"A Reason to Wait: The Effect of Legal Status on Teen Pregnancy"
A Replication Project

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1   Introduction

Undocumented immigration status, as well as being a cause of marginalisation and precariousness, is linked with diminished economic opportunities and early school dropout rates. With birthright citizenship being a proven method to prevent deportation, one might wonder whether legal status is a factor in childbearing decisions of young immigrants. Using the DACA program as a natural experiment, the researchers Elira Kuka, Na'ama Shenhav, and Kevin Shih study the impact of legal status on teenage fertility among Hispanic immigrants in the USA.

DACA, or the "Deferred Action for Childhood Arrivals" program, was established in 2012 by Barack Obama, with the objective to protect young, undocumented migrants who entered the United States unlawfully prior to their 16th birthday by June 2007 among other eligibility criteria. It provides temporary relief from deportation for 2 years and offers support to these undocumented youths with administrative efforts such as obtaining their driver's licence, social security, and work authorization.

The study carried out in this paper is particularly interesting as it dives into a previously unexamined aspect of the impact of DACA. Previous research has focused on DACA's effect on factors such as education, employment, and health outcomes, whereas this paper investigates how DACA affects Hispanic teenage pregnancy rates. Understanding how DACA affects teenage pregnancy rates provides valuable insights for policymakers and advocates working on immigration and reproductive health issues. The study's findings can inform discussion on the broader societal impacts of immigration policies and underscores the importance of considering immigration status in addressing reproductive health disparities.

In this paper, we will replicate the methods used by Kuka et.al in addition to some of our own additional analyses, to answer the research question of whether legal status has an effect on teenage fertility rates among the Hispanic population in the United States.

2   Econometric model - Difference-in-differences

This paper raises two questions:

1. How does legal status affect teen pregnancy ?

2. How does legal status affect sexual behaviour and pregnancy prevention ?

To answer these questions, the authors used a difference-in-differences estimator. This strategy requires two dimensions:
  - The group dimension, which is defined as the citizens and the non-citizens of our sample.
  - The time dimension, which is before and after the implementation of DACA in 2012.

2.1 How does DACA affect teenage fertility ?

The estimation equation is:

$$Y_{iagst} = \alpha_0 + \alpha_1 Elig_g + \alpha_2 Elig_g \cdot Post_t$$
$$+ \rho\prime X_{ig} + \gamma_{st} + \phi_{ag} + \epsilon_{iagst}$$

With:
- Y: the measure of fertility for individual i, with eligibility status g, that entered the US at age a, living in state s in year t.
- Elig: indicator for non-citizens (dummy variable taking 1 if eligible, and 0 otherwise)
- Post: indicator for 2012 onward (the year of the implementation of DACA)
- X: control variable, taking into account the age-by-year and the year of entry
- Fixed effects gamma and phi: state-by-year and age-of-arrival-by-eligibility fixed effects. State-by-year allows to absorb state-specific shocks, and age-of-arrival allows to account for cohort effects.

The interaction between Eligible and Post, captured by the coefficient Alpha 2, provides the average effect of DACA after 2012.

They estimate three fertility outcomes: any children, number of children, and whether the individual had a child born in the last year.

The first assumption that needs to be verified in order to have an unbiased estimation is the **Parallel Trend Assumption**. In **Figure 1**, the authors plotted the share of young female Hispanic immigrants that are childless, given their citizen status. We can attest visually that the assumption has been verified, since the two groups followed parallel trends prior to 2012. In order to check the validity more rigorously, we decided to carry out a placebo test (to be found in the additional analysis section).

The second assumption is the **Stable Unit Treatment Value Assumption**. Since the authors focus on a sample of Hispanic teens between the age of 15 and 20 that arrived in the US by age 10 and by 2007, it minimizes changes in the composition of both the treatment and the control groups. Since the control group is composed of legal immigrants and the "treatment" provides legal status (thus something the control group already has), the interactions between the two groups can't have an impact on the outcome of the treatment. Thus no interaction effect can counter the stable unit value assumption. What's more, the only anticipation effect that we could think of is the incentive to stay in school. Indeed, one of the criteria to qualify for DACA is to have graduated or to still be in high school. The individuals might anticipate the "treatment" and remain in school. However, as this is one of the goals of DACA, this potential anticipation effect might not cause a significant bias in the estimation.

