Potential Factors of Decreasing Birth Rates in the US since the Great Recession and Beyond*

Reproduction of 'The Puzzle of Falling US Birth Rates since the Great Recession'(Kearney, Levine & Pardue, 2022)

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This paper replicates Kearney, Levine, and Pardue's (2022) study on the notable decrease in US birth rates from 2007 to 2020. Analyzing data spanning from 1980 to 2020, we examine variations in birth rates among different age groups and disparities based on the race and ethnicity of mothers. Our analysis uncovers additional factors contributing to this trend beyond the initial attribution to the Great Recession. Specifically, socio-economic factors such as contraceptive use, cultural norms, and financial stability play key roles in the observed decline in birth rates.

1 Introduction

According to the Centers for Disease Control and Prevention (CDC), the birth rate is defined as "the number of live births per 1,000 population." This rate is calculated by dividing the number of live births in a population in a year by the midyear resident population. Specifically, for census years, rates are calculated based on the unrounded census counts of the resident population as of April 1st.

From an economic perspective, birth rates are a vital determinant of a country's growth. Recent years have seen widespread concern over declining birth rates globally, prompting nations to explore strategies to address this issue. For example, in 2024, Germany's birth rate is reported as 9.3, lower than Canada's 10.0 and the US's 12.0 (Macrotrends 2024). Germany is taking action by actively recruiting skilled workers from abroad (Grunau 2023) and reforming

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its citizenship law to allow dual citizenship (Knight 2024) as measures to combat declining birth rates and overall population decline.

Furthermore, birth rates serve as an indicator of replacement-level fertility, essential for maintaining population stability in developed nations. Replacement-level fertility is the level of fertility at which each generation is exactly replaced by the next generation without any population growth or decline. It's typically estimated to be around 2.1 children per woman in developed countries, accounting for factors like infant mortality and individuals who don't reproduce. When birth rates fall below this threshold, it can lead to population decline, aging populations, and potential economic challenges.

The estimand, or the target of estimation, in this context is the birth rate itself – specifically, the average number of live births per 1,000 population over a specified period. Understanding and accurately estimating this estimand is crucial for assessing population dynamics and informing policy decisions aimed at addressing declining birth rates.

Two economists, Melissa S. Kearney and Phillip B. Levine, along with Luke Pardue, a PhD Candidate in Economics, authored a paper addressing the dramatic decline in birth rates in the United States between 2007 and 2020 and proposed possible explanations. They examined the overall reduction in the birth rate among various population groups of women, including teens, Hispanic women, and college-educated white women. While they attributed the main cause of the decline in the early part of the period to the Great Recession, they were unable to identify any other economic, policy, or social factors that have changed since 2007 to support the decline beyond the Great Recession (Kearney, Levine, and Pardue 2022). This paper aims to replicate and expand upon their study by examining additional factors influencing birth rate trends in the US. In particular, it explores the perspectives of various population subgroups, analyzing data by age groups and race/ethnicity to gain deeper insights.

This paper utilizes a replication package of the original study and employs a cleaned data CSV file to reproduce the related figures and tables. While the original code in the replication package was written in Stata, this paper utilizes R (R Core Team 2020) for analysis, leveraging packages such as ggplot2 (Wickham et al. 2016) for creating graphical representations. Additionally, the gridExtra package was used to enhance the layout and presentation of the figures (Murrell 2021).

The paper proceeds by first presenting the trend in US birth rates over the period 1980 to 2020. It then delves into variations in birth rates by age group and race/ethnicity of mothers, correlating these trends with education, socio-economic factors, and financial stability. The replication of Kearney, Levine, and Pardue's study focuses on answering the following research questions:

- What is the trend in US birth rates from 1980 to 2020?

- How do birth rates vary across different age groups?

- How do birth rates differ based on the race and ethnicity of mothers?

Through this comprehensive analysis, we aim to contribute to a better understanding of the complex factors influencing birth rate trends in the United States.

2 Data

2.1 Methodology

The data on the trend in US Birth Rates, measured as births per 1,000 women aged 15-44 from 1980 to 2020, was sourced from the CDC Vital Statistics Births Reports for the years 2015, 2019, and 2020 (Martin and Mathews 2017; Martin and Driscoll 2021). Additionally, trends in Birth Rates by Population Subgroup, specifically birth rates categorized by age group, race, and ethnicity, were gathered from the CDC Vital Statistics Births Reports. The original paper utilized single-age population counts across all races from 1969 to 2019 and by race and Hispanic origin from 1990 to 2019, sourced from the CDC SEER database (CDC NCI 2021). The data is freely available at https://seer.cancer.gov/popdata/download.html, with raw files located in the data/pop/ folder of the original replication package.

