	(35.81)	(35.59)

Explanatory note: The table reports the averages, medians (between square brackets) and standard deviations (between parentheses), for all uncensored observations in the sample, and divided by social class.

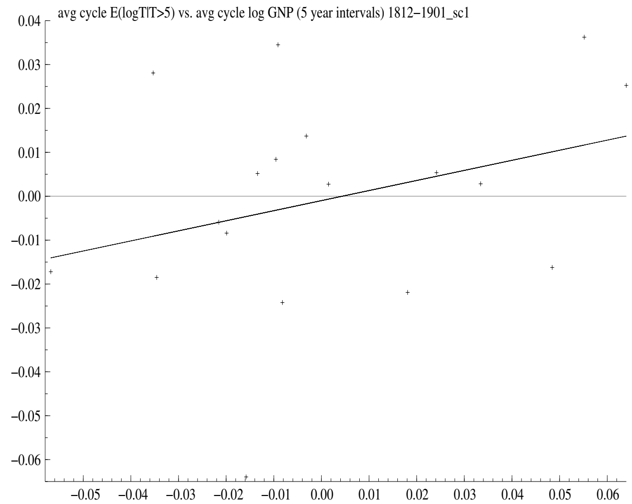

Figure 2: *Average cyclical terms for log GNP and mean log $T|T > 5$ at birth, social class 1.*

as for log GNP. Secondly, the cyclical terms of GNP at birth and average log lifetimes may be dependent simply because of instantaneous effects of economic conditions on infant mortality. We handle this by considering the average log lifetime conditional on surviving until 5, instead of the unconditional mean. To reduce the noise due to measurement errors, we time-aggregate the two cyclical terms by using averages over five-year intervals. This results in (1902-1812)/5=18 data points for each social class.

The cyclical terms of the conditional mean log lifetime by birth year are calculated from individuals who survive beyond age 5 and who have uncensored lifetimes. In our data, the numbers of individuals with social class 1 to 6 who satisfy these requirements are, respectively, 1743, 764, 1069, 938, 96 and 47. Due to the very small number of observations in social classes 5 and 6 we restrict attention to social classes 1 to 4, and we refer to social class 4 as the higher social class.

The results are depicted in Figures 2 to 5, where the average cyclical term of log GNP is on the horizontal axis, and the average cyclical term of the conditional mean log lifetime by birth year is on the vertical axis.

It turns out that the relationship is positive for the lowest three social classes (which constitute most of the population) while it is slightly negative for social class 4. These results are not driven by obvious outliers. Thus, good conditions early in life seem to decrease the mortality rate beyond early childhood for all lower and medium classes but not for the higher class. Time-aggregation into

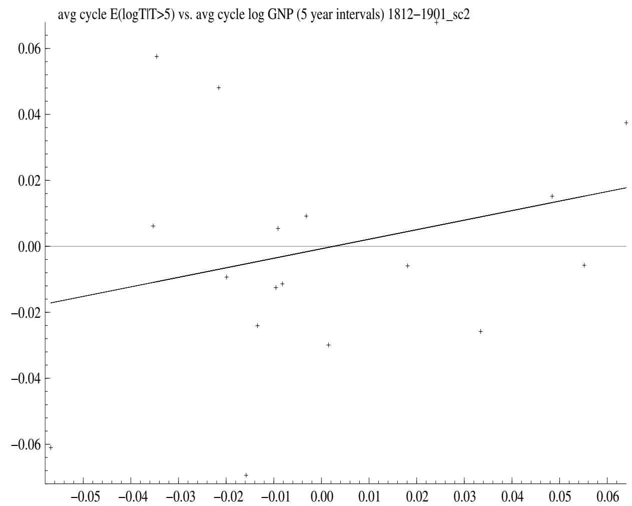

Figure 3: *Average cyclical terms for log GNP and mean log $T|T > 5$ at birth, social class 2.*

