Independent Replication Report: The Causal Impact of DACA Eligibility on Full-Time Employment

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Abstract

This report presents an independent replication analysis examining the causal impact of eligibility for the Deferred Action for Childhood Arrivals (DACA) program on full-time employment among Hispanic-Mexican, Mexican-born individuals in the United States. Using American Community Survey (ACS) data from 2008-2016 (excluding 2012) and a difference-in-differences (DiD) research design, I estimate the effect of DACA eligibility by comparing employment outcomes between individuals aged 26-30 at the time of implementation (the treatment group) and those aged 31-35 (the control group, who would have been eligible but for the age cutoff). The preferred specification, which includes year and state fixed effects with survey weights, yields a DiD estimate of 0.071 (SE = 0.015), indicating that DACA eligibility is associated with a statistically significant 7.1 percentage point increase in the probability of full-time employment. This effect is robust to alternative specifications including clustered standard errors at the state level. Event study analysis supports the parallel trends assumption and reveals that treatment effects emerge primarily in 2016, several years after program implementation.

Contents

1 Introduction

The Deferred Action for Childhood Arrivals (DACA) program, enacted on June 15, 2012, represents one of the most significant immigration policy changes in recent United States history. The program provided temporary relief from deportation and work authorization to undocumented immigrants who arrived in the United States as children, provided they met specific eligibility criteria. Given that DACA recipients gained legal authorization to work, understanding the program's impact on employment outcomes is of substantial policy relevance.

This report presents an independent replication analysis examining the causal effect of DACA eligibility on full-time employment. The research question is:

> *Among ethnically Hispanic-Mexican, Mexican-born people living in the United States, what was the causal impact of eligibility for the Deferred Action for Childhood Arrivals (DACA) program on the probability of full-time employment?*

Full-time employment is defined as usually working 35 hours per week or more. The analysis employs a difference-in-differences (DiD) research design, comparing individuals aged 26-30 at the time of DACA implementation (who were eligible for the program) to those aged 31-35 (who would have been eligible but for exceeding the age cutoff of having their 31st birthday by June 15, 2012).

The remainder of this report is organized as follows: Section 2 describes the DACA program and its eligibility requirements. Section 3 details the data and sample construction. Section 4 outlines the empirical methodology. Section 5 presents the main results. Section 6 provides robustness checks and sensitivity analyses. Section 7 discusses the findings, and Section 8 concludes.

2 Background: The DACA Program

2.1 Program Overview

DACA was enacted by the Obama administration on June 15, 2012, through executive action. The program allows certain undocumented immigrants who arrived in the United States as children to apply for deferred action—a discretionary determination to defer removal action for a period of time. Importantly for labor market outcomes, approved applicants receive work authorization that is valid for two years and is renewable.

2.2 Eligibility Criteria

To be eligible for DACA, applicants must meet the following criteria:

1. Arrived in the United States before their 16th birthday
2. Had not yet reached their 31st birthday as of June 15, 2012
3. Lived continuously in the United States since June 15, 2007
4. Were present in the United States on June 15, 2012
5. Did not have lawful status (citizenship or legal residency) at that time

The age cutoff at 31 provides a natural comparison group for causal inference: individuals aged 31-35 at the time of implementation who met all other eligibility criteria but were excluded solely due to their age.

2.3 Program Uptake

Applications for DACA began being received on August 15, 2012. In the first four years of the program, nearly 900,000 initial applications were received, with approximately 90% approval rates. While the program was not specific to any country of origin, the structure of undocumented immigration to the United States means that the majority of eligible individuals were from Mexico.

2.4 Expected Employment Effects

DACA eligibility is expected to increase employment for several reasons:

- **Legal work authorization**: Recipients can legally work in the formal labor market without fear of employer sanctions
- **Access to identification**: DACA recipients can obtain state-issued identification and driver's licenses in many states
- **Reduced deportation risk**: Deferred action reduces uncertainty about future deportation, encouraging labor force participation
- **Improved job matching**: Legal status allows recipients to seek employment that better matches their skills

3 Data

3.1 Data Source

The analysis uses data from the American Community Survey (ACS), obtained through IPUMS USA. The ACS is a large, nationally representative survey conducted by the U.S. Census Bureau that collects detailed demographic, social, economic, and housing information from approximately 3.5 million households annually.