2.2 Features

The de facto population of women of reproductive age spans from 15 to 49 years in a country (World Health Organization 2024). The average age of the final menstrual period (menopause) is 51, and for women in their 40s, pregnancy is rare but not impossible (ASRM 2012). Beginning in 1997, the birth rate for the maternal age group 45-49 includes data for mothers aged 45 and over in the numerator and is based on the population of women aged 45-49 in the denominator (National Center for Health Statistics 2023). Thus, the women population in the age group 45-49 is excluded in this paper, although they fall under the reproductive age group category. Birth data comprises births per 1,000 women aged 15 to 44 over the 40-year period from 1980 to 2020.

In this paper, data validation is conducted using an R script file named '03-test_data' to ensure the accuracy of the dataset obtained directly from the original package. The paper utilizes both 'fig_1' and 'fig_2a_2b' CSV files.

In the dataset, 'brate_all' represents the birth rates of all women aged 15-44 in the US. 'Brate' is an abbreviation for 'birth rates'. For example, 'brate_1519' corresponds to the birth rate data for women aged 15 to 19 years old, irrespective of race and ethnicity. Similarly, 'brate_whitenh' represents the birth rates of white, non-Hispanic women, regardless of age.

Regarding race and ethnicity, "white" refers to the non-Hispanic Caucasian population group, "black" refers to the non-Hispanic African American group, and "Hispanic" refers to individuals with Hispanic ethnicity, primarily from South America, for brevity.

3 Results

3.1 Trend in US Birth Rates

The overall trend in US Birth Rates fluctuates over time, with the highest number of births recorded in 1990 at a rate of 70.9. The second-highest peaks occurred in 1991 and 2007, with rates of 69.3. These peaks are accompanied by valleys. However, the difference between the birth rates in 1980 and 2020 is 12.6, and the gap between the maximum and minimum points during this period is 15.1. These calculations clearly demonstrate the variation over time and suggest that there may be factors influencing the gradual negative slope of the trend. Figure 2 presents the scatter plot version of Figure 1, providing a clearer representation of the negative trend observed in the line graph. Lastly, the year 2007 has been marked with a dotted line to signify the beginning of the fall on both graphs.
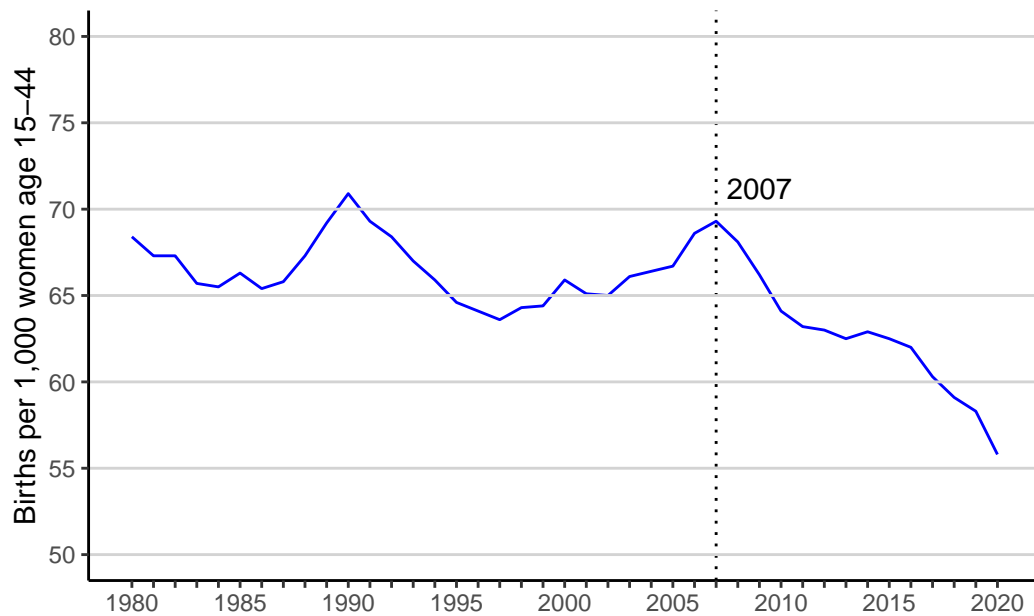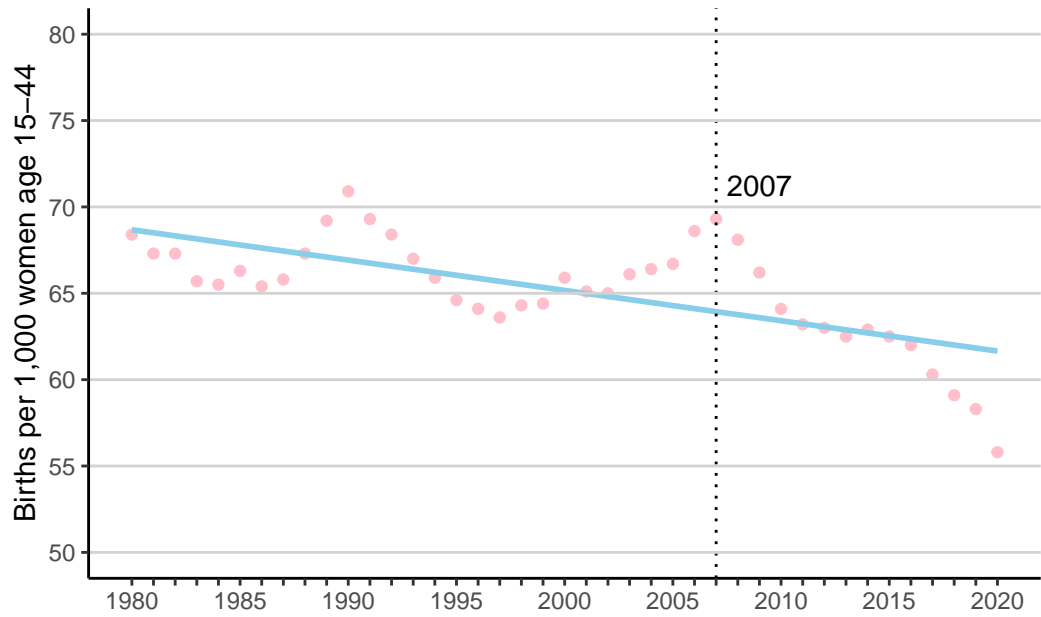

