The Post-2007 Declining U.S. Birth Rates imply Significant Societal Shifts in the U.S.*

Sagith Kalaichelvam Youngho Kim Joseph Chung

21 February 2023

Abstract

This paper explores several potential explanatory factors for the steep decline in birth rates in the United States between 2007 and 2020. The decline in U.S. birthrates offers some significant insights into U.S. society. Changes in birth patterns among recent young adult women moving through the childbearing age group can be directly related to the decline in birth rate from a purely statistical standpoint. We provide evidence that the steep drop in birth rates could be attributed to recent young adults' shifting interests. These shifting priorities represent changes in young adults' preferences regarding having children and aspirations for life. Resonating with the original paper, we conclude with a brief discussion of the implications of the declining birth rate in the United States and its impact on society as an entirety.

Table of contents

*Code, data and reproduction package are available at: https://github.com/UtopianYoungChung/Paper2 and reproduction package link to be updated

List of Figures

List of Tables

1 Introduction

To measure birth rates, the National Center for Health Statistics (NCHS) aggregates data on birth rates for women by age, race, education level, and other factors; the aggregated data for a particular year is the total number of births per 1000 women. Each year NCHS measures birth rates nationwide and analyzes the data to make insights into societal phenomena. For instance, in 1997, NCHS published a paper on how a mother's education level influences the birth rate. In the paper, NCHS asserted that there is a negative correlation between a mother's education level and birth rate. Their study found a direct relationship between years of education and birth rates, with the highest birth rates among women with the lowest educational attainment "1997 Fact Sheet - Mothers Education and Birth Rate" (1997).

In this paper, we gathered data from the American Economic Association, National Center for Health Statistics, and the U.S. population data. With the gathered data, we generated graphs and tables to observe the trend in birth rates of different demographics using R (R Core Team 2020). We also uploaded and cleaned data using R (R Core Team 2020), tidyr (Wickham 2021), dplyr (Wickham et al. 2021), tidyverse (Wickham et al. 2019), and haven (Wickham and Miller 2021) packages. Figures and tables were created with knitr (Xie 2014), ggplot2 (Wickham 2016), kableExtra (Zhu 2021), and dplyr (Wickham et al. 2021).

Figure 1 depicts U.S. birth rate trends over the last 40 years. Here, we can see that the trend is fluctuating relatively stable. However, during the post-2007 recession, it takes a steep decline with no sign of returning. We start our journey to explore potential explanations for the decline.

In Section 4.1, we discuss how decomposing the decline in the birth rate between demographic groups offers us a clearer picture of the topic. As shown in **?@fig-2** and **?@fig-3**, by dissecting the demographics into age groups and ethnicity groups, we notice that there is a significant amount of decrease among the white ethnicity women between ages 15 and 24, while other ethnic groups are showing a minor decrease.

Section 4.2, briefly discusses the empirical relationship between birth rates and economics and policy factors. We then argue that other economic, policy or social factors that have changed since 2007 do not contribute much to the decline.

Section 4.3, presents a potential attributing factor for the declining U.S. birth rate after the 2007 recession. We show strong evidence that suggests the most recent group of young adults is a significant driver of the post-2007 decline in the birth rate. This significance suggests that the societal shifts among young women moving through childbearing age are an ongoing trend.

We conclude the paper by raising a concern that this societal phenomenon imposes some severe societal consequences and, therefore, should be considered at a high level. Most importantly, we need to consider what it means for the nation's well-being when there are no signs of returning from the negative trend in birth rates.

2 Data

2.1 Data Source and Collection

The datasets for this paper were obtained from the paper "The Puzzle of Falling US Birth Rates since the Great Recession" (Kearney, Levine, and Pardue 2022), a paper from the Journal of Economic Perspectives (AEA 2022). The data used by the paper was compiled by various sources such as the NCHS Natality Database (NCHS 2018), CDC SEER (CDCSEER 2019), the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) (Flood et al. 2020), the New York Federal Reserve (Federal Reserve 2022), and the Integrated Public Use Microdata Series (IPUMS) (Flood et al. 2020). The paper and datasets were published during the year 2022. All of these various sources are providing a lot of useful information which are shown throughout all of the figures within this paper we created. For example, the sources collected lots of raw data such as population of people giving births, race, lifestyle factors, age of parent when giving birth, etc. So, all of these information were collected from these various sources, and written into the paper "The Puzzle of Falling US Birth Rates since the Great Recession" (Kearney, Levine, and Pardue 2022). Which was then analyzed in our paper with our version of analysis.