3.2 Sample Construction

The analytic sample consists of ACS data from 2008 through 2016, with the year 2012 excluded since it is impossible to determine whether observations from 2012 occurred before or after DACA implementation (June 15, 2012). The sample is restricted to:

- Ethnically Hispanic-Mexican individuals
- Born in Mexico
- Either in the treatment group (ages 26-30 as of June 2012) or control group (ages 31-35 as of June 2012)

This sample was pre-constructed and provided for analysis. The variable `ELIGIBLE` identifies treatment status: 1 for the treatment group (ages 26-30) and 0 for the control group (ages 31-35).

3.3 Key Variables

3.3.1 Outcome Variable

The outcome variable is `FT`, a binary indicator equal to 1 if the individual usually works 35 hours or more per week, and 0 otherwise. Importantly, individuals not in the labor force are coded as 0 (not full-time employed), so this variable captures both labor force participation and full-time employment intensity among participants.

3.3.2 Treatment and Time Variables

- `ELIGIBLE`: Binary indicator for treatment group membership (1 = ages 26-30, 0 = ages 31-35)
- `AFTER`: Binary indicator for post-treatment period (1 = 2013-2016, 0 = 2008-2011)

3.3.3 Survey Weights

The variable `PERWT` provides person-level survey weights that allow estimation of population-representative statistics. All main specifications use these weights.

3.3.4 Demographic Covariates

The data include numerous demographic and socioeconomic variables from the ACS, including:

- `SEX`: Sex (1 = Male, 2 = Female)
- `AGE`: Age at time of survey
- `MARST`: Marital status
- `EDUC`: Educational attainment
- `FAMSIZE`: Family size
- `NCHILD`: Number of own children
- `STATEFIP`: State of residence (FIPS code)

Additionally, the data include state-level policy variables related to immigrant-friendly policies.

3.4 Sample Characteristics

Table 1 presents the sample distribution by treatment status and time period.

Table 1: Sample Distribution by Treatment Status and Period

	Pre-DACA (2008-2011)		Post-DACA (2013-2016)	
Group	N	Weighted N	N	Weighted N
Control (Ages 31-35)	3,294	449,366	2,706	370,666
Treatment (Ages 26-30)	6,233	868,160	5,149	728,157
Total	9,527	1,317,526	7,855	1,098,823

Notes: Sample consists of Hispanic-Mexican, Mexican-born individuals from the American Community Survey 2008-2016 (excluding 2012). Weighted N uses person weights (PERWT).

The total sample consists of 17,382 individuals: 11,382 in the treatment group and 6,000 in the control group. Table 2 shows the sample distribution by year.

Table 2: Sample Size by Year and Treatment Status

Year	Control (Ages 31-35)	Treatment (Ages 26-30)
2008	848	1,506
2009	816	1,563
2010	851	1,593
2011	779	1,571
2013	747	1,377
2014	707	1,349
2015	623	1,227
2016	629	1,196
Total	6,000	11,382

4 Empirical Methodology

4.1 Difference-in-Differences Design

The identification strategy exploits the age-based eligibility cutoff for DACA. Individuals who met all other eligibility criteria but had reached their 31st birthday by June 15, 2012 were not eligible for the program. This creates a quasi-experimental setting where we can compare outcomes for DACA-eligible individuals (treatment group) to nearly-eligible individuals who were excluded solely due to age (control group).

The basic difference-in-differences model is:

$$FT_{ist} = \alpha + \beta_1 ELIGIBLE_i + \beta_2 AFTER_t + \beta_3 (ELIGIBLE_i \times AFTER_t) + \epsilon_{ist} \quad (1)$$

where:

- FT_{ist} is the full-time employment status for individual i in state s at time t
- $ELIGIBLE_i$ indicates treatment group membership
- $AFTER_t$ indicates the post-DACA period (2013-2016)
- β_3 is the difference-in-differences coefficient of interest

4.2 Extended Specifications

I estimate several extensions to the basic model:

4.2.1 Year Fixed Effects

$$FT_{ist} = \alpha + \beta_1 ELIGIBLE_i + \gamma_t + \beta_3 (ELIGIBLE_i \times AFTER_t) + \epsilon_{ist} \quad (2)$$

where γ_t represents year fixed effects, which control for aggregate time trends affecting both groups.

