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Children, dynastic altruism and the wealth of nations

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ABSTRACT

The effective life span, or quantity of life, of an altruistic parent extends beyond her own longevity. The quantity of life is also determined by the number and longevity of her descendants. Using a calibrated version of the Barro–Becker model, I derive and estimate measures of effective quantity of life and of relative well-being for representative individuals of 116 countries between 1970 and 2005. I find that the gains in effective quantity of life arising from longevity improvements were on average more than offset by the losses due to fertility reductions. Effective quantity of life in the world fell by more than 7 percent during the period 1970–2005. Contrary to previous estimates, I find that the effective growth rate of well-being in the world, taking into account quantity and quality of life, was significantly below the growth rate of per-capita consumption.

"... who is loved more but our children, for they are the prolongation of our existence ..." *Lyrics of a classic Colombian song.*

1. Introduction

It is well-recognized that GDP per capita is an imperfect indicator of average economic well-being. As a flow measure, GDP gauges the material *quality* of life in a given period but it is silent about the *quantity* of life, the number of years over which the flow of income is enjoyed. Thus, even if two countries have identical GDP per capita, average welfare may differ due to differences in longevity. Recent works by Becker et al. (2005), Jones and Klenow (2011), and Cordoba and Ripoll (2013) calculate full measures of income that take into account longevity differences across countries and across time.

The quantity of life, however, is not only determined by the life span of an individual. Parents who perceive their children as extensions of their own life increase their effective quantity of life through the life of their children, grandchildren, etc. The idea that longevity and children are equivalent is embedded in the infinitely-lived model commonly used in macroeconomics. The model is often motivated as really representing a dynasty, a sequence of finitely lived individuals linked by altruism. This idea is formalized by the Barro–Becker model of fertility (Becker and Barro, 1988, and Barro and Becker, 1989).

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This paper uses quantitative versions of the Barro–Becker model to assess the welfare implications of fertility differences across time and space. The presumption that fertility may significantly affect welfare evaluations is based on two facts. First, as illustrated in Figs. 1 and 2, net fertility rates differ significantly across countries and have changed substantially over time.[2] The lowest and highest net fertility rates in 2005 were 1.23 and 5.98 children per women in Poland and Niger respectively, with a world standard deviation of 1 child. Moreover, net fertility rates around the world fell by 2 children on average between 1970 and 2005. Second, parents spend a significant fraction of their resources, wealth and time, on their children suggesting that children are a major source of enjoyment. For example, the U.S. Department of Agriculture estimates that the total present value of expenses on a child born in 2009 for a middle-income husband–wife family with two children is $226 920 in 2010 dollars (USDA, 2010, p. 23). This is only a partial figure because it only includes direct parental expenses made on children through age 17 such as housing, food, transportation, health care, clothing, child care, and private education, but excludes time costs and forgone earnings by parents, college costs and other costs after age 17.

Part of the observed fertility reductions are the result of direct government interventions through family planning policies. Perhaps the most significant example is the One Child policy in China. The policy placed major restrictions on fertility choices with the goal of reducing poverty and alleviating social and environmental problems. Partly as a result of the policy, the net fertility rate in Chine dropped by 3.2 children between 1970 and 2005. During the same period, per capita consumption grew at an impressive rate of 5% per year, one of the largest in the world. But is the One Child Policy a welfare enhancing policy? After all, everything else equal, altruistic parents are better off by having more children. Was the observed consumption growth enough to compensate for the welfare loss due to lower fertility? What is the actual growth rate of well-being in China's taking into the cost of the policy? This paper sheds some light on these questions, and more generally, provides estimates of the evolution of well-being around the world that take into account fertility trends.

The key concept of the paper is the *effective* quantity of life, Q. Specifically, in dynastic altruistic models the lifetime utility of an individual can be written as $u(c)Q$ where $u(c)$ is the utility flow due to consumption, or quality of life, times Q. In the Barro–Becker model, $Q = Q(T)Q(n)$ where $Q(T)$ and $Q(n)$ measures effective longevity and effective dynasty size respectively given longevity T and fertility n. The core of the paper reports estimates of effective quantity of life, effective longevity, effective dynasty size and consumption equivalent measures of welfare for representative individuals of 116 countries and for the years 1970 and 2005 using calibrated versions of the model. The discipline of the quantitative exercise comes from requiring the model to match U.S. targets for the value of statistical life and the economic value of children.

The following are the main insights from the model. First, there is a large difference between longevity, T, and effective longevity, $Q(T)$. Thus, for example, while longevity was 88% higher in Japan than in Zimbabwe in 2005, effective longevity was only 39% higher. The difference between actual and effective longevity is accounted by a small rate of time discounting, of only 2% per year, which implies than an additional year of life at age 65 is worth only 0.3 years of extra life at age 5. Second, children's welfare is significant discounted: the weight that a parent puts on the welfare of her child, relative to her own weight, is 0.098 on average. As a result effective dynasty size, $Q(n)$, is only 1.2 members even though the net fertility rate is 2.5 children on average. Effective quantity of life, Q, was 45 years on average around the world in 2005.

Third, effective quantity of life is weakly negative correlated with per-capita consumption in 2005. While longevity and effective longevity are strongly positively correlated with per-capita consumption, and fertility and effective dynasty size are strongly negative correlated, both effects largely offset each other overall, although significant exceptions exist for specific countries. Simple regressions show that doubling per-capita consumption is empirically associated with increasing longevity and effective longevity by 3.58 and 1 years respectively on average for the world, reducing fertility and effective dynasty size by 0.56 and 0.04 respectively, and decreasing effective quantity of life by 0.08 years. Relative to the U.S., the world on average loses an equivalent of 20% on its consumption due to its lower effective longevity but gains 16% due to its higher effective dynasty size. These figures show that taking into account fertility differentials have a first order effect on welfare calculations.

Fourth, effective quantity of life significantly decreased during the period 1970–2005. The gains due to added longevity, of around 6.4 years on average, were more than offset by the losses due to lower fertility, a loss of 2 children. On average for the world, effective longevity increased by 5.1% during the period but effective dynasty size fell by 11.6%. As a result, effective quantity of life fell by 7.1%. Fifth, the welfare consequences of the drop in effective quantity of life were significant. While consumption per capita grew on average around the world at an annual rate of 2.6% during the period 1970–2005, welfare measured in consumption equivalent units grew at an annual rate of 1.9% during the same period. If only trends in longevity are considered, ignoring fertility trends, then annual welfare growth during the period would have been around 0.5% higher than consumption growth, consistent with the findings of Becker et al. (2005).[3] However, considering trends in both longevity and fertility, welfare growth is actually 0.7% lower than consumption growth, or around 1.2% lower than what was suggested by Becker et al.

In addition to the overall findings for the world, I also report results for individuals countries. The Chinese case is particularly telling. During the 1970–2005 period longevity increased by around 5 years but net fertility fell by 3.2 children.

[2] Details about the definitions and the data set used are provided in Section 3.

[3] They find that increasing longevity around the world for the period 1960–2000 is equivalent to around 0.7 additional percentual points of economic growth for a sample of 96 countries.