2.2 Data Cleaning

Most of data used in this paper were cleaned to get the most accurate information, and remove any unneccessary information to be outputted in this paper. Data was cleaned to remove data of some years, age group, race category, etc. So, that the revised figures can provide the most accurate information according to our analysis, and not have any information that is unrelevant to our analysis.

2.3 Data Modification

2.4 Data Visualization

3 Results

Figure 1. Trends in US birth rates over the past 40 years show a steep decline in the birth rate during the post-2007 recession (Figure 1).

Figure 1 shows that overtime, the number of births in the United States is dropping steadily, while it slightly went up on peak around 1990, 2001, and 2007. Most likely the hikes of going up during these years might have been into other factors that made more people among the selected population to have kids. After 2007, the number of births drastically dropped a lot. Nowadays, among 1,000 women from age 15 to 44, only about 56 births will occur. While, in the past around the 1980s, and 1990s, the number of births was around 65 to 70 range. The line in the graph shows that in the near future much lower amount of people will have kids, and this can be due to other factors from their lifestyle which is making them to decide to not have more kids.

Figure 2.place it here with Figure 6 (**?@fig-2**).

Figure 3. place it here with Figure 7 (**?@fig-3**).

Figure 4. place it here with the Figure 4 from the Original paper (**?@fig-4**).

Figure 5. place it here with the Figure 2-a from the Original paper (Figure 2).

Figure 2 shows lots of important information about when people tend to have kids at certain age over the timeframe from 1990 to 2020. Based on the graph, the data shows that more people are having kids after the age 30 during this present time. In the past, most people tend to have kids before the age 30. Around the years 2000 to 2005, that is when the lifestyle started to change where people tend to either get marry

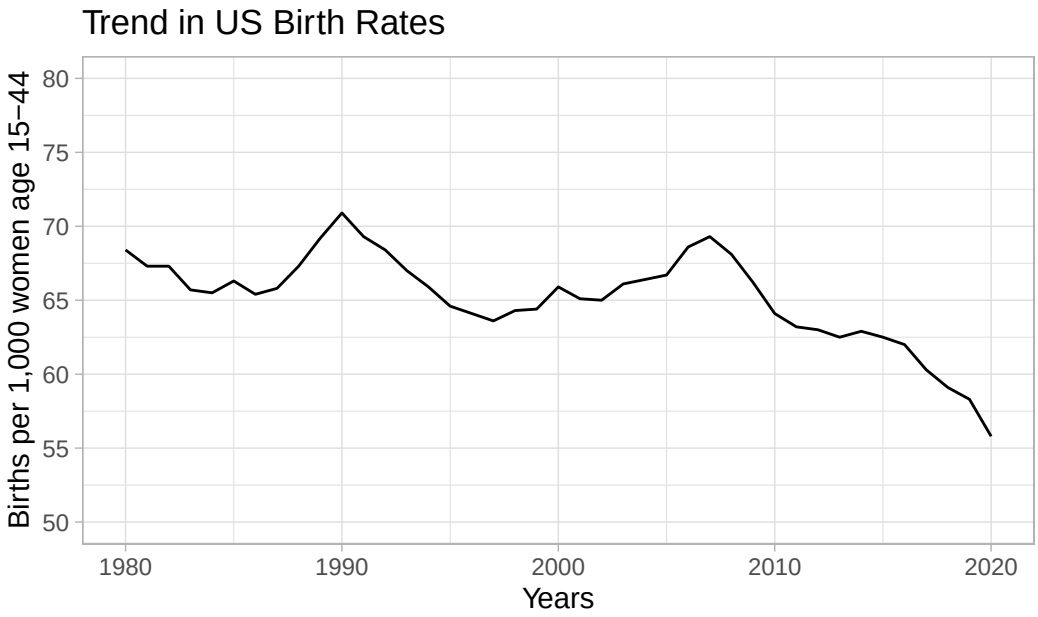

Figure 1: Trends in U.S. Birth rates of 1000 women between age 14 to 44 from 1980 to 2020