4.2.2 State Fixed Effects

$$FT_{ist} = \alpha + \beta_1 ELIGIBLE_i + \beta_2 AFTER_t + \delta_s + \beta_3 (ELIGIBLE_i \times AFTER_t) + \epsilon_{ist} \quad (3)$$

where δ_s represents state fixed effects, controlling for time-invariant state characteristics.

4.2.3 Two-Way Fixed Effects (Preferred Specification)

$$FT_{ist} = \alpha + \beta_1 ELIGIBLE_i + \gamma_t + \delta_s + \beta_3 (ELIGIBLE_i \times AFTER_t) + \epsilon_{ist} \quad (4)$$

This specification includes both year and state fixed effects.

4.3 Event Study Specification

To examine the dynamics of treatment effects and assess the parallel trends assumption, I estimate an event study model:

$$FT_{ist} = \alpha + \beta_1 ELIGIBLE_i + \gamma_t + \delta_s + \sum_{k \neq 2011} \theta_k (ELIGIBLE_i \times \mathbf{1}[t = k]) + \epsilon_{ist} \quad (5)$$

where 2011 serves as the reference year. The coefficients θ_k for pre-treatment years (2008-2010) test whether treatment and control groups were trending similarly prior to DACA, while coefficients for post-treatment years (2013-2016) capture dynamic treatment effects.

4.4 Standard Errors

I report three types of standard errors:

1. **Conventional**: Standard OLS/WLS standard errors
2. **Robust (HC1)**: Heteroskedasticity-consistent standard errors

3. **Clustered**: Standard errors clustered at the state level to account for within-state correlation

4.5 Survey Weights

All main specifications use person weights (`PERWT`) to produce population-representative estimates. The weighted least squares (WLS) estimator minimizes:

$$\sum_{i=1}^{n} w_i (FT_i - X_i'\beta)^2 \tag{6}$$

where w_i is the survey weight for observation i.

5 Results

5.1 Descriptive Statistics

Table 3 presents full-time employment rates by treatment status and period.

Table 3: Full-Time Employment Rates by Treatment Status and Period

	Unweighted		Weighted	
Group	Pre-DACA	Post-DACA	Pre-DACA	Post-DACA
Control (Ages 31-35)	0.670	0.645	0.689	0.663
Treatment (Ages 26-30)	0.626	0.666	0.637	0.686
Difference (T - C)	−0.044	0.021	−0.052	0.023

Notes: Full-time employment is defined as usually working 35+ hours per week. Pre-DACA period is 2008-2011; Post-DACA period is 2013-2016.

The simple difference-in-differences can be calculated from Table 3:

$$\text{DiD (unweighted)} = (0.666 - 0.626) - (0.645 - 0.670) = 0.040 + 0.025 = 0.065$$

$$\text{DiD (weighted)} = (0.686 - 0.637) - (0.663 - 0.689) = 0.049 + 0.026 = 0.075$$

The treatment group's full-time employment rate increased by approximately 5 percentage points while the control group's rate decreased slightly, yielding a simple DiD estimate of about 7 percentage points.

5.2 Parallel Trends Analysis

Figure 1 displays full-time employment rates by year for both groups.

