Encouraging Naturalization: The Broader Effects of DACA on U.S. Immigration

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Preliminary and Incomplete.

Abstract

This paper explores the potential effects of providing protection from deportation and work authorization on immigration, focusing on the impacts of Deferred Action for Childhood Arrivals (DACA). DACA could impact immigration-related outcomes in several ways. First, the protections may lead to an increase in immigration. Second, the protections may lead to higher rates of naturalization among noncitizen immigrants. To quantify the impact of DACA on immigration patterns over time, we use ACS data and a difference-in-difference design, exploiting variation in exposure to DACA-eligible immigrants across geographies. We find DACA significantly increased the number of naturalized citizens without increasing the number of noncitizens. We show that the rise in naturalized citizens is driven by increased naturalization rates among prior noncitizens, most of whom are likely not DACA beneficiaries. We provide evidence consistent with DACA increasing the incentives for and reducing the barriers to naturalization for eligible-to-naturalize noncitizens by protecting their undocumented DACA-eligible contacts.

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1 Introduction

The recent surge in immigration to the U.S. has prompted formal calls for more secure immigration status and work authorization for both newly arrived and longstanding immigrants. For instance, in a letter to the Biden-Harris administration[1], mayors from 40 cities outlined the challenges posed by the arrival of recent migrants—many of whom have been bussed from the border as part of Texas Governor Abbott's Operation Lone Star—alongside issues related to undocumented immigrants. The mayors argue that providing these individuals with secure immigration status and work authorization would enable them to support themselves economically and reduce their vulnerability to exploitation.

Providing immigrants temporary protection from deportation and work authorization could have several immigration-related consequences. First, beneficiaries may become more socially and economically secure which could allow them to provide resources for friends and family back home, leading to more immigration. Second, these policies could serve as a "call" for immigration. In other words, prospective migrants may believe they too will eventually receive such protections and authorization if they enter the U.S. Lastly, these policies could resolve some uncertainty for the beneficiaries and their contacts, leading to greater commitments to living in the destination country. This may result in more permanent stays and increased naturalization of noncitizen immigrants.

This paper investigates the potential effects of providing protection from deportation and work authorization on immigration. We focus on the policy Deferred Action for Childhood Arrivals (DACA). Exploiting the variation across geographies in the pre-existing size of the DACA eligible population and the timing of the policy, we show that DACA significantly increased the number of naturalized citizens but did not increase the number of noncitizens. We find that the increase in the number of naturalized citizens is driven by increased naturalization rates of previous noncitizens, the overwhelming majority of whom are likely not DACA beneficiaries. We provide evidence consistent with DACA increasing the incentives and decreasing the barriers to naturalization for eligible-to-naturalize noncitizens by protecting their DACA eligible undocumented contacts.

To measure the size of the DACA eligible population across geographies and quantify changes in immigration patterns over time, we use the IPUMS American Community Survey (ACS). The ACS provides information on birth country, citizenship, and year of immigration and naturalization for the foreign-born. Using these and other observable characteristics in the ACS, we show that there is considerable variation in the number of DACA eligible immigrants as a share of the population across geographies several years before DACA is established. In our baseline analysis, we use the consistent public use microdata area (CPUMA) though the results are robust to other boundaries such as commuting zones (Autor and Dorn 2013; Autor et al. 2019).

Before DACA, places with high baseline DACA eligible population shares saw similar trends

[1]See the announcement from the office of the New York City Mayor here.

in the overall number of immigrants relative to places with low DACA eligible population shares. Almost immediately after DACA, the number of naturalized citizens increased differentially in places with high DACA eligible population shares. The number of noncitizen immigrants in these places did not increase and if anything decreased slightly though the estimated effect size is not statistically significant. The strong, positive, and significant effect of exposure to DACA on the number of naturalized citizens combined with the small, negative, and insignificant effect on the number of noncitizens led to an overall increase in the number of immigrants. Our results suggest that for every three additional DACA eligible immigrants, there was one additional immigrant, and this increase in immigration is driven entirely by more naturalized citizens.

How did exposure to DACA increase the number of naturalized citizens? We show that the resulting increase in the number of naturalized citizens is mostly driven by increased naturalization of noncitizens and is not driven by changes in migration patterns of already naturalized immigrants. Specifically, we leverage information on year of naturalization in the ACS and find that naturalization rates increased differentially for noncitizens in CPUMAs with high baseline DACA eligible population shares. We also rule out changes in migration patterns of already naturalized immigrants as a potential channel by showing there were no meaningful changes in their in-migration or out-migration rates after DACA in high exposure CPUMAs.