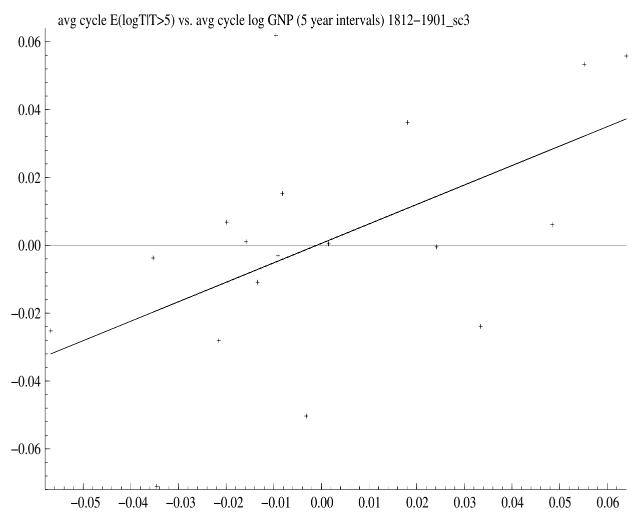

Figure 4: *Average cyclical terms for log GNP and mean log $T|T > 5$ at birth, social class 3.*

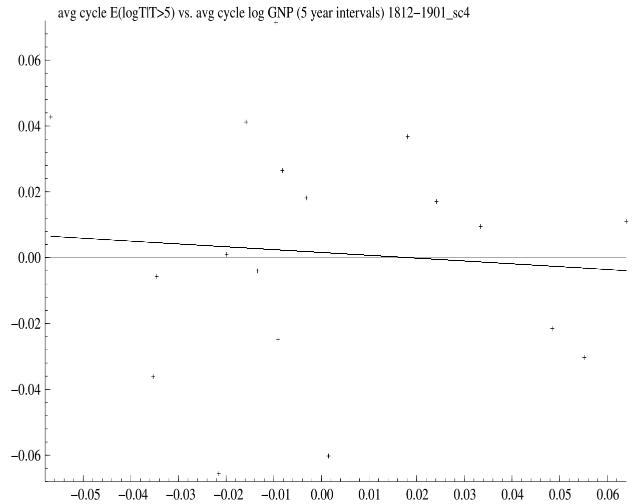

Figure 5: *Average cyclical terms for log GNP and mean log $T|T > 5$ at birth, social class 4.*

smaller (than five-year) intervals leads to smaller but still positive coefficients, with smaller correlation coefficients.

Note that standard errors are hard to compute, since the two variables in each regression are aggregated outcomes of decompositions of time series, one of which is based on a sample. Along the line of reasoning of the next section, any dynamic selection early in life due to unobserved heterogeneity is likely to lead to under-estimation of the slope.

A disadvantage of the analyses so far is that they ignore periodicity of business cycles throughout the childhood years of an individual. Someone who is born in bad times is likely to experience good times during some childhood years, and vice versa, just because good and bad times succeed each other with an average frequency of a few years. If conditions at birth as well as during childhood affect mortality later in life, then the effect of the bad times at birth may be mitigated by the effect of the good times during childhood. The above analyses only examine the relation between cyclical conditions at birth and mortality later in life, so this may under-estimate the effect of cyclical conditions at birth if childhood conditions could be kept constant. To proceed, in the next section, we estimate duration models where the individual mortality rate is allowed to simultaneously depend on conditions at birth and on conditions during childhood. The estimation of these models exploits the variation in the timing of the stages of the business cycle across individuals, to disentangle the long-run effects of conditions at birth and during childhood. This leads to parameter estimates of the effect of cyclical conditions at birth on mortality later in life for given conditions during later childhood years. The duration analysis also controls for individual characteristics, albeit at the expense of functional-form model assumptions.