Source: Birth Rates collected from CDC Vital Statistics Births Reports for 2015, 2019, and 2020.

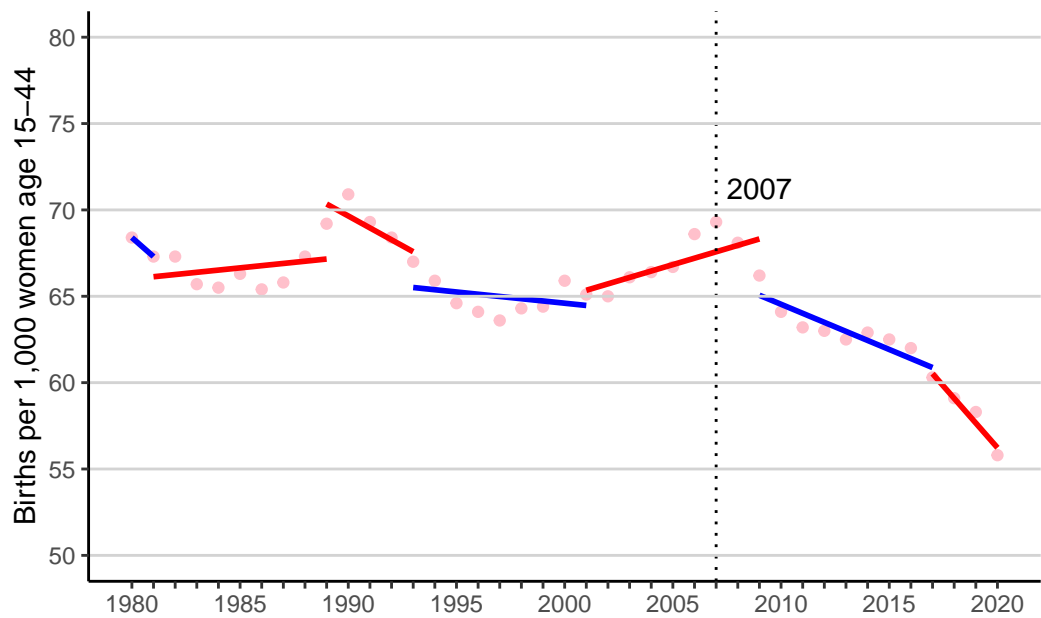Figure 1: Trend in US Birth Rates

3.2 Trends in Birth Rates by Population Subgroup

Figure 4 consists of two panels, each representing distinct aspects of the data. Panel Group A is dedicated to depicting birth rates across five-year age groups, while Panel Group B illustrates birth rates by race and ethnicity for women aged 15 to 44.

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Source: Birth Rates collected from CDC Vital Statistics Births Reports for 2015, 2019, and 2020.

Figure 2: Negative Trend in US Birth Rates

Source: Birth Rates collected from CDC Vital Statistics Births Reports for 2015, 2019, and 2020.

Figure 3: Trend in US Birth Rates During the Presidential Mandate

Both plots feature the year on the x-axis and births per 1,000 women in the respective population subgroup on the y-axis. In Group A, six different lines delineate the birth rates across five-year age groups from ages 15 to 44. The onset of the Great Recession is denoted by a dotted vertical line on both panels. Notably, while birth rates significantly decreased after 2007 for women aged 15 to 29, older age groups over 30 exhibited ascending trends regardless of this economic event. Additionally, the age group 15-29 showed a downward slope from 1980 until reaching its peak in 1991.