Why did DACA increase naturalization rates of noncitizens? We argue that this is likely due to the fact that DACA increased the benefits and decreased the barriers to naturalization for eligible-to-naturalize immigrants. Of the many benefits to citizenship, one is the ability to quickly and easily sponsor relatives for legal permanent resident visas (i.e., green cards). However, most undocumented immigrants cannot be sponsored given their immigration status. DACA eligibility opened several pathways for these immigrants thereby increasing the benefits to naturalization for their eligible-to-naturalize contacts. DACA's protection from deportation for undocumented immigrants may have also alleviated concerns about going through the process for eligible-to-naturlize immigrants living in mixed status households as the application requires providing information about one's immediate family members.

To shed light on this mechanism, we compare the likelihood of naturalization for noncitizens living with foreign-born childhood arrivals meeting DACA's observable eligibility criteria to noncitizens living with foreign-born childhood arrivals who are ineligible for DACA before and after DACA was established. Specifically, we estimate a triple difference specification where the treated group is formed by noncitizens living with foreign-born age-eligible (30 or younger as of June, 2012) childhood arrivals and the control group is formed by noncitizens living with foreign-born age-ineligible childhood arrivals. Within these groups, we also compare those living with noncitizens who may be eligible for DACA to foreign-born citizens who would not directly benefit from DACA.

The results show large positive effects of living with DACA eligible immigrants on the likelihood of naturalization. Our estimates suggest that living with DACA eligible immigrants increased the

likelihood of naturalizing in past year by 4 percentage points (p.p.), a 59 percent increase relative to the mean naturalization rate (6.82 percent). These results are consistent with DACA potentially increasing the benefits and decreasing the costs of naturalization.

Our research is related to work on the effects of immigration policy on chain migration and naturalization decisions. In particular, Cascio and Lewis (2023) study the chain migration impact of the Immigration Reform and Control Act of 1987 (IRCA), finding no support for out-of-control chain migration following the legalization of undocumented immigrants. In our paper, we study a contemporary policy that does not directly provide legal status for undocumented immigrants. In addition, we investigate new mechanisms relevant to our policy framework. Amuedo-Dorantes and Lopez (2021) study the effect of interior immigration enforcement on naturalization decisions. Our paper focuses on how a more pro-immigrant policy impacts naturalization.

This work is closely related to the literature looking at the impacts of DACA on immigrants and non-immigrants. Several papers investigate the impact of DACA on DACA recipients, finding improved economic outcomes (Pope (2016) and Amuedo-Dorantes and Antman (2016)) and changing schooling decisions (Kuka et al. (2020) and Hsin and Ortega (2018)). Other work looks at the impact of DACA on recipients' wellbeing, such as marriage (Amuedo-Dorantes and Wang (2023)), health (Hainmueller et al. (2017)), and crime reporting (Pearson (2024)). Other work looks at spillover effects of the policy on natives' economic (Battaglia (2023) and Kiser and Wilson (2024)) and schooling (Ballis (2023)) outcomes. We complement this literature by considering how a temporary immigration policy may impact permanent immigration decisions.

2 Policy Background

2.1 Deferred Action for Childhood Arrivals (DACA)

Unable to pass more broad immigration reform, DACA was signed by Executive Order in 2012 by President Barack Obama. DACA provides recipients with relief from deportation for a period of two years and eligiblility for a work permit. While recipients can renew these benefits, there is no direct pathway to citizenship through DACA.[2]

DACA applicants must meet certain eligibility requirements. Specifically, applicants be undocumented as of June 2012 and must be physically in the United States. In addition, there is a set of requirements to ensure applicants arrived as children and are not a public safety concern. In particular, applicants must: (i) be under 31 as of June 15, 2012, (ii) have entered the United States before age 16, (iii) have been residing in the United States continuously since June 15, 2007, (iv) be at least 15 years old at the time of application, (v) be currently in school, have a high school

[2]The Dream Act, first introduced to Congress in 2001, would provide citizenship to childhood arrivals who meet certain eligibility requirements. The Dream Act has come before Congress several times since its introduction, but has failed to garner the necessary support.

diploma or GED, or have been honorably discharged from the armed forces, and (vi) not have been convicted of a felony, serious misdemeanor, three or more other misdemeanors, or pose a threat to national security.

The Department of Homeland Security began accepting applications in August of 2012. By May 2018, more than 900,000 initial applications had been received. The Trump administration rescinded the program in September 2017, and a series of court cases followed. The Supreme Court found Trump's rescission to be illegal and President Joe Biden reenacted the policy. Texas courts then brought a suit against DACA and DACA's future is pending future court rulings. As of this writing, DACA recipients can continue to receive renewals, but no new applications will be processed.