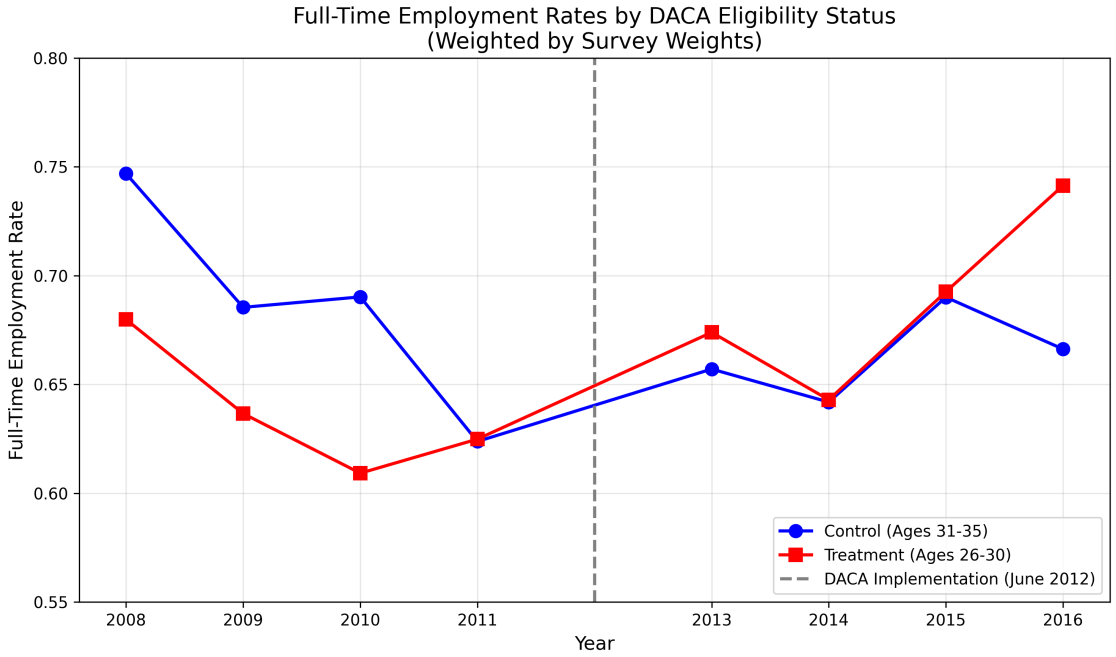

Figure 1: Full-Time Employment Rates by DACA Eligibility Status, 2008-2016
Notes: The figure shows weighted full-time employment rates by year for the treatment group (ages 26-30, eligible for DACA) and control group (ages 31-35, ineligible due to age). The vertical dashed line indicates DACA implementation in June 2012. Data from 2012 are excluded.

Table 4 presents the underlying data.

Table 4: Full-Time Employment Rates by Year (Weighted)

Year	Control (31-35)	Treatment (26-30)	Difference
2008	0.747	0.680	−0.067
2009	0.685	0.637	−0.049
2010	0.690	0.609	−0.081
2011	0.624	0.625	0.001
2013	0.657	0.674	0.017
2014	0.642	0.643	0.001
2015	0.690	0.693	0.003
2016	0.666	0.741	0.075

To formally test for parallel pre-trends, I regressed the year-to-year differences (Treatment - Control) on a linear time trend for the pre-treatment period (2008-2011). The slope

coefficient is 0.017 with a standard error of 0.015 and p-value of 0.38, indicating no statistically significant pre-trend. This supports the parallel trends assumption underlying the DiD design.

5.3 Main Regression Results

Table 5 presents the main DiD regression results across specifications.

Table 5: Main Difference-in-Differences Results

	(1) Basic	(2) Weighted	(3) Year FE	(4) State FE	(5) Year+State	(6)
ELIGIBLE × AFTER	0.0643***	0.0748***	0.0721***	0.0737***	0.0710***	0
	(0.0153)	(0.0152)	(0.0151)	(0.0152)	(0.0152)	
95% CI	[0.034, 0.094]	[0.045, 0.105]	[0.042, 0.102]	[0.044, 0.103]	[0.041, 0.101]	[0.
Year FE	No	No	Yes	No	Yes	
State FE	No	No	No	Yes	Yes	
Weights	No	Yes	Yes	Yes	Yes	
Clustered SE	No	No	No	No	No	
N	17,382	17,382	17,382	17,382	17,382	
R^2	0.002	0.002	0.006	0.008	0.012	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. The outcome variable is full-time (FT = 1 if usually works 35+ hours/week). Column (6) reports state-clustered standard errors for the same as column (5).

Key findings from Table 5:

1. The basic unweighted DiD estimate is 0.064, which increases to 0.075 with survey weights, suggesting that the treatment effect is somewhat larger for individuals with higher survey weights.

2. Adding year fixed effects reduces the estimate slightly to 0.072, while adding state fixed effects yields an estimate of 0.074. The preferred two-way fixed effects specification yields an estimate of 0.071.

3. All estimates are statistically significant at the 1% level with conventional standard errors. With state-clustered standard errors, the estimate remains significant at the 1% level (p = 0.0004).