4 Estimation of models for the individual mortality rate

4.1 Models for the individual mortality rate

The individual mortality rate is the natural starting point of the specification of the model, because of our interest in its dependence on conditions early in life. As our model specifications closely follow those in Van den Berg, Lindeboom and Portrait (2004), the present exposition can be brief. Age is measured in days, so we take it to be a continuous random variable. Let τ denote current calendar time. We express the mortality rate θ of an individual at a given point of time in terms of the prevailing age t, individual socio-economic and demographic background characteristics x, current macro-economic conditions $z(\tau)$, the trend components and cyclical indicators $z_{tr}(\tau-t+i)$ and $z_c(\tau-t+i)$ of macro-economic conditions earlier in life ($i \in \{0, ..., t-1\}$), and various interaction terms. The z variables are only measured once a year.

More specifically, we take $\log\theta(t|\tau, x, z)$ of an individual at age t at calendar year τ to be the sum of a number of terms (see also equation (1) below). The first of these, denoted by $\psi(t)$, captures the dependence on the prevailing age. This is a piecewise constant specification with 10 different intervals (0, 1, 2-6, 7-14, 15-34, 35-59, 60-69, 70-79, 80-89, 90+), in consequence giving rise to 10 parameters. The second term is a linear parametric function of x. We restrict attention to characteristics at birth as opposed to later in life, for the reason that the latter may be endogenous or confounded. The third term is a linear parametric function of the prevailing $z(\tau)$. For $z(\tau)$ we take log annual real per capita GNP at t, as well as dummy variables for years with epidemics and for World War II. The latter also captures the fact that the GNP variable is missing for that period.

The fourth term is a linear parametric function of the cyclical indicators earlier in life. These parameters are the parameters of interest. As indicators we take the cyclical components $z_c(\tau)$ of the decomposition of log GNP from Section 2, at the birth year $\tau - t$, and also averaged over the years corresponding to age 1 up to 6. Of course, at $t = 0$ these are not allowed to affect θ. At $t = 1$, only the component in the previous year (i.e., $z_c(\tau - 1)$) is allowed to affect θ. At, for example, $t = 3$, θ depends on $z_c(\tau - 3)$ and on the average of $z_c(\tau - 2)$ and $z_c(\tau - 1)$.

The trend component $z_{tr}(\tau - t)$ of the decomposition from Subsection 2.2 at the birth year captures the secular long-run effects. The trend components in early childhood are typically very similar to this. Indeed, it is empirically difficult to disentangle the effects of these trend components of the conditions earlier in life from the effects of $z(\tau)$, due to multicollinearity. All of these variables are mostly increasing over time, and at the individual level the trend components of log GNP can be captured relatively well by the sum of current log GNP and an increasing function of age. We therefore omit $z_{tr}(\tau - t + i)$ from the model specification. Similar problems arise if we add calendar time polynomials to the specification.

This gives rise to

$$\begin{aligned} \log \theta(t|\tau, x, z, c) \;\; &= \;\; \psi(t) + \beta' x + \alpha_1' z(\tau) + \alpha_2(x)\; z_c(\tau - t)\; \mathrm{I}(t \geq 1)\; + \\ &+ \alpha_3(x) \sum_{i=1}^{\min\{6,t-1\}} \frac{z_c(\tau - t + i)}{\min\{6, t-1\}}\; \mathrm{I}(t \geq 2) \end{aligned} \tag{1}$$

where the dependence of α_2 and α_3 on x emphasizes that we allow these to depend on the social class, for example by way of $\alpha_j(x) = \gamma_j' x$. We also estimate more general specifications allowing for various other interaction effects between the mortality rate determinants. In particular, we fully interact the age dependence and current log GNP. Babies may suffer disproportionally from bad current conditions. If this is ignored then this may be picked up by the estimated coefficient of the cyclical indicator at birth, which may then be biased. The models are estimated by Maximum Likelihood.

