My title*

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Lantao Cui Huakun Shen Sijian Wu

27 February 2022

Abstract

This paper is based on Kearney's paper The Puzzle of Falling US Birth Rates since the Great Recession Between 1980.[1] (Kearney, Levine, and Pardue 2022) During the Great Recession, US birth rate varied between a tight range of roughly 65 to 70 birth per 1000 women between the age of 15 to 44. However, after the Great Recession, the birth rate started to decline significantly, it dropped by nearly 20 percent in 13 years. In this paper, we aim to find out the reason behind the decline, all of the data are collected from the CDC Vital Statistics Births Reports. Our findings can help to understand the reason behind the drop.

1 Introduction

The Great Recession has been a world-wide crisis that reconstructed the economy, and was deep, synchronous and global. Canadian GDP dropped by 3.3 percent, US GDP by close to 4 percent, that of the Euro area by 5 percent and that of Japan by more than 8 percent. The impact on international trade has been severe that all G20 countries experienced serious reductions in trade(Michael Hart 2010). Although it is difficult to compare across countries since policy context, society norms and cultural preferences tend to differ, it is never possible to separately consider the effects on each country even after recovery.

In the United States, unemployment rates, mortgage foreclosures, and poverty rates rose while housing values fell, but the extent of these changes varied widely across local areas. Another impact from depressed economic condition is delayed childbearing, and others to hasten it. The fertility rate declined at the national level, dropping from a recent high in 2007 of 69.5 births per 1,000 women aged 15 to 44, to 63.2 for 2012.1 There was, however, great variation by state, age, and ethnicity, with younger and Hispanic women showing disproportionate decreases(Christine Percheski 2017). The significant consequence on fertility rate would make us wonder how severe is America being affected by the great recession. However, by comparing currency devaluations, equity market declines, and rising sovereign bond spreads, the U.S. is the third leas affected country(URI DADUSH 2009).

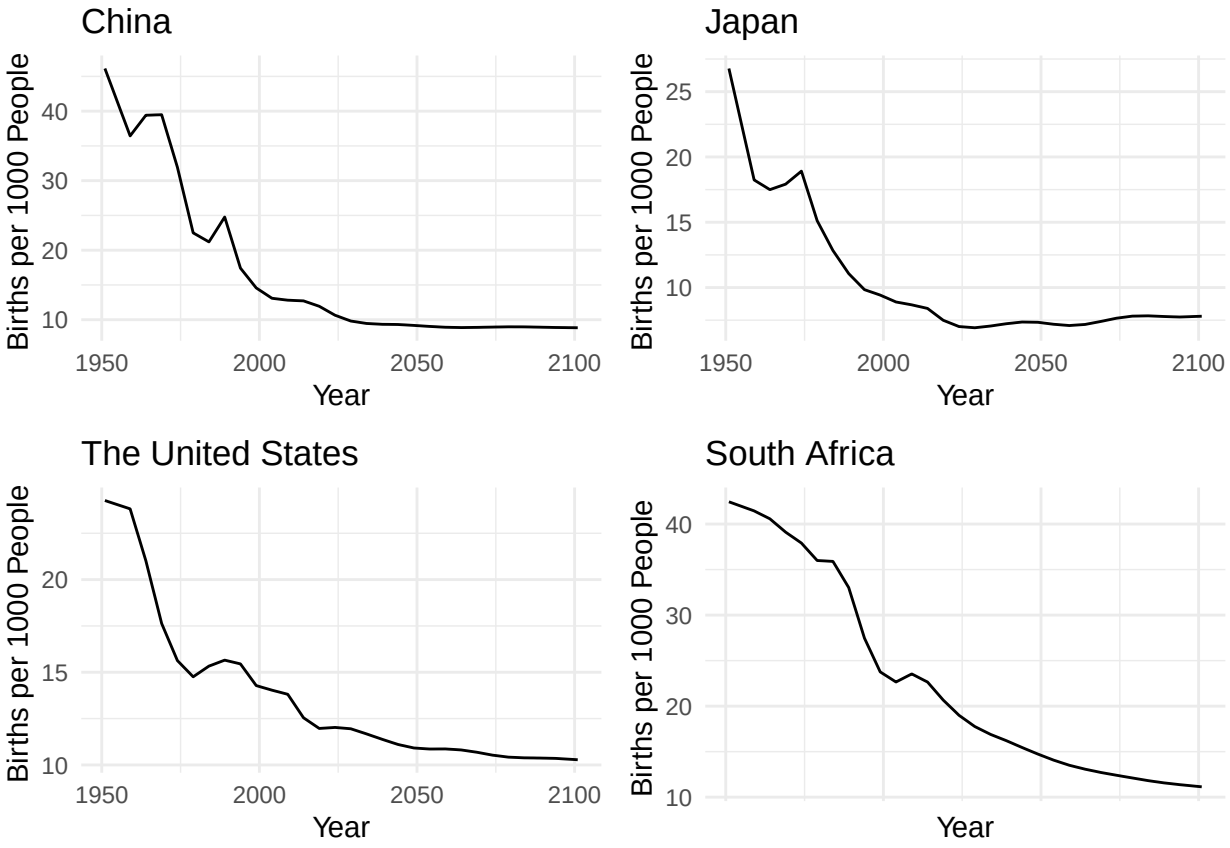
Prior research suggests that stress may be linked to riskier sextual activity. Financial hardship and poverty can negatively affect cognitive function, and shorten the time horizons over which individuals make cost-benefit determinations. Alternatively, fertility may be unaffected by economic conditions if cultural norms related to the context and timing of births are particularly influential. For example, non-marital births are more socially consequential for some racial and ethnic groups, and in some geographic areas. For some individuals, these social norms may outweigh any economic considerations(Christine Percheski 2017). The same consideration of religious belief could also be applied to other countries.