It is important to note that the data set for race and ethnicity subgroups is available from 1989 onwards, hence the x-axis of the graph starts from 1989. In Panel B of Figure 4, three distinct subgroups are presented: Hispanic, Black, and White. Both the White and Black subgroups represent non-Hispanic populations. While the birth rates for the White population group display a relatively linear trend over 30 years, Hispanic and Black population groups exhibited birth rates 1.7 times and 1.3 times higher than the White population group, respectively, until 2007. The birth rates of Hispanic and Black population groups experienced significant drops over the 11-year period from 1989 to 2000, followed by another significant decrease as of 2007, observed only in the Hispanic population group. The change in births per 1,000 women in race and ethnicity population subgroups varied, with declines of 7.3, 25.8, and 42.1 in the White, Black, and Hispanic groups, respectively. As of 2012, all race and ethnicity population groups exhibit a relatively stable trend with a gradual decline.
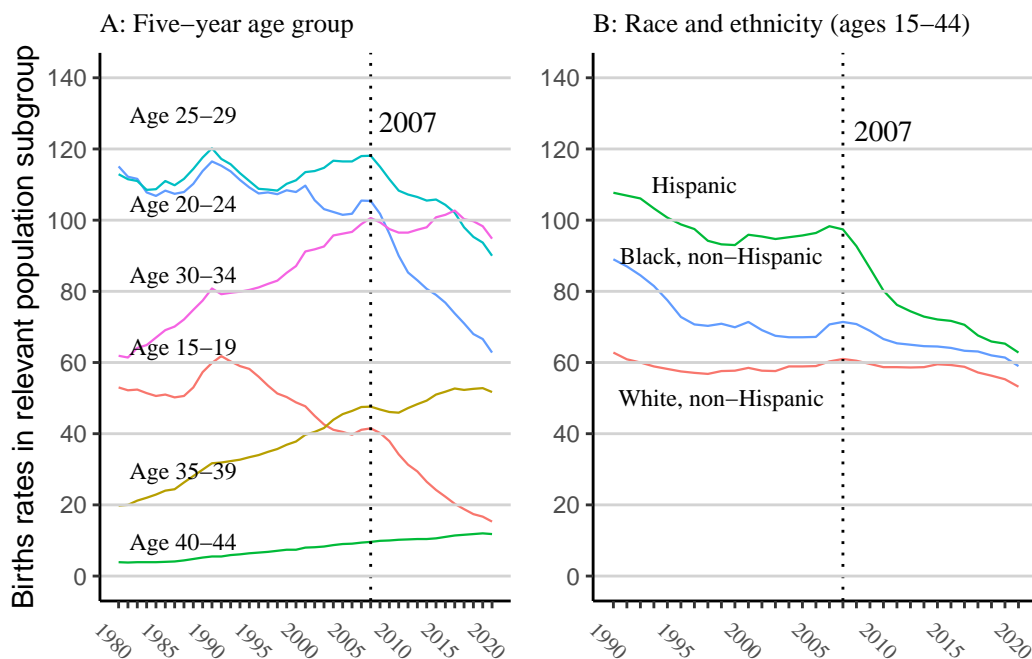