2.2 Immigration Policy and Naturalization

While there are nearly 50 million foreign-born individuals in the United States as of 2023, representing almost 15% of the United States population, much of the immigration policy in the United States dates back to the 1960s to 1990s. For example, the Immigration and Nationality Act of 1965 is a key immigration policy, setting the main policies and regulations for immigration that is still used today. The 1965 INA abolished the national origins quota system and replaced it with the preference system that is currently in use. The Immigration Reform and Control Act of 1986 was a bipartisan agreement that granted amnesty for undocumented immigrants meeting certain requirements, alongside increased border enforcement and enhanced employer verification. A third key immigration policy, the Immigration Act of 1990, revised the 1965 INA to establish the H-1B visa program for skilled temporary workers. These policies shape the immigration procedures in the United States, including the process to become naturalized.

Of the foreign-born population, 49% are naturalized. Before going through the naturalization process, a foreign-born individual needs to obtain Lawful Permanent Resident (LPR) status (this status is often informally referred to as a "green card"). LPR status provides individuals with an indefinitely renewable visa to live and work in the United States. Individuals can become eligible for LPR status in several ways, such as family sponsorship, employment purposes, or refugee/aslyee status. The length of time to obtain LPR status varies based on the type of visa and the origin country. There is a lot of variation in waiting time—from a few months to a few years—due to country caps and the cost can range several thousand dollars.

After being a LPR for 5 years (3 if married to a U.S. citizen), individuals become eligible-to-naturalize.[3] In order to naturalize, individuals must submit an application, attend a biometrics appointment, complete a citizenship interview, pass an exam testing English proficiency and U.S. civics knowledge, and take an oath of allegiance to the U.S. constitution. The processing time is

[3]Individuals must also maintain a continuous residence in the United States for the previous 5 years, with a physical presence in 30 months of the previous 5 years, and must have lived in their current state for the previous 3 months.

several months and the cost is around $800.[4]

Around 30% of LPRs have been eligible-to-naturalize for 20 years. Given the potential benefits of naturalization, such as voting, sponsoring family members, and receiving government benefits, why would some eligible-to-naturalize LPRs not naturalize? One reason could be financial. While the naturalization process is cheaper than the LPR process, the naturalization fee could be burdensome for some individuals. A second reason could be language or administrative barriers. Individuals need a strong grasp of the English language in order to pass the required examinations. Additionally, the form required for naturalization is 14 pages long, creating a barrier for individuals who may be eligible to naturalize. A third potential reason is lack of interest. It's possible an individual does not believe the benefits of naturalization exceed the (time and monetary) cost involved with the process. Individuals in mixed-status households may also be apprehensive of completing the naturalization process if they fear it may lead to adverse consequences for their undocumented housemates.

3 Empirical Strategy

Our strategy for estimating the effects of DACA on immigration is similar to Cascio and Lewis (2023) who study the effects of IRCA on chain migration. Namely, we exploit the cross-sectional variation across geographies in the pre-existing size of the DACA eligible population. We use the 2005 IPUMS ACS (Ruggles et al. (2025)) to estimate the size of the DACA eligible population several years before DACA. We use 2005 as the baseline year because it is the earliest year in which the ACS provides granular geographic information for respondents; however, our results are robust to using other years to measure the pre-existing size of the DACA eligible population. We identify immigrants who will potentially be eligible for DACA if they meet the following conditions: i.) they are non-citizens, ii.) have a high-school degree or more or are in school, iii.) they immigrated before the age of 16, and iv.) they would be 30 or younger and thus age-eligible based on their birth year and birth quarter[5]

Figure 1 shows the DACA eligible population share across consistent public use microdata areas (CPUMAs)[6], which we use as our measure of exposure to DACA. There is considerable variation in exposure across CPUMAs, even within regions and in some cases within states.

[4]The current form fee is $710 for an online filing and an additional $85 fee for the biometrics appointment. There are reduced fees for individuals meeting certain income restrictions.

[5]We classify an individual as age-elgibile if they were born after 1981 or if they were born in the first or second quarter (before July) of 1981.

[6]The smallest geography available in the ACS is the Public Use Microdata Area (PUMA). Since PUMA boundaries change during our period of study, we use the CPUMA boundaries to ensure consistent geographic boundaries. In total, there are 1,078 CPUMAs. In Section 4.2, we show our results are robust to using alternative geographic boundaries such as commuting zones.

3.1 Difference-in-differences

To identify the effects of DACA on immigration, we compare immigration patterns between geographies with high and low DACA eligible shares before and after DACA. Specifically, we use a difference-in-difference approach and estimate the following specification:

$$y_{ct} = \alpha_c + \alpha_t + \beta \text{DACA Share}_c \times \text{Post}_t + X_{ct} + \varepsilon_{ct} \quad (1)$$

where y_{ct} is the outcome of interest in CPUMA c in year t. For the main results, the outcome of interest is the number of immigrants relative to the baseline population in 2005 ($100 \times \frac{immigrants_{ct}}{pop_{c2005}}$), which we refer to as the immigrant population share. We also estimate the effect of DACA on the number of immigrants by citizenship status (i.e., on the naturalized citizen share and the noncitizen share). DACA Share$_c$ is the DACA eligible population share in 2005 in CPUMA c and Post$_t$ is an indicator equal to one for years $t \in [2012, 2019]$.