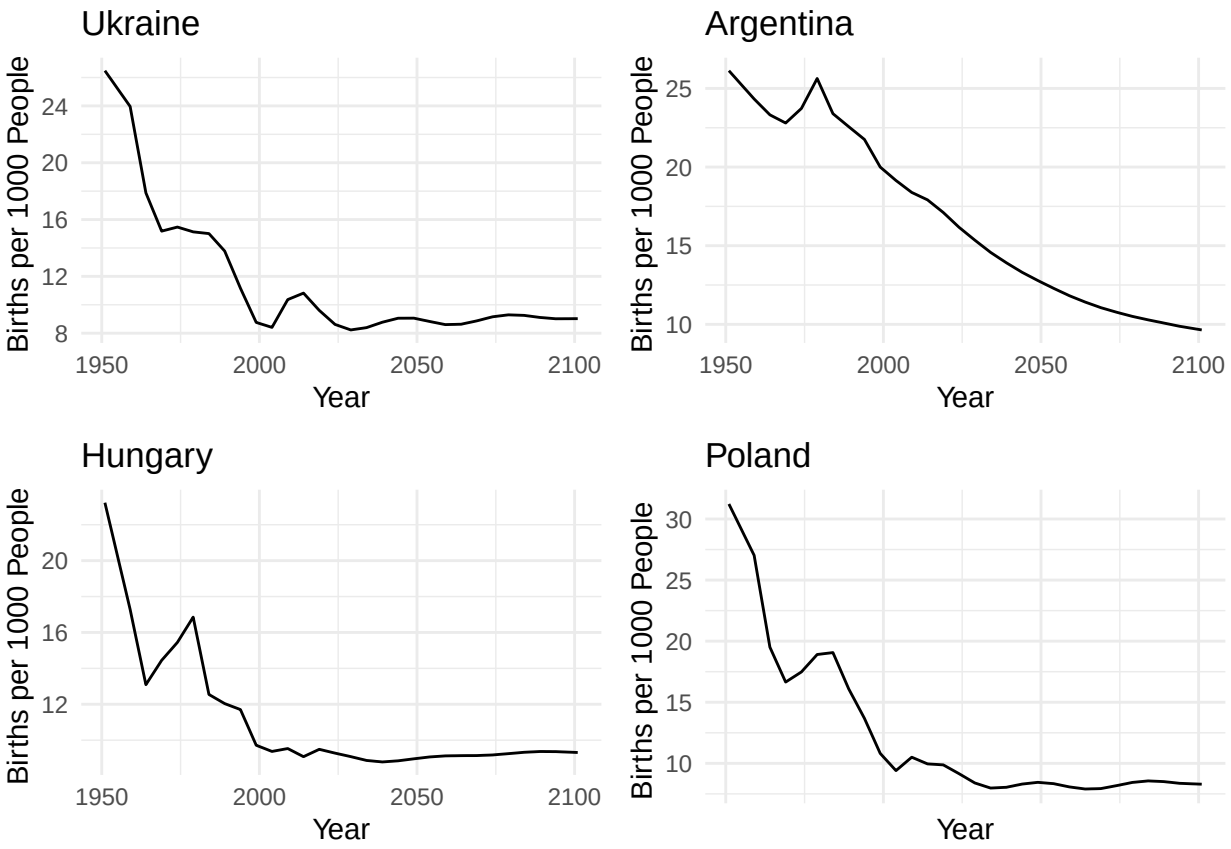
*Replication avaliable at https://doi.org/10.48152/ssrp-mbxx-jm47. Code and data avaliable at https://github.com/cuilantao/STA304-Paper-2