Figure 4: Trends in Birth Rates by Population Subgroup

4 Discussion

4.1 Findings

Figure 3 displays multiple trend lines representing US birth rates during presidential mandates, with each line corresponding to the political party of the president. The trend lines are color-coded, with blue indicating Democrat and red representing Republican presidencies. A notable observation from the analysis is a radical drop in birth rates during Republican presidential mandates, whereas Democrat presidential mandate periods illustrate a relatively moderate declining tendency.

In panel A of Figure 4, the trend indicates that the proportion of US women using contraceptive methods increased from 56% in 1982 to 60% in 1988 and further to 64% in 1995. These trends in contraceptive use have implications for downward shifts in pregnancy rates, which ultimately affect birth rates (Piccinino and Mosher 1998). Additionally, states began passing parental involvement laws to limit minors' confidential access to abortion (Myers 2022). This means that although judicial precedent established in 1980 allowed minors to consent to abortion services in the absence of valid restrictions, by 1980 minors faced limitations on abortion, possibly leading to increased usage of contraceptive measures to prevent pregnancy. The ascending patterns observed in the age group over 30 can be attributed to advancements in healthcare and financial stability.

According to an article from the Journal of the National Medical Association, many Hispanic people in the United States retain the customs and traditions of their country of origin. As a result, their use of preventive healthcare measures is lower than that of the majority of the population. Moreover, Hispanics often marry and start a family earlier than the average US citizen, resulting in a higher birth rate and fertility rate (number of live births per 1,000 women aged 15 to 44 years) than the average. Additionally, Hispanic culture expects women to bear children, and abortion, adoption, and artificial insemination are less acceptable to Hispanics than to the average American (Poma 1987). This explains why Hispanic birth rates were much higher compared to other population groups in panel B of Figure 4.

Another interesting factor could be Christianity. Including Protestants and Catholics, Christians generally oppose the idea of abortion and view it as morally wrong. They also oppose contraceptive use outside of marriage, as religious groups tend to be socially conservative. However, there has been a shift in religious activities among young Americans. In the early 1990s, about 90% of US adults identified as Christians. Over time, however, young Americans are now less likely to become or remain Christian (Pew Research Center, 2022). In 2020, the unaffiliated group comprised the largest portion of the American religious landscape, accounting for 23% (PRRI, 2020). This change in religious activity could explain the reason why the birth rate is decreasing for all race and ethnicity groups over the period. Regardless of religion, people engage in sexual activities before marriage, but as the population with religious affiliations becomes more unaffiliated, they are free to use contraceptives and seek abortion if necessary.

4.2 Ethical Implication

It's important to note that beliefs and practices related to abortion, contraceptive use, and sexual activity before marriage can vary within and among different religious groups. Additionally, individual beliefs and practices may not always align perfectly with the official teachings or doctrines of a particular religious tradition.

4.3 Limitation

Beginning in 1997, the birth rate for the maternal age group 45-49 includes data for mothers aged 45 and over in the numerator and is based on the population of women aged 45-49 in the denominator (National Center for Health Statistics, 2023). However, since the dataset is missing data for the population of women aged 45-49 before 1997, and the paper covers the period from 1980 to 2020, the population subgroup of women aged 45-49 is eliminated from the analysis.

Additionally, the population subgroups can become increasingly mixed over time, making it difficult to accurately classify individuals into distinct racial categories. Therefore, it is unclear whether individuals classified as Hispanic, Black, or White remained purely within those categories throughout the period studied.

As a result of these factors, the data may be skewed, and caution should be exercised when interpreting the results.

4.4 Future Research

For future research, exploring additional aspects of society such as political demographics, immigration law, and enforcement, based on the trends observed in Figure 3, could provide valuable insights. Understanding the potential impact of immigration laws and campaign promises during presidential mandates on birth rates could enhance our understanding of the factors influencing demographic trends. Further exploration of these topics could contribute to a deeper understanding of the broader societal context surrounding birth rate trends in the United States.

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