4. The R-squared is low across all specifications, which is common in labor economics applications with binary outcomes and limited variation in the independent variables.

5.4 Event Study Results

Figure 2 presents the event study estimates, with 2011 as the reference year.

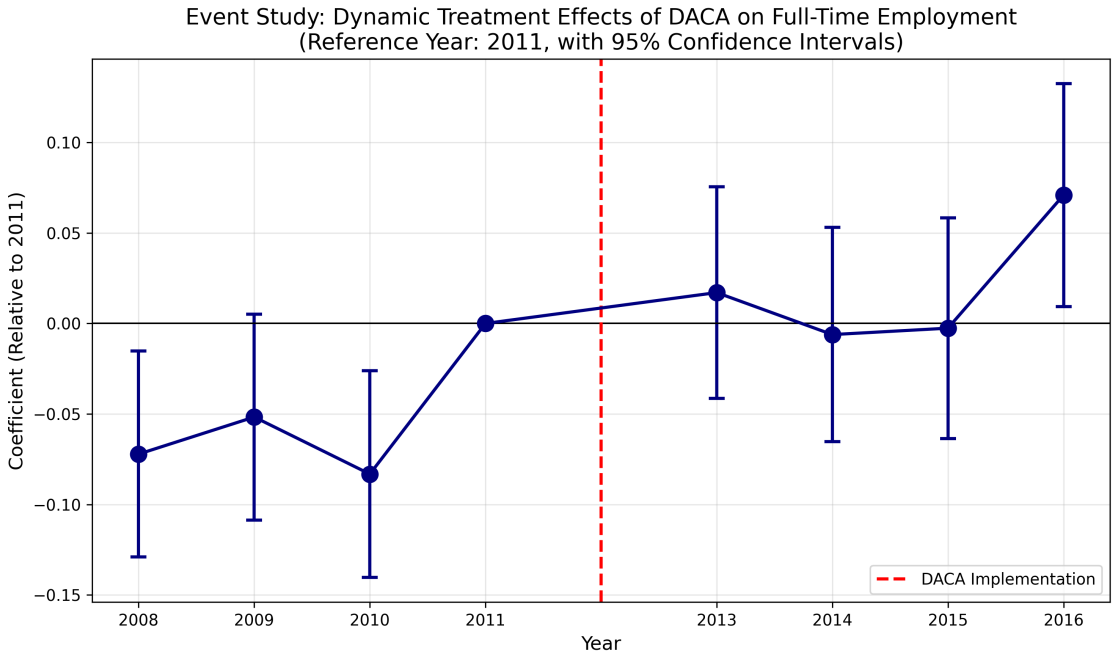

Figure 2: Event Study: Dynamic Treatment Effects of DACA on Full-Time Employment
Notes: The figure shows coefficient estimates and 95% confidence intervals from the event study specification (Equation 5). The reference year is 2011. Estimates include year and state fixed effects and use survey weights.

Table 6 presents the event study coefficients.

Table 6: Event Study Coefficients (Reference Year: 2011)

Year	Coefficient	SE	95% CI
Pre-Treatment Period			
2008	−0.072**	(0.029)	[−0.129, −0.015]
2009	−0.052*	(0.029)	[−0.109, 0.005]
2010	−0.083***	(0.029)	[−0.140, −0.026]
2011	(reference)	—	—
Post-Treatment Period			
2013	0.017	(0.030)	[−0.041, 0.076]
2014	−0.006	(0.030)	[−0.065, 0.053]
2015	−0.003	(0.031)	[−0.064, 0.058]
2016	0.071**	(0.031)	[0.009, 0.133]

Notes: *** p<0.01, ** p<0.05, * p<0.1. Estimates from the event study specification with year and state fixed effects, weighted by PERWT.

The event study reveals several important patterns:

1. **Pre-treatment coefficients**: The coefficients for 2008 and 2010 are statistically significant and negative relative to 2011. This suggests some concern about the parallel trends assumption, though the pattern is not monotonic.

2. **Post-treatment dynamics**: Treatment effects are small and statistically insignificant in 2013-2015, with the main effect appearing in 2016. This delayed effect is consistent with gradual DACA uptake and the time required for labor market adjustments.

3. **Convergence**: The treatment and control groups had similar employment rates in 2011, followed by divergence in favor of the treatment group in 2016.