[1]Original paper available at: https://www.aeaweb.org/articles?id=10.1257/app.2.2.95

2 Data

We started our analysis by using R (R Core Team 2020), dplyr(Wickham et al. 2021), tidyverse(Wickham et al. 2019). Graphs are generated using ggpubr(Kassambara 2020) and ggplot2(Wickham 2016).





3 Model

4 Results

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 LGBT Section

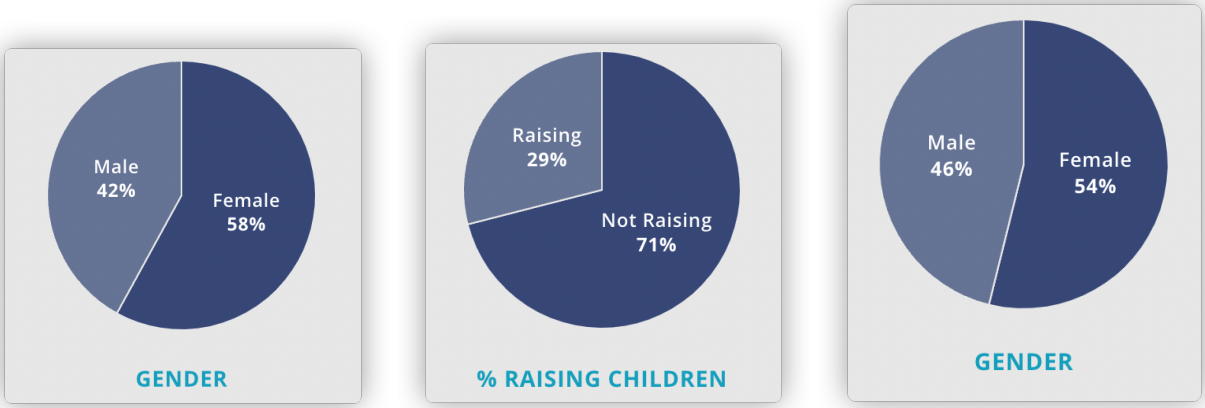
The percentage of LGBT (and many other genders) has risen in recent years in the US, probably related to propaganda and political correctness.

Since there is not much data for other genders, and LGBT are the majorities, we will focus on LGBT population and the potential effect they bring to birth rate.