2.2 How does DACA affect sexual behaviour and pregnancy prevention ?

This time using the answers of the Youth Risk Behavior Surveillance System, the authors estimate the effect of DACA on sexual behaviour the same way as with fertility, with this equation:

$$Y_{ist} = \alpha + \beta_1 HiShareElig_s \cdot Post_t$$
$$+ \gamma_s + \gamma_t + \epsilon_{st}$$

Y corresponds to sexual behavior, which can be defined multiple ways, such as the contraception used during the last sexual act. Since the surveillance system doesn't collect citizenship status, the equation is a little different than the first one. Here, HiShareElig is an indicator for having above median share eligible in state s among the Hispanic population ages 14 to 18 between 2005 and 2011. Thus, this model estimates the effect of legal status on the state level.

However, there is a potential selection bias in the estimation due to the data, because the surveillance system only has answers from highschoolers. Since DACA increases the probability of remaining in school, there is thus a selection bias in the estimation of sexual behavior. If the system could target every young teenagers age 14 to 18, the estimation wouldn't be biased anymore.

3   Data and sample

The research study utilised two datasets, both of which are temporal. The two datasets used provided comprehensive information on various demographic, socioeconomic and behavioural factors relevant to the study.

The first database is the American Community Survey which is a nationwide survey conducted annually by the U.S. Census Bureau. It collects detailed demographic, economic, social and housing information from a representative sample of the US population. This dataset includes variables such as age, gender, race/ethnicity, educational attainment, employment status, income, household composition, immigration status, and geographic location (state of residence) which are needed for this study. The ACS dataset covers the period from 2005 to 2015, capturing data before and after the enactment of DACA in 2012.

The second database is the Youth Risk Behaviour Surveillance System (YRBSS) which is a nationwide survey conducted biennially by the Centers for Disease Control and Prevention (CDC). This survey collects data on health-related behaviours among high school students in the United States. The variables from this dataset used in this study provides information specifically on Hispanic high school students' behaviours related to sexual activity such as sexual debut, frequency of sexual relationships, contraceptive use, and other risk behaviours such as substance use. The YRBSS dataset covers the period from 2005 to 2015, allowing researchers to examine changes in sexual behaviour among Hispanic high school students over time.

Both datasets are used widely in public health and social science research to examine various health-related behaviours and outcomes among different population groups in the United States. In this study, they are utilised to assess the impact of DACA on teenage fertility decisions and explore changes in sexual behaviours among Hispanic adolescents.

4   Descriptive statistics

4.1   Likelihood of Having No Children Among Hispanic Youths, by Citizenship Status

The replication of **Figure 1** of the original paper presents the share of young Hispanic immigrants that are childless, for each year of the data base. This figure reveals multiple pieces of information. The gap between citizens and non-citizens is the first remarkable observation: in 2005, around 90% of teenage legal immigrants did not have a child, while it was 84% for illegal immigrants. That difference between the two groups explains the interest of policy makers and the authors in the impact of legal status on teenage fertility. What's more, this figure can be used to verify the Parallel Trend Assumption, as we can argue that the two groups followed similar patterns before 2012. Lastly, the gap reduces notably after 2012, but we'll come back to this point later on.

