Chapter

GDP *Almost Perfectly* Predicts Survival

Gordon G. Bechtel and Timothy Bechtel

Abstract

This article extends results reported by Bechtel, G. and Bechtel, T. (2021). These previous findings induce the hypothesis confirmed here; namely, that gross domestic product GDP *nearly perfectly* predicts survival in the world's entire population. The fractional polynomial regressions here are run over the pre-pandemic period 1991–2016. During the subsequent pandemic, the American Center for Disease Control reported that life expectancy at birth in the USA dropped one year during the first six months of 2020, the largest drop since World War 11. The drops in African and Hispanic life expectancy at birth during this period were 2.7 and 1.9 years (Aljazeera; Democracy Now, February 18, 2021). The USA is the worst covid-19-effected population. It is now imperative to confirm that life expectancy at birth is well predicted from GDP in all nations over 1991–2018. This pre-pandemic control for each nation will accurately calibrate it's subsequent yearly survival drops due to Covid-19. This is especially important in light of the trade war between the United States and China, which has increased the need for accurate measurement of the human effects of this war.

Keywords: A Theory of Imperatives, Life Expectancy at Birth, Fractional-Polynomial Transformation of GDP, Pandemic Threats to Lives and Economies, R^2 Invariance with Respect to GDP and Survival Calibration

1. Introduction

Among the plethora of economic variables that might be invoked to measure Covid-19's negative effect on economic recovery, GDP remains paramount. This economic imperative is exceeded only by the human imperative of survival itself [1].

Section 2 shows that world GDP can almost perfectly predict the life expectancy of the entire world population. In arriving at this finding, this work relies on only three data definitions and one fractional-polynomial command. It will be interesting to see if the World Bank or IMF can verify that these definitions and their processing command will predict the survival rate of the world's rich as well as poor nations.

2. Dual data imperatives

2.1 Keynesian GDP (K) and survival (S)

The dollar denomination of variables counted in different units (automobiles, cereal boxes, etc.) allows the ratio scaling of GDP up to a multiplier calibrating GDP in single, thousands, millions, billions, or trillions of current US dollars.

This ratio scaling also allows daily exchange-rates to multiply one nation's currency into another's (e.g. dollars into yen). Likewise, the ratio scaling of life expectancy at birth allows survival to be scaled in days, months, years, or decades.

The goal of this paper is to relate GDP to survival by posing survival as a fractional-polynomial function of GDP. It is shown that this function predicts survival of the world population.

Definition 1. K denotes frequency-weighted Keynesian GDP. Vector **K** replicates **Kt** N_t times and contains $\Sigma_t N_t$ values, where N_t is world population size in year t = 1990 ... 2018.

Definition 2. St is survival time, denoted by life expectancy at birth in year t = 1990 ... 2018.

Definition 3. Vector **S** replicates **St** N_t times and contains $\Sigma_t N_t$ values, where N_t is world population size in year t = 1990 ... 2018. **S** is a ratio scale unique up to multiplication by a positive constant that calibrates **S** in days, weeks, months, or years.

2.2 Fractional polynomial regression of S on K

The following Stata command returns an importance-weighted fractional polynomial regression [2, 3]:

$$\text{fracpoly regress } \mathbf{S}\,\mathbf{K}\left[\text{iweight} = \text{POPmillions}\right], \text{degree}(9)\,\text{noscaling}. \qquad (1)$$

R^2 = .9751 for this time-series regression of **S** on **K** over t = 1991 ... 2018 for the entire world population. It is also important to note that this R^2 is invariant with respect to the units in which **S** and **K** are calibrated; i.e. days, weeks, months, or years for survival and single, thousands, millions, billions, or trillions of current US$ for GDP.

Acknowledgements

This chapter is dedicated to the memory of the author's best critic, Maria Cohn Bechtel. The author thanks Dr. Bethany Bechtel for the book *The Great Invention: The Story of GDP and the Making and Unmaking of the Modern World* [4]. We have also benefited from Dr. Bechtel's insistence on monitoring a population's economic indicators over time, coupled with a gradual approach to resolving societal conflicts and loosening entrenched beliefs. This paper generalizes previous work reported in [5, 6] and [1, 7, 8]. The author thanks the reviewers of all five of these open access articles for their stringent reviews, which have strengthened *this* article's content and clarity.

Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The data files used in this study are available on request from the corresponding author. These files are not publicly available due to their extraction and reduction from the World Bank. This extraction and reduction by the author renders these files understandable and usable by a reader of this article.

DOI: http://dx.doi.org/10.5772/intechopen.97788

Author details

Gordon G. Bechtel[1*] and Timothy Bechtel[2]

1 Warrington College of Business, University of Florida Gainesville, USA

2 Aviation Power, Frankfurt, Germany

*Address all correspondence to: bechtel@ufl.edu

References

[1] Bechtel, G.; Bechtel, T. GDP Alone Predicts Income and Survival. Open Journal of Social Sciences 2021, 9, 487-493.

[2] Royston, P.; Altman, D. J. 1994. Regression using fractional polynomials of continuous covariates: parsimonious parametric modeling (with discussion). Applied Statistics 429-467.

[3] StataCorp. *Stata Statistical Software, Release 12*; StataCorp LP: College Station, TX, USA, 2011.

[4] Masood, E. 2016. *The Great Invention: The Story of GDP and the Making and Unmaking of the Modern World*; Pegasus Books Ltd.: New York, NY, USA,

[5] Bechtel, G. 2017. New Unidimensional Indexes for China. Mathematical and Computational Applications, 22(1), 13.

[6] Bechtel, G. 2019. GDP *is* Well-Being. Open Journal of Social Sciences 7, 189-204.

[7] Bechtel, G.; Bechtel, T. American GDP Alone Predicts Human Development. Advances in Social Sciences Research Journal 2020a, 7, 273-282.

[8] Bechtel, G.; Bechtel, T. GDP and Human Development. Open Journal of Social Sciences 2020b, 8, 333-343.