LGBT is the acronym of the following 4 genders, **L** for Lesbian, **G** for gay, **B** for bisexual, **T** for transgender. By definition, these genders by definition should have a much lower birth rate than heterosexual. Then change

in birth rate and change in LGBT population should have a negative propotional relationship (i.e. Growth in LGBT population leads to lower birth rate). Thus, the population changes in these population are very likely to make an impact on the birth rate of the US.

If we assume the simpliest case where we ignore race, gender distribution (equal percentage of male and female) and all other factors, and assume that no LGBT or same sex couple population give birth to a child, then there would be a perfect correlation (perfectly proportional) between LGBT population change and birth rate (i.e. a $x\%$ increase in LGBT population could lead to $x\%$ decrease in birth rate). Let's define $\phi = \frac{\Delta BirthRate}{\Delta LGBTPopulation}$ and call ϕ the BirthRate-LGBT coefficient for convenience. If we take other factors into account, the impact to birth rate could be even larger (i.e. $\phi < -1$).



(a) LGBT Gender Distribution (b) LGBT Percentage Raising Children (c) Same Sex Couple Gender Distribution

Figure 1: Gender Distribution and Percentage Raising Children Distribution

Figure 1 shows the gender distribution of LGBT and Same Sex Couple as well as the percentage raising children. Figure 1 (a) and Figure 1 (c) clearly shows that more females are non-heterosexual. This should make a even larger impact ($\phi < -1$) on birth rate as only females are able to give births (in normal situations).

Figure 1 (b) shows the percentage of LGBT population that raise children. 71% of the LGBT population don't raise children.

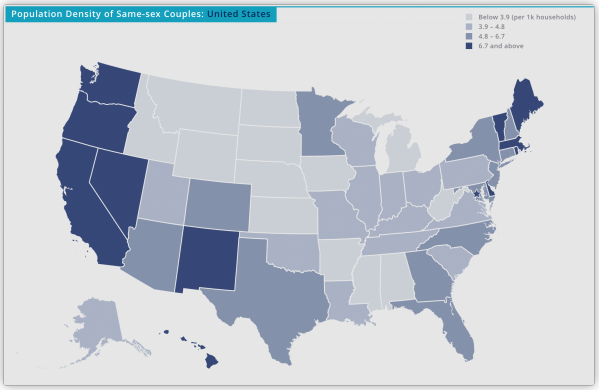
Figure 2 shows the population density of Same Sex Couple and LGBT by States, and birth rate distribution by State. Darker color means higher density or higher negative change in birth rate. From these plots we can see that the states with higher LGBT density and same sex couples generally have higher negative change in birth rate. We cannot conclude whether LGBT population has a large impact on US birth rate based on these plots yet, but there should be some correlation between birth rate and gender identity of Americans.

From 3 we can see that White population takes up the majority of the population of LGBT and Same Sex Couple. White is also the majority of the population of the US. Thus, larger LGBT population could lead to a even larger decrease in birth rate ($\phi < -1$).

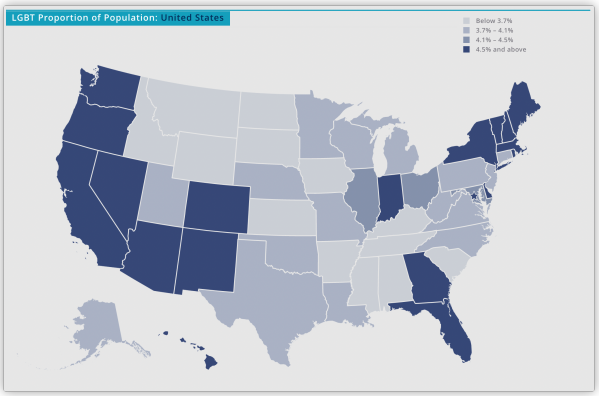
From 4 (a) we can see that most same sex couples fall in the age group 25-64. This period overlaps with the majority of the childbearing age. From 4 (b), we can see that LGBT population decreases as age increases starting from the age or 18, which is the beginning of women's childbearing age. These 2 evidences also growth of LGBT population could lead to a larger decrease in birth rate ($\phi < -1$).