4.2   Mean number of children of young Hispanic immigrants

In **Figure 2**, as an additional descriptive statistic, we computed the mean number of children of young Hispanic immigrants, while taking into account all the observations, i.e. keeping in the computation the childless immigrants. We can observe a significant gap between citizens and non-citizens, that is diminishing after 2012. This is a complementary figure to Figure 1, as it depicts similar information.
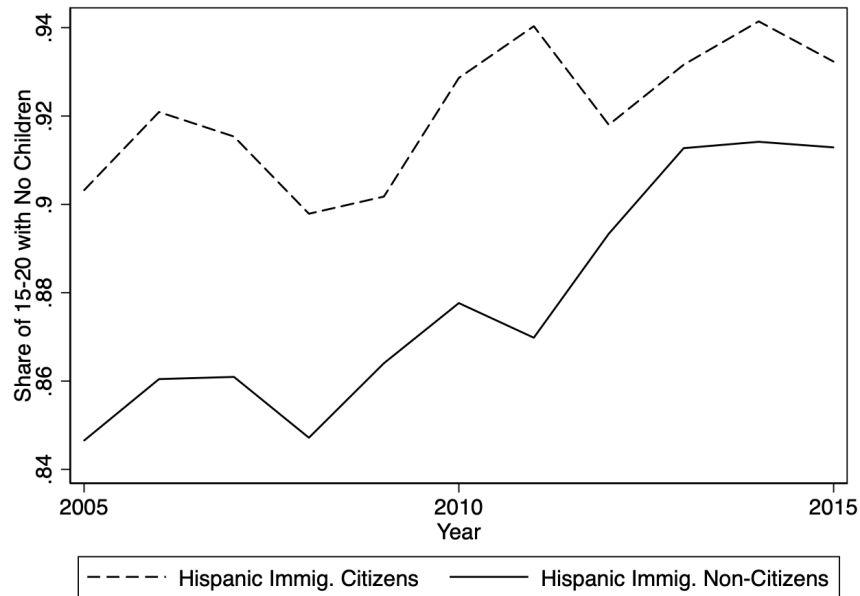
Figure 1: Likelihood of Having No Children Among Hispanic Youths, by Citizenship Status
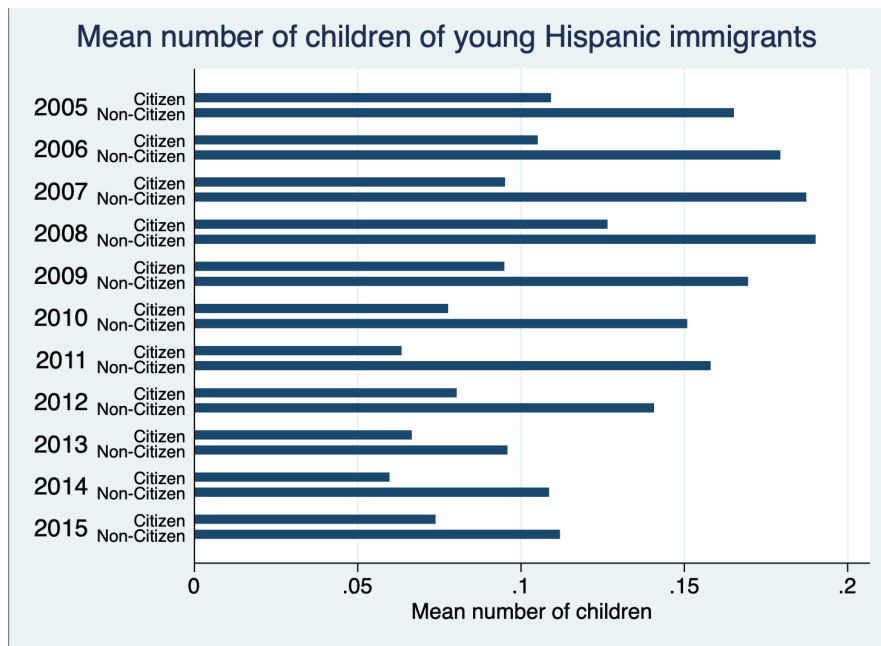

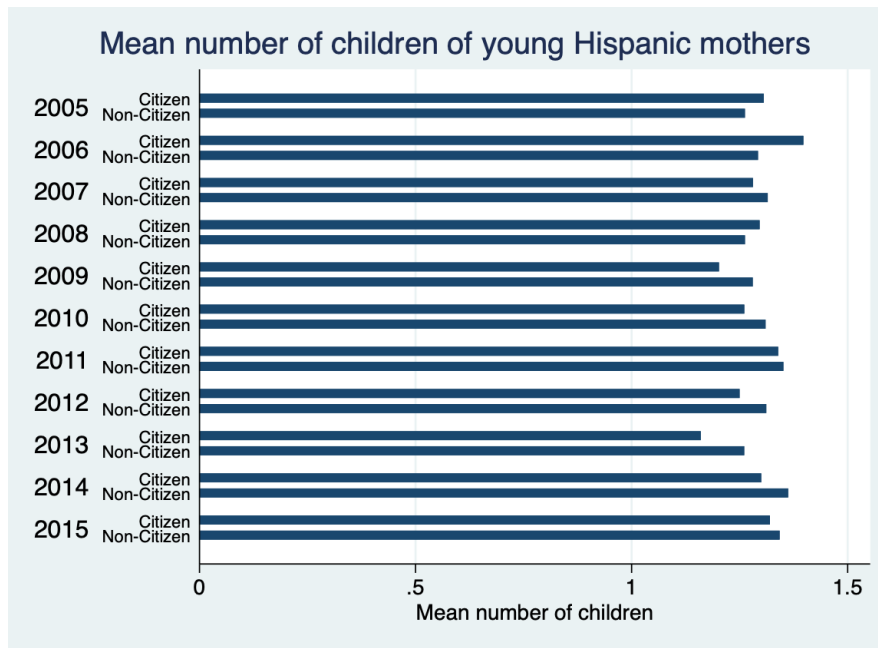Figure 2: Mean number of children of young Hispanic immigrants