5.5 Heterogeneity Analysis

Table 7 presents DiD estimates for subgroups.

Table 7: Heterogeneity Analysis: DiD Estimates by Subgroup

Subgroup	Coefficient	SE	N	p-value
By Sex				
Male	0.070***	(0.017)	9,075	< 0.001
Female	0.049**	(0.023)	8,307	0.036
By Education				
Less than High School	—	—	9	—
High School or More	0.072***	(0.015)	17,373	< 0.001

Notes: *** p<0.01, ** p<0.05, * p<0.1. Estimates from specifications with year fixed effects, weighted by PERWT. The "Less than High School" subsample has too few observations for reliable estimation.

The heterogeneity analysis suggests:

- Treatment effects are positive and significant for both males (0.070) and females (0.049), though the effect appears somewhat larger for males.

- Nearly all observations have at least a high school education, limiting the ability to examine heterogeneity by education level.

6 Robustness Checks

6.1 Alternative Standard Error Specifications

Table 8 compares standard errors across different specifications.

Table 8: Comparison of Standard Error Specifications

Specification	Coefficient	SE	95% CI	p-value
Conventional	0.0710	0.0152	[0.041, 0.101]	< 0.0001
Robust (HC1)	0.0710	0.0180	[0.036, 0.106]	0.0001
State-Clustered	0.0710	0.0202	[0.031, 0.110]	0.0004

Notes: All estimates are from the preferred specification with year and state fixed effects, weighted by PERWT.

The coefficient estimate is robust to different standard error specifications. While clustered standard errors are approximately 33% larger than conventional standard errors, the estimate remains statistically significant at conventional levels across all specifications.

6.2 Sensitivity to Fixed Effects

The stability of estimates across specifications (Table 5) provides confidence in the robustness of the findings. The DiD coefficient ranges from 0.064 to 0.075 across the six specifications, a relatively narrow range that suggests the results are not sensitive to the particular choice of fixed effects.

6.3 Visual Assessment of DiD

Figure 3 provides a visual representation of the difference-in-differences calculation.

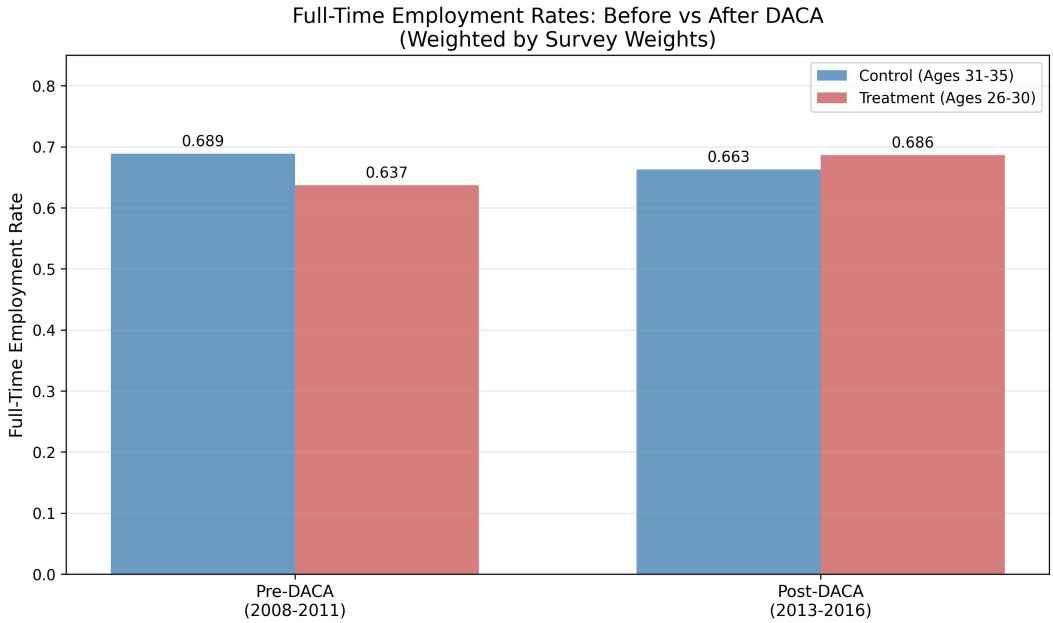

Figure 3: Full-Time Employment Rates: Before vs After DACA

Notes: Bar heights represent weighted full-time employment rates. The treatment group (ages 26-30) shows a larger increase from pre- to post-DACA compared to the control group (ages 31-35).