With these information, we can conclude that the growth of LGBT population is able to cause a negative change in birth rate.

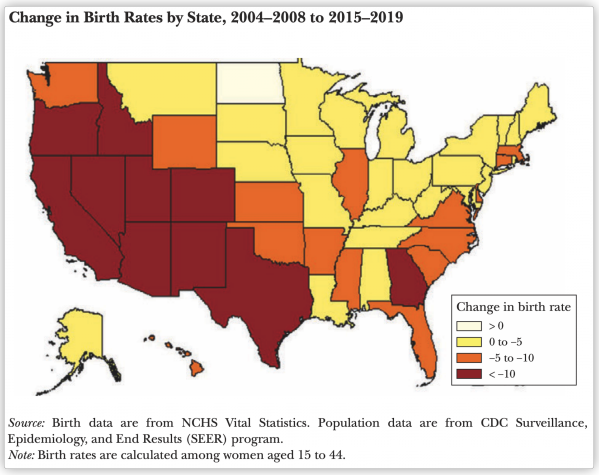
Figure 5 shows some Socioeconomic Indicators classified by sexual orientation (LGBT or not), such as employment status, income level education level, and whether or not being insured and food insecure. Darker color represents LGBT, lighter color represents non-LGBT. From the plots, we can extract some



(a) Same Sex Couple State Density

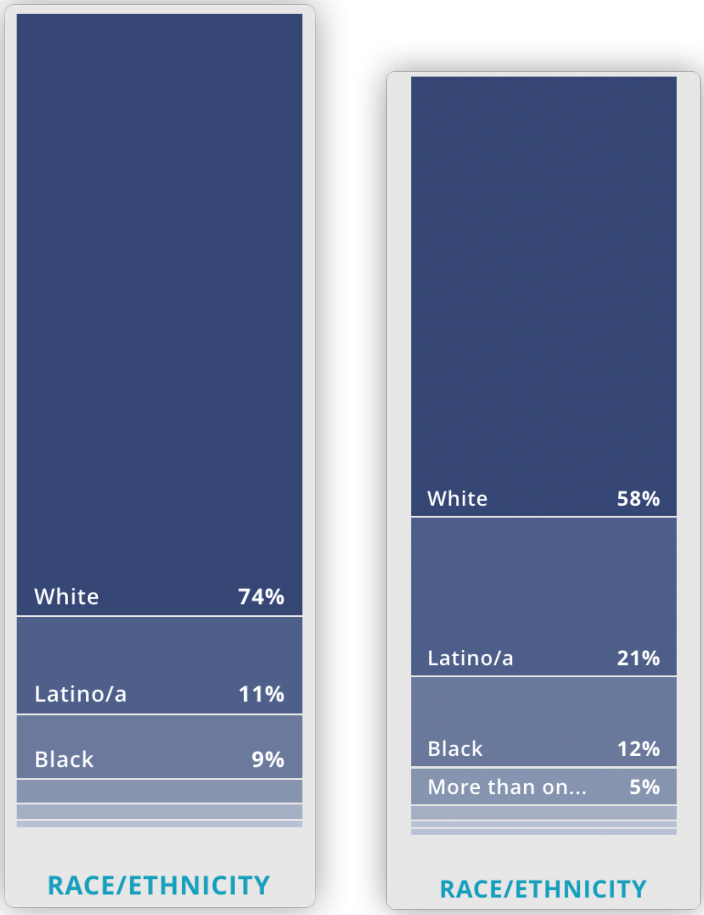


(b) LGBT State Density



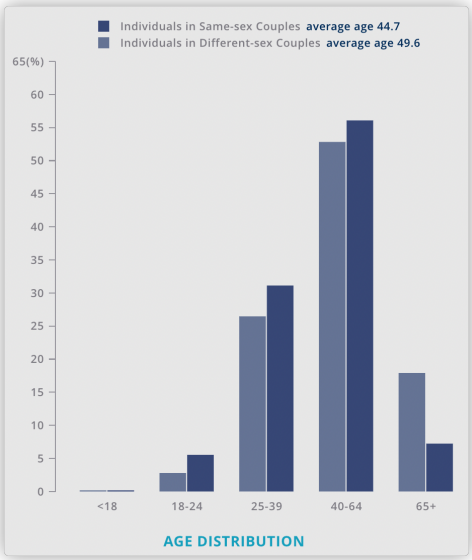
(c) Birth Rate Distribution by State

Figure 2: Density by State

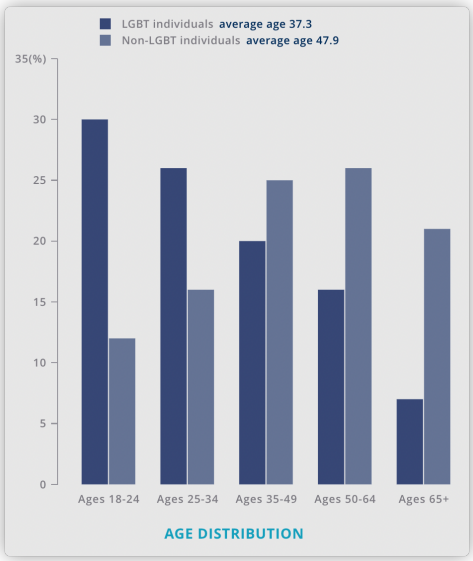