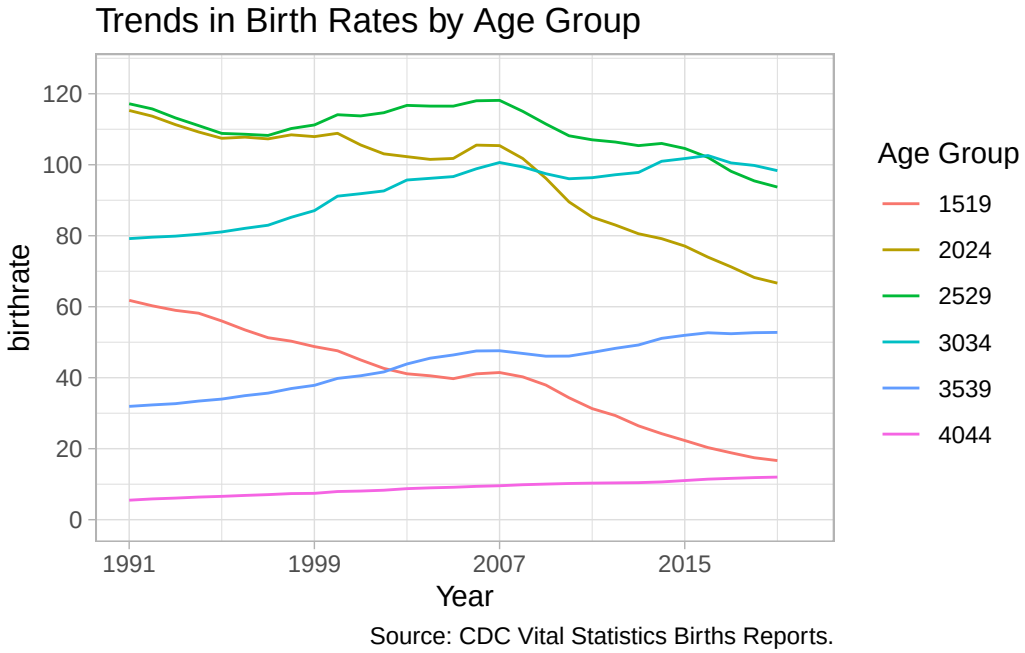

Figure 2: Relationship between Changes in Birth Rates 2004-2008 to 2014-2019

later, or have kids later which is why the trend of birth rates in age 30 and up are going higher from the 2000's. While, the births before the age of 30 tends to slow down and decreasing over time from the 2000's. According to the graph, maybe in another 100 years, we can expect that most birth rates can happen around the age 40-44.

Figure 6. Children Ever Born by Mother's Age and Birth Cohort (Figure 3).