Figure 3: Mean number of children of young Hispanic mothers

Figure 3 relates to **Figure 2** as in they both represent the mean number of children of young Hispanic immigrants, but **Figure 3** presents a slight nuance: it portrays the mean number of children of young Hispanic immigrants that are already mothers, i.e. we computed the mean after dropping the childless individuals from the sample. Surprisingly, the gap between citizens and non-citizens has now remarkably decreased (it is however important to note that the scale of the two figures are different, thus making the comparison of the gaps complex). In addition, the group composed of citizens does not always have the highest mean number of children. This fact brings us to the hypothesis that legal status might have an effect only on individuals on the margin of their first birth. Further on, during the estimation analysis, we will come back to this hypothesis and check its validity.

5   Replication of regression tables

The following results present how DACA is correlated with the three fertility outcomes we identify: the probability of having a child in the last year of study, the probability of never having a child, and the probability of having one more child for Hispanic female migrants. The independent variable (fertility outcome) is a rate, so we interpret the results in percentage points as a variation in probability. All estimates found are statistically significant at 95% confidence level.

First, we consider the regression including controls for pre-existing trends. The main finding from the model is that DACA has a negative relationship with the probability of being a teenage mother among Hispanic women migrants (between 15 and 20 years old). For the women eligible to DACA, the likelihood of having an additional child drops by 3 percentage points. The mean presented in the table is the average outcome for eligible Hispanic women before 2012. DACA leads to a reduction in the average number of children Hispanic women have to 0.091, which is equivalent to a decrease of 25% compared to before 2012.

To decompose the effect, the authors examine the two outcomes of having a child in the last year and of having zero children. The first estimate shows that DACA leads to a decrease of 1.7 p.p. in the likelihood of having a child in the last year. This corresponds to a decrease in probability of 31% relative to the mean before 2012. Even if we consider the 95% confidence interval, the size of the effect is still significant: 0.7 p.p. decrease which is equivalent to a decline of 13%.

The second main finding of the model is that the reduction in teenage fertility is concentrated on the first child. The authors reached this conclusion by observing that the first estimate is mirrored in the second. The absolute decrease in the first estimate of 1.7 pp is paralleled by the absolute increase in the probability of having zero children of 1.6 pp. Therefore, the reduction in Hispanic women's fertility caused by DACA is driven by women who were at the margin of having their first child. The share of eligible Hispanic women migrants (non-citizen) that do not have children went from 0.906 (before 2012) to 0.922. This variation is represented in the figure and demonstrates that DACA allows the difference in fertility between citizen and non-citizen Hispanic women to reduce by 50%.

In the second part of the table, the authors examine the sensitivity of the results by omitting the controls for trends on eligibility existing before 2012. In this case, we observe little difference compared to the previous regression: the results are still significant and both the sign and the size of the estimates are similar. Because we obtain similar results with and without controlling for-existing trends, it proves the robustness of the parallel trend assumption, which states that the time trend has the same effect on eligibility for the two groups.

Table 1: Effect of DACA on Teenage Fertility

		Children	
	Last Year	Zero	Number
A. With Trend			
Elig*Post	-0.017***	0.016**	-0.030***
	(0.005)	(0.006)	(0.008)
B. Without Trend			
Elig*Post	-0.014**	0.016**	-0.023**
	(0.005)	(0.006)	(0.008)
Individuals	30333	30442	30442
Elig Mean	0.0567	0.906	0.121

ACS 2005-2015 : sample includes Hispanic women ages 15 to 20.

The second model aims to explain the reasons for the observed changes in fertility decisions of eligible Hispanic women. It shows the effect of DACA on the sexual behaviour of Hispanic high school students from age 15 to 20. We interpret the results in percentage points, as the independent variable is a rate.

The first significant finding is that DACA leads to a noticeable decrease of unprotected sex among Hispanic high school students of 4.9 p.p.. Concerning the use of pregnancy protection methods, we observe a significant increase in use of condoms of 6.2 p.p., a decrease in shots/IUD and an increase in withdrawal and other methods. The trend is particularly strong for the use of condoms, which was already the most common prevention method before 2012.