(a) Same Sex Couple Race Distribution (b) LGBT Race Distribution

Figure 3: Race Distribution



(a) Same Sex Couple Race Distribution



(b) LGBT Race Distribution

Figure 4: LGBT and Same Sex Couple Age Distribution

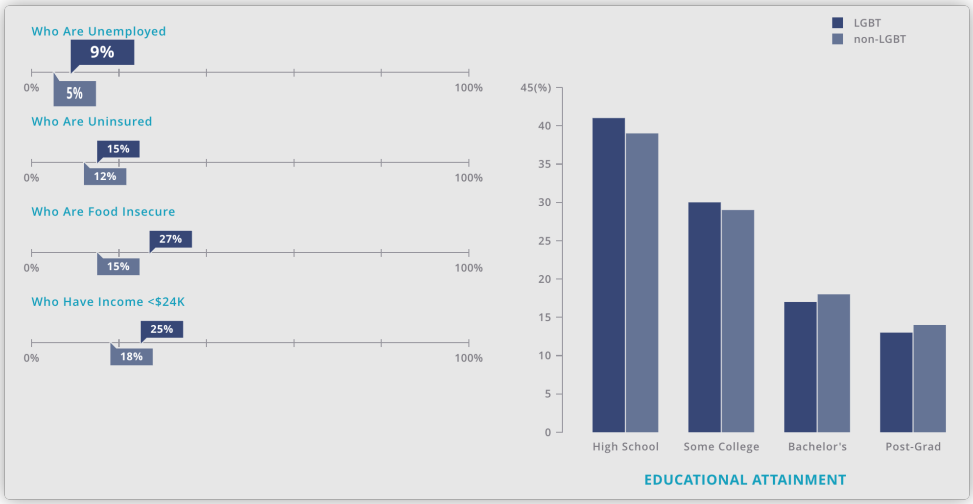


Figure 5: Socioeconomic Indicators

socioeconomic indicators of LGBT. Comparing to non-LGBT population, LGBT are more likely to be unemployed, uninsured, being food insecure, having a low income (lower then $24k), and having a lower education level (percentage of LGBT population with Bachelor's or post-grad degree is lower than that of the percentage of non-LGBT population).

Appendix

A Additional details

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