As is well known, ignoring unobserved heterogeneity of mortality determinants across individuals may result in biased estimates of the duration model parameters (see Van den Berg, 2001, for an overview). Unobserved heterogeneity poses an additional problem if the current individual hazard rate is allowed to depend on the value of an explanatory variable at a point of time in the past but after the beginning of the spell; in our case the cyclical indicator during early childhood years (see e.g. Vaupel and Yashin, 1985). Basically, bad childhood years may give rise to selection of childhood survivors with favorable characteristics. So if unobserved heterogeneity is present but is not taken into account then the effect of the cycle during early childhood may be biased. However, the dynamic selection effect can be expected to generate a positive relation between the cycle during early childhood and observed mortality later in life. So, if we find a negative effect without taking account of unobserved heterogeneity, then the true effect is likely to be at least as negative. Of course, if the amount of unobserved heterogeneity differs across social class then the comparison of estimation results by social class is hampered.

4.2 Estimation results

Table 2 presents the estimation results for the basic model specification, while Table 3 gives the results for the specification with interactions between age and current GNP. The estimates concern the mortality rate, so a positive value is associated with a shorter lifetime. The time unit is one year. To interpret the estimates for the cyclical indicators, notice that the reported marginal effects correspond to the hypothetical class with value zero. As an example, in Table 2, the effect of the cyclical indicator at birth for social class 2 equals $-1.453 + 0.414 * 2$. Conversely, the marginal effect of social class can be read off directly from the tables, because the cyclical indicators are mean-centered.

The most striking result is that for the lowest three classes (i.e., for most individuals) the cyclical indicator in the birth year has a negative effect on the mortality rate later in life. For individuals in social class 4, 5 and 6, the effect is positive. However, recall that classes 5 and 6 are very small, and notice that the effect for class 4 is very close to zero. All these results are in accordance to those found in the previous section. We take this as evidence that among lower classes, at the individual level, economic conditions at birth have long lasting effects on mortality. Selection due to unobserved heterogeneity cannot explain this result, because it would give a positive coefficient. Allowing for interaction effects between age and current macro-economic conditions gives a slightly smaller absolute value of the coefficient of the cyclical indicator in the birth year. The cyclical indicator at ages 1 up to 6 does not have a significant effect on mortality later in life for any social class.

Current log annual real per capita GNP has a significantly negative estimated instantaneous effect. The estimated coefficient is the same whether we allow the long-run effect of the cycle at birth to vary with social class or not. A likelihood ratio test of the restriction that the effect is age-independent results in rejection. The estimated effect is largest for individuals aged between 15 and 34. This may reflect an instantaneous effect but may also reflect secular developments accumulated up to the current age. The model specification allows for the cholera epidemic in Utrecht in 1849, the smallpox epidemic in Utrecht in 1870 and in Friesland and Zeeland in 1871, and the influenza epidemic of 1918, as these are typically regarded to be the most severe in our observation window. We do not discuss the covariate, age, and epidemics effects in detail, because they are similar to those in Van den Berg, Lindeboom and Portrait (2004). The share of agricultural production in the annual GNP at birth has a positive coefficient, but this variable contains cyclical as well as trend components, so that its effect is hard to interpret.

4.3 Remarks on sensitivity analysis

We considered several model specifications where we included other cyclical indicators. Instead of using the cyclical indicator at birth, we computed the average cyclical indicator between the year previous to birth and the year of birth so that the period of the pregnancy is also taken into account. This did not result in any substantial difference in the outcomes of the model. Besides, cyclical indicators for the age set $\{7, \ldots, min\{14, t-1\}\}$ also turn out to be insignificant, and changes in the age intervals in the age dependence function do not affect the estimation results.

Other models we estimated include interactions between the social class of the individual and the indicator of being born in an urban area, interactions between the cyclical indicator at birth and this urban indicator and also between this three variables described. None of them are significant.