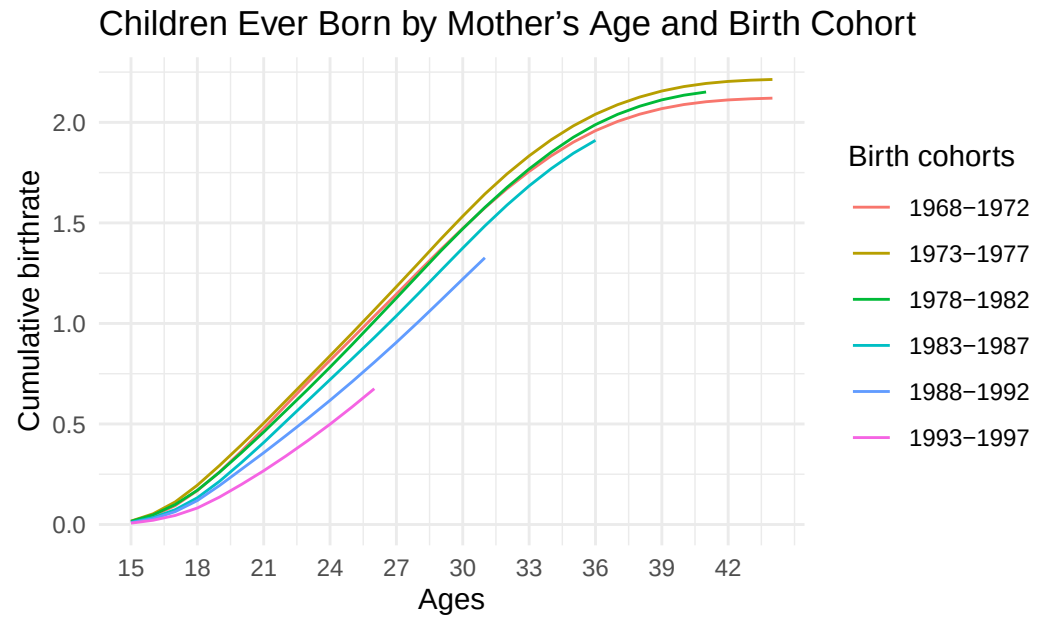

Figure 3: Children Ever Born by Mother's Age and Brith Cohort

4 Discussion

4.1 Birth Rates by Demographic Groups

4.2 Economic and Policy Factors

4.3 A Potential Explanation: Shifting Priorities

When it comes to the age of all the population from the United States and comparing it from the past to now. It shows that more people tend to have kids much later than before. While, less people have kids earlier than the past. During the past, more people tend to have kids much earlier. There are several reasons why more people had kids at early age because back then people use to get marry much earlier, and many people were unemployed or doing a job for self-employment, which was not even an educated or professional job. The modern lifestyle that is being adapted in the past few decades tends to make people to focus on all other areas of life, which makes them to marry much later, and have kids late. Nowadays, many marriages happen at the age of late 20s or early 30s, while they tend to have their first child around early to mid 30s.

4.4 Weakness and Moviforward

4.4.1 Bias and Ethical Concerns

As we know that this data was collected and created by other human beings just as how we are. There are some ethical concerns that could affect the accuracy of our data because humans can make mistakes, they can make decisions based on their preferences, which can affect the whole dataset. So, this analysis is only valid based on our dataset, which can be modified if the original dataset was changed.

According to rhe original data provided which shows different races such as White, Black, and Hispanic. They have included Hispanic based on all colours, which kind of erases the identity of Black and Indigenous Hispanic people. This tends to be a bit racism because the information provided on the data did not specifically indicate whether or not the Hispanic category includes everyone that identifies as Hispanic, or is it just people that look like Hispanic.

4.4.2 Data Collection Concerns

This dataset tends to collect a huge data information of population among the people from the United States, and considers lots of factors from race, birth rates by age, student debts, etc. Having too much information mean that when the data was collected there is a possibility of human error, calculation error, and chances of small modification of data due format of reporting error. So, the way how the data was collected can have lots of problem because people can make mistakes easily.

4.4.3 Movingforward

References

"1997 Fact Sheet - Mothers Education and Birth Rate." 1997. *National Center for Health Statistics*. https://www.cdc.gov/nchs/.

AEA. 2022. *The American Economic Association Portal. The American Economic Association*. https://www.aeaweb.org/.

CDCSEER. 2019. "U.s. Population Data - Seer Population Data." *SEER*. https://seer.cancer.gov/popdata/download.html.

Federal Reserve, New York. 2022. "Center for Microeconomic Data." *Center for Microeconomic Data - FEDERAL RESERVE BANK of NEW YORK*. https://www.newyorkfed.org/microeconomics.

Flood, Sarah, Miriam King, Renae Rodgers, Steven Ruggles, and J. Robert Warren. 2020. "Integrated Public Use Microdata Series, Current Population Survey: Version 8.0." Minneapolis, MN: IPUMS. https://doi.org/10.18128/D030.V8.0.

Kearney, Melissa S., Phillip B. Levine, and Luke Pardue. 2022. "The Puzzle of Falling US Birth Rates Since the Great Recession." *Journal of Economic Perspectives* 36 (1): 151–76. https://doi.org/10.1257/jep.36.1.151.

NCHS. 2018. *NCHS' Vital Statistics Natality Birth Data. NCHS' Vital Statistics Natality Birth Data - MyNBER*. https://data.nber.org/data/vital-statistics-natality-data.html.

R Core Team. 2020. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. https://ggplot2.tidyverse.org.

———. 2021. *Tidyr: Tidy Messy Data*.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Wickham, Hadley, Romain François, Lionel Henry, and Kirill Müller. 2021. *Dplyr: A Grammar of Data Manipulation*.

Wickham, Hadley, and Evan Miller. 2021. *Haven: Import and Export 'SPSS', 'Stata' and 'SAS' Files*.

Xie, Yihui. 2014. "Knitr: A Comprehensive Tool for Reproducible Research in R." In *Implementing Reproducible Computational Research*, edited by Victoria Stodden, Friedrich Leisch, and Roger D. Peng. Chapman; Hall/CRC. http://www.crcpress.com/product/isbn/9781466561595.

Zhu, Hao. 2021. *kableExtra: Construct Complex Table with 'Kable' and Pipe Syntax*.