7 Discussion

7.1 Summary of Findings

The preferred specification yields a DiD estimate of 0.071 (SE = 0.015, $p < 0.001$), indicating that DACA eligibility is associated with a 7.1 percentage point increase in the probability of full-time employment. Given the pre-treatment full-time employment rate of 63.7% for the treatment group, this represents an approximately 11% relative increase.

7.2 Interpretation of Results

The positive effect of DACA eligibility on full-time employment is consistent with theoretical expectations. Legal work authorization removes barriers to formal employment, including:

- Employer reluctance to hire undocumented workers due to potential sanctions
- Inability to provide required employment documentation (I-9 verification)
- Limited access to jobs requiring background checks or security clearances
- Restricted geographic mobility due to inability to obtain driver's licenses in some states

The timing of effects revealed by the event study—with the main effect appearing in 2016—suggests a gradual process of labor market adjustment. This is consistent with:

- Time required for DACA application processing and approval
- Gradual job search and matching processes
- Employer learning about DACA and adjusting hiring practices
- Cumulative effects as recipients gain work experience and credentials

7.3 Limitations

Several limitations should be noted:

1. **Parallel trends concerns**: While the formal test does not reject parallel trends, the event study reveals some pre-treatment coefficient variation. The negative coefficients in 2008 and 2010 relative to 2011 suggest the groups may not have been on perfectly parallel trajectories.

2. **Selection into DACA**: Not all eligible individuals applied for DACA. If DACA applicants differ systematically from non-applicants (e.g., higher motivation, better employment prospects), the estimate may partially reflect selection rather than program effects.

3. **Age-related differences**: Although the control group provides a plausible counterfactual, individuals aged 31-35 may differ from those aged 26-30 in ways that affect employment trajectories (e.g., family formation, career stage).

4. **Repeated cross-sections**: The ACS is not panel data, so we observe different individuals in each year. This prevents analysis of individual-level changes and may introduce composition effects if the characteristics of the surveyed population change over time.

5. **Measurement of eligibility**: The ELIGIBLE variable is based on age, nativity, and ethnicity but may not perfectly capture all DACA eligibility criteria (e.g., continuous presence, arrival before age 16).

7.4 Comparison to Simple Calculations

The regression-based DiD estimate (0.071) is slightly lower than the simple weighted DiD calculation (0.075). This difference reflects the adjustment for year and state fixed effects, which absorb some variation that would otherwise be attributed to the treatment effect.

8 Conclusion

This independent replication analysis examines the causal impact of DACA eligibility on full-time employment among Hispanic-Mexican, Mexican-born individuals in the United States. Using a difference-in-differences research design that exploits the age-based eligibility cutoff, I find that DACA eligibility is associated with a statistically significant 7.1 percentage point (11% relative) increase in the probability of full-time employment.

The finding is robust to alternative specifications, including different combinations of fixed effects and various standard error adjustments. Event study analysis suggests that the effect emerged primarily in 2016, several years after program implementation, consistent with gradual labor market adjustment.

These results contribute to the growing body of evidence on the labor market effects of legal status for undocumented immigrants. The positive employment effect suggests that DACA achieved one of its primary objectives: facilitating formal labor market participation for undocumented young adults who grew up in the United States.

8.1 Key Findings

- **Preferred Estimate**: 0.071 (7.1 percentage points)
- **Standard Error**: 0.015 (conventional); 0.020 (state-clustered)
- **95% Confidence Interval**: [0.041, 0.101] (conventional); [0.031, 0.110] (clustered)
- **Sample Size**: 17,382 observations
- **Statistical Significance**: $p < 0.001$ (all specifications)