There are no statistically significant results concerning the likelihood of having sex. It means that the reduction in teenage fertility after DACA cannot be explained by a decline in sexual relationships, DACA may reduce teen pregnancy by lower unprotected sex and greater use of some methods of protection.

Table 2: Effect of DACA on pregnancy prevention and sexual behavior

| | Last Time Had Sex, Pregnancy Protection: | | | | | Had Sex | |
	None	Pill	Condom	IUD/Shot	Withdraw/Oth.	Ever	Last 3 Mos.
High Elig.*Post	-0.049***	-0.004	0.062***	-0.040***	0.032***	-0.007	0.002
	(0.010)	(0.008)	(0.013)	(0.005)	(0.009)	(0.009)	(0.008)
Individuals	29332	29332	29332	29332	29332	67913	67100
Eligible Mean	0.406	0.406	0.406	0.406	0.406	0.856	0.842

YRBSS 2005-2015 : sample includes Hispanic women ages 14 to 18 who attend high school.

6 Additional analysis

6.1 Placebo Test

To check for the Parallel Trend Assumption in a more precise way, we decided to perform a placebo test with regards to the year 2010 (a date without any meaning). We coded a new variable **Post2010** and proceeded to estimate the effect of the year 2010 on the eligible group. As expected, the coefficients are very small and, more importantly, they are insignificant. In conclusion, the Parallel Trend Assumption is confirmed.

Table 3: Placebo Test : 2010

| | Children | | |
	Last Year	Zero	Number
Eligible*Post2010	-0.005	0.010	-0.001
	(0.005)	(0.006)	(0.008)
Individuals	30333	30442	30442
Eligible Mean	0.0567	0.906	0.121

6.2 Robustness - restricting the age group

When restricting the main analysis to to a younger sample, the results remain similar, if not slightly more precise.

Table 4: Robustness: Effect of DACA on Teenage Fertility, age 15 to 18

| | Children | | |
	Last Year	Zero	Number
A. With Trend			
Eligible*Post	-0.016***	0.018***	-0.037***
	(0.004)	(0.005)	(0.006)
B. Without Trend			
Eligible*Post	-0.010*	0.011*	-0.020**
	(0.004)	(0.005)	(0.006)
Individuals	20768	20845	20845
Eligible Mean	0.0380	0.952	0.0577

7   Conclusion

We can draw three main conclusions from the results outlined above, the first and foremost being DACA's impact on teenage fertility: results show a statistically significant decline in the likelihood of having a teenage birth among undocumented Hispanic females, indicating a substantial impact of the DACA program on teenage pregnancy rates. We also observed a shift in fertility behaviour since the implementation of DACA: an increase in the use of contraception methods (particularly the use of condoms) rather than an increase in celibacy leading to the first conclusion, and also a delay in first-time pregnancy amongst these youths. The third conclusion drawn is that the DACA program appears to have closed the gap in teenage childbearing, namely narrowing the disparity in fertility outcomes between undocumented Hispanic immigrants and documented Hispanic immigrants.

Teenage pregnancy can have many negative effects, such as the loss of future opportunities due to precariousness, lack of investment in human capital, and social misfortune caused by marginalisation from family or general society. This study underscores the importance of policies that provide legal status and economic opportunities for undocumented youth which in turn influences fertility outcomes.

Through the replication of the paper by Kuka et.al we find many strengths in the study, and potential ideas for further research in this field. We appreciated that this is an original contribution to the previous literature on DACA's impacts. Previous research has found that the "Deferred Action for Childhood Arrivals" program benefits undocumented individuals in terms of their education and employment outcomes, and now this study adds on the impact of a reduction of teenage pregnancy rates after DACA. The methodology used by Kuka et.al is robust, having made use of multiple longitudinal datasets, and carrying out appropriate sensitivity analyses in order to obtain the results found. We also carried out our own robustness tests as found above to ensure that these results were indeed as robust as we expected. In addition, the policy relevance as previously mentioned is highly valuable, with this being a previously unexplored aspect of the impact of DACA.

Moving forward, many doors for research have been opened up following this study, including a potential long-term follow-up analysis post-DACA, or even extending this analysis to other ethnic groups in the US or indeed elsewhere in the world.