5 Conclusion

The lower social classes suffer disproportionally from being born in recessions, in the sense that their lifetimes are reduced by more than the reduction for the higher social classes. This exacerbates cross-sectional mortality inequality. These results follow from a range of different empirical approaches, and from the estimation of different model specifications. It may therefore be sensible to target policy at infants born in low social-class families and born in recessions. Their mortality later in life could then be significantly reduced if their conditions are improved upon, for example by way of food, housing, and health provision.

Table 2: Parameter estimates of the baseline model for the individual mortality rate

variable	parameter estimate	standard error
Individual background characteristics		
female	-0.100	(0.024)*
social class	-0.032	(0.010)*
father not illiterate	-0.079	(0.034)*
born in urban area	0.080	(0.029)*
share agriculture in GNP at birth	0.014	(0.004)*
born in province Utrecht	0.241	(0.032)*
born in province Zeeland	0.302	(0.028)*
Conditions early in life		
cyclical indicator in birth year	-1.453	(0.495)*
idem × social class	0.414	(0.188)*
cyclical indicator for age 1 up to 6	-0.509	(0.913)
idem × social class	0.163	(0.349)
Contemporaneous macro conditions		
current log(annual real per capita GNP)	-0.323	(0.035)*
1849 cholera in Utrecht	0.848	(0.198)*
1870/1 smallpox	0.192	(0.122)
1918 influenza	-0.228	(0.178)
world war II (GNP missing)	-0.629	(0.098)*
Current age		
age 0	-1.261	(0.129)*
age 1	-2.576	(0.136)*
age 2–6	-3.864	(0.135)*
age 7–14	-5.087	(0.144)*
age 15–34	-4.894	(0.137)*
age 35–59	-4.494	(0.142)*
age 60–69	-3.286	(0.149)*
age 70–79	-2.198	(0.153)*
age 80–89	-1.227	(0.160)*
age 90+	-0.435	(0.178)*

Explanatory note: An asterisk denotes significance at the 5% level. The province Friesland is the reference province.

Table 3: Parameter estimates of the model for the individual mortality rate with interactions between current GNP and age

variable	estimate	st.error	estimate	st.error
Individual background characteristics				
female	-0.101	(0.024)*		
social class	-0.034	(0.010)*		
father not illiterate	-0.073	(0.035)*		
born in urban area	0.077	(0.029)*		
share agriculture in GNP at birth	0.019	(0.004)*		
born in province Utrecht	0.248	(0.032)*		
born in province Zeeland	0.303	(0.028)*		
Conditions early in life				
cyclical indicator in birth year	-1.343	(0.508)*		
idem × social class	0.405	(0.192)*		
cyclical indicator for age 1 up to 6	-0.294	(0.932)		
idem × social class	0.172	(0.355)		
Contemporaneous macro conditions				
1849 cholera in Utrecht	0.755	(0.202)*		
1870/1 smallpox	0.177	(0.123)		
1918 influenza	-0.126	(0.179)		
world war II (GNP missing)	-0.479	(0.111)*		
Current age, and interacted with current log*(annual real per capita GNP)*				
age 0	-1.529	(0.171)*	-0.209	(0.091)*
age 1	-2.615	(0.278)*	-0.389	(0.189)*
age 2–6	-3.273	(0.259)*	-0.874	(0.179)*
age 7–14	-3.891	(0.378)*	-1.305	(0.273)*
age 15–34	-3.393	(0.250)*	-1.425	(0.154)*
age 35–59	-4.389	(0.183)*	-0.468	(0.079)*
age 60–69	-3.421	(0.190)*	-0.325	(0.066)*
age 70–79	-2.675	(0.181)*	-0.164	(0.049)*
age 80–89	-1.635	(0.192)*	-0.212	(0.050)*
age 90+	-1.050	(0.395)*	-0.158	(0.124)

Explanatory note: The first two columns contain the marginal effects of age while the last two columns give the coefficients of the interaction terms of age and GNP. An asterisk denotes significance at the 5% level. The province Friesland is the reference province.

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