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PERSISTENCE IN UK HISTORICAL DATA ON LIFE EXPECTANCY

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Abstract

This paper provides estimates of persistence in historical UK data on life expectancy applying fractional integration methods to both an annual series from 1842 to 2019 and a 5-year average from 1543 to 2019. The results indicate that the former exhibits an upward trend and is persistent but mean reverting; the same holds for the latter, though its degree of persistence is higher. Similar results are obtained for the logged values. On the whole, this evidence suggests that the effects of shocks to the series are transitory though persistent, which is useful information for policy makers whose task is to take appropriate measures to increase life expectancy.

Keywords: life expectancy; long memory; fractional integration

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1. Introduction

Life expectancy is a useful indicator of a population's health (Roser et al., 2013). Historically, it was extremely low (about 30 years) throughout the globe prior to the Age

modelling framework has the advantage of being more general and flexible than the standard one based on the stationary I(0) versus nonstationary I(1) dichotomy since it allows the differencing parameter to take any real value, including fractional ones, as opposed to integers only; as a result, it encompasses a much wider range of stochastic processes, and provides evidence on whether or not those are mean-

We employ the testing procedure proposed by Robinson (1994) that is based on the Lagrange Multiplier (LM) principle and includes a version of the Whittle function in the frequency domain, where the null is the following:

$$H_o : \ d \ = \ d_o \, , \qquad (4)$$

Note that in equations (1) and (2) d can be any real number, including decimals from the nonstationary range ($d \geq 0.5$), but the limit distribution of the test statistc is standard N(0, 1) (for its functional form see Gil-Alana and Robinson, 1997).

3. Empirical Results

Tables 1 – 8 report the estimated values of d alongside their 95% confidence intervals for three different model specifications: i) without deterministic terms, ii) with an intercept only, and iii) with an intercept as well as a linear time trend. The coefficients in bold are those from the models selected on the basis of the statistical significane of the regressors.

TABLES 1 4 ABOUT HERE

and the estimates of d are now 0.82 and 1.00 (i.e., they are much higher than in the previous case) and mean reversion (d < 1) is only found in the case of the annual series.

TABLES 5 8 ABOUT HERE

Concerning the logged values (Tables 5-8), the time trend is significant for both series regardless of the error term specification, and the estimated values of d are now 0.61 (annual) and 0.57 (5-years) with white noise errors, and 0.77 and 0.78 with autocorrelation, whilst the hypothesis of mean reversion cannot be rejected in any single case, which implies that the effects of shocks will gradually die away.

4. Conclusions

This paper provides estimates of persistence in historical UK data on life expectancy applying fractional integration methods to both an annual series from 1842 to 2019 and a 5-year average from 1543 to 2019. The results indicate that the former exhibits an upward trend and is persistent but mean reverting; the same holds for the latter, though its degree of persistence is higher. Similar results are obtained for the logged values. On the whole, this evidence suggests that the effects of shocks to the series are transitory though persistent, which is useful information for policy makers whose task is to take appropriate measures to increase life expectancy.

Future work could investigate possible nonlinearities, for ex-3(n7m08871 0 595.32 841.92 reW*841

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Figure 1

Figure 2