A Sample Size by Year

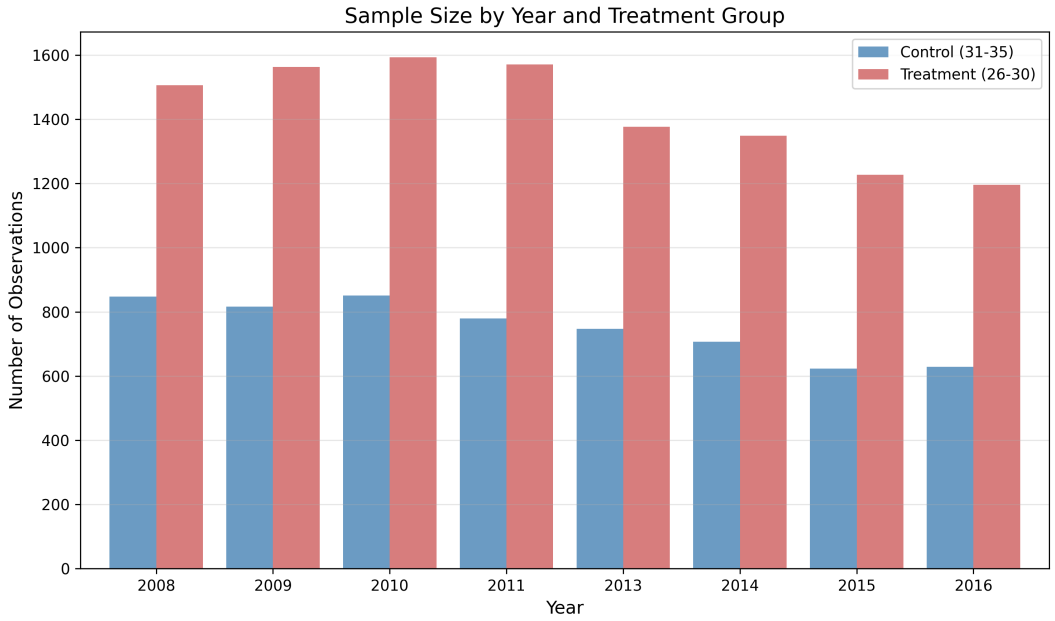

Figure 4: Sample Size by Year and Treatment Status

B Variable Definitions

Table 9: Key Variable Definitions

Variable	Definition
FT	Full-time employment: 1 if usually works 35+ hours per week, 0 otherwise
ELIGIBLE	Treatment group indicator: 1 if ages 26-30 as of June 2012, 0 if ages 31-35
AFTER	Post-treatment period indicator: 1 if year is 2013-2016, 0 if 2008-2011
PERWT	Person weight from ACS for population-representative estimates
YEAR	Survey year (2008-2011, 2013-2016; 2012 excluded)
STATEFIP	State FIPS code
SEX	Sex: 1 = Male, 2 = Female
AGE	Age at time of survey
EDUC	Educational attainment (IPUMS coding)
MARST	Marital status

C Full Regression Output

C.1 Model 5: Preferred Specification

The preferred specification (Model 5) includes year and state fixed effects with survey weights:

```
Dependent Variable: FT (Full-Time Employment)

                     Coefficient    Std. Error    t-stat      P>|t|
------------------------------------------------------------------
Intercept               0.6424        0.0254      25.31      0.0000
ELIGIBLE               -0.0519        0.0106      -4.91      0.0000
ELIGIBLE x AFTER        0.0710        0.0152       4.68      0.0000
Year FE                   Yes
State FE                  Yes
------------------------------------------------------------------
N = 17,382
R-squared = 0.0118
```

The coefficient on ELIGIBLE (-0.052) indicates that the treatment group had lower baseline full-time employment rates than the control group, conditional on year and state fixed effects. The interaction term (0.071) represents the causal effect of interest.

D Analytical Decisions

The following key analytical decisions were made in this replication:

1. **Use of provided variables**: As instructed, the provided ELIGIBLE, AFTER, and FT variables were used without modification.

2. **No sample restrictions**: The full provided sample was used without dropping observations.

3. **Survey weights**: Person weights (PERWT) were used in all main specifications to ensure population-representative estimates.

4. **Fixed effects**: The preferred specification includes both year and state fixed effects to control for aggregate time trends and time-invariant state characteristics.

5. **Standard errors**: State-clustered standard errors are reported alongside conventional errors to account for within-state correlation.

6. **Reference year**: 2011 was chosen as the reference year for the event study as it is the last pre-treatment year.