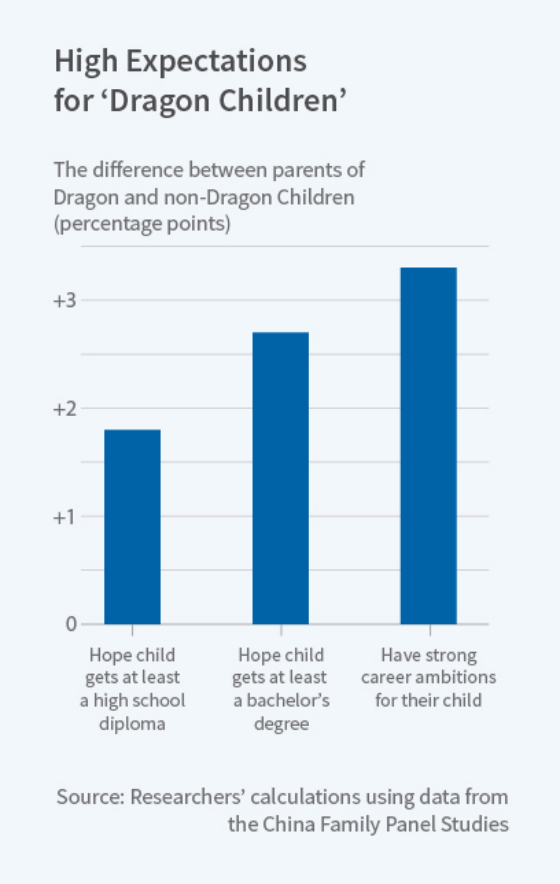
Explaining the Good Fortune of Dragon Year Children



Those born in a Year of the Dragon are more likely than others to obtain a bachelor's degree or higher — because parents invest more in them.

Is a child born in a certain zodiac year really destined to have more good fortune and success in life than a child born in another year? Many parents in China believe that's the case for children born in a Year of the Dragon, and some education statistics would appear to confirm it.

But in **Can Superstition Create a Self-Fulfilling Prophecy? School Outcomes of Dragon Children in China** (NBER Working Paper No. 23709) Naci H. Mocan, and Han Yu show that the higher educational achievements of Dragon year children in China are largely due to the much higher expectations of their parents. Some parents time marriages so as to have children born in Dragon years, and many of them invest more time and money in their children than other parents, thereby helping to fulfill their lofty expectations.

In Chinese astrology, one of the oldest horoscope systems in the world, each year in a 12-year cycle is represented by an animal, and there is widespread

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Bang for the R&D Buck Is in a Long, Steady Decline

In **Are Ideas Getting Harder to Find?** (NBER Working Paper No. 23782), Nicholas Bloom, Charles I. Jones, John Van Reenen, and Michael Webb argue that, to maintain a given rate of economic growth, resources devoted to research must increase over time. They cite both aggregate evidence and measures of R&D productivity in specific industries, in particular computers, agriculture, and medicine.

They illustrate their finding by reference to Moore's Law, the observation by Intel co-founder Gordon Moore in 1965 that the density of computer chips was doubling every two years. "[B]ecause of declining research productivity, it is around 18 times harder today to generate the exponential growth behind Moore's Law than it was in 1971," the researchers calculate. Bang for the buck from research on computer chips has declined at an average annual rate of 6.8 percent, they find.

Similarly, ever-increasing R&D effort has been required to keep crop yields for corn, soybeans, cotton, and wheat increasing at an annual rate of 1.5 percent per year since 1960. The researchers estimate that research productivity has declined by 4 to 6 percent per year.

> Declining U.S. research productivity means ever-increasing R&D expenditures are required to keep computer technology, medicine, and yields of major crops improving.

The medical field also shows diminishing returns to research dollars, but the results there are more mixed. Looking at the number of drugs approved by the Food and Drug Administration from 1970 through 2015 and the amount spent by the pharmaceutical industry on R&D, the researchers estimate that research productivity has fallen at an average annual rate of 3.5 percent, although the decline has slowed since 2007.

The researchers also compare mortality rates to the flow of new medical research as measured by published studies and, more narrowly, clinical trials. Based on clinical trials, average annual research productivity declined by 7.2 percent for heart disease for the years 1968–2011 and 5.2 percent for cancer in 1975–2006.

In aggregate, the researchers estimate that research productivity in the U.S. has

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popular belief that individuals born in different zodiac years are inherently different. Those born in a Year of the Dragon supposedly are destined for good fortune and greatness. Previous studies of a number of Asian cultures have shown that fertility rates increase in Dragon years.

Previous studies of the educational achievements of Dragon year children produced mixed results. Some showed no effects, and others found negative educational effects, leading to speculation that higher birth rates in Dragon years actually harm children who are subsequently exposed to larger classroom sizes and more competition for college and job openings.

In this study, the researchers analyze data about marriages, births, demographic backgrounds of children and their families, school test scores, college entrance exam results, family surveys, and other information from sources including the China Health Statistical Yearbook, the China Civil Affairs Statistical Yearbook, the China General Social Survey, the Beijing College Students Panel Survey, and the China Education Panel Survey.

After adjusting their data to account for the differences between zodiac and Gregorian calendar years, they find spikes in Chinese marriages in the two years prior to the most recent Dragon years: 2000 and 2012. Both Dragon years saw birth rate increases. Live births increased by 289,224 in 2000 compared to the year prior, and by 935,854 in 2012 compared to 2011. Conversely, the researchers find a sharp decrease of more than 400,000 births in 2003, the Year of the Sheep, an unfavorable year for births in the Chinese astrological system. Children born in a Dragon year were 14 percent more likely than children born under the other 11 signs to obtain a bachelor's degree or higher. Those born in Dragon years also scored higher on college entrance exams and middle school tests.

Differing income and educational levels of parents cannot explain the higher

educational achievements of Dragon year children. However, in analyzing government surveys of parents, the researchers find that mothers and fathers of Dragon year students have consistently higher expectations for their children than do parents of children born in other years. Moreover, the parents report investing more time, money, and effort into making sure their Dragon-year children succeed — and even provide them with more pocket money and require them to do fewer household chores, presumably so they can focus more on school work.

“Even though neither the Dragon children nor their families are inherently different from other children and families, the belief in the prophecy of success and the ensuing investment become self-fulfilling,” the researchers conclude.

— Jay Fitzgerald

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