Exposure to DACA is correlated with other CPUMA characteristics which may shape immigration patterns over time. First, places with high DACA eligible shares have higher levels of immigration. Following Battaglia (2023), we allow for different effects of baseline immigration by categorizing CPUMAs as high, medium, or low immigration based on their baseline immigrant population share tercile and interacting this categorical variable with year fixed effects. We are thus identifying the effects of exposure to DACA by comparing CPUMAs with similar immigration levels before DACA. In Section 4.2, we include additional controls to address confounding immigration shocks and obtain similar results.

In addition to immigration, we also measure the following baseline characteristics and interact them with year fixed effects: i.) Hispanic population share, ii.) Black population share, iii.) the share of the working-age population with a college degree or more, iv.) and the average age. These controls allow for differential trends in immigration patterns based on these CPUMA characteristics. We include these baseline controls $\times$ year fixed effects and the immigrant population share tercile $\times$ year fixed effects in X_{ct}.

We estimate equation 1 on the panel of CPUMAs (n=1,078) for the years 2006-2019 and cluster standard errors at the CPUMA level. Our coefficient of interest is β, which measures the average percentage change in the population driven by changes in the eight years after DACA (2012-2019).

Identifying Assumptions: The identifying assumption underlying out empirical strategy is that the counterfactual trends in immigration for high DACA exposure CPUMAs are parallel to trends for low DACA exposure CPUMAs conditional on the controls. In the next section, we estimate event-study style versions of equation 1 which support the validity of this assumption. In addition to the parallel trends assumption, in order for β to isolate the effects of DACA exposure, we must assume there are not other shocks that occur post-DACA that are correlated with DACA exposure. In Section 5.2, we exploit specific eligibility requirements to ensure that the effects we

observe are indeed driven by DACA as opposed to some other policy or shock.

4 Effects of DACA on Immigration

4.1 Main Results

Figure 2 shows the coefficients along with 95 percent confidence intervals for the event study regression of equation 1 for the immigrant (panel (a)), noncitizen (panel (b)), and naturalized citizen (panel (c)) population shares between high and low DACA exposure CPUMAs. This regression separately estimates the interactions between the year and the DACA eligible population share, with 2011 as the omitted year.

The estimates show similar pre-trends across CPUMAs, lending support to the identifying assumption. Turning to the post-period, the results show that a few years after the policy was established, exposure to DACA increased the immigrant share. Interestingly, this increase in immigration was driven entirely by an increase in the number of naturalized citizens, while the number of noncitizens declined slightly but insignificantly.

Table 1 reports results of equation 1, which estimates the average effect of DACA from 2013-2019. The odd-numbered columns include our baseline controls described in Section 3.1, while the even-numbered columns additionally include Bartik labor demand controls for all workers, all immigrant workers, noncitizen workers, and naturalized citizen workers. The results suggest that 1 p.p. increase in the DACA eligible share increased the immigrant share by between 0.33 and 0.35 p.p. Consistent with the event study results, this increase was fully accounted for by an increase in naturalized citizens, with no significant change in the number of noncitizens.

These results suggest that areas with large DACA-eligible populations did not experience an increase in the number of noncitizens, despite the possibilities of chain migration and decreased out-migration of existing noncitizens. Instead, we find striking evidence that DACA led to a significant increase in the number of naturalized citizens.

4.2 Robustness Checks

Before exploring the channels and mechanisms, we first assess the robustness of our main results to several potential confounders. We describe each in turn below.

Sensitivity to Weighting and Geography. The baseline analysis uses the CPUMA geography available in the IPUMS ACS given its consistency over time and weights each observation equally. In Figure 3, we show that the baseline results are similar when weighting by the baseline population (see "Weight by Pop." coefficients and confidence intervals). This suggests that the baseline results are similar to the population-weighted average effect and that there does not appear to

be any heterogeneity by population size. We also show that the results are similar when we use the commuting zone geography using the crosswalks provided by Autor and Dorn (2013) (see "Commuting Zone" coefficient and condience intervals).

Addressing Confounding Immigration-Related Shocks. One potential concern is that our estimates may capture the effects of other factors correlated with exposure to DACA, particularly changes in immigration policy affecting noncitizens. We address this in several ways.

First, we control for shocks affecting childhood arrivals by exploiting DACA's age requirement, which stipulated that individuals had to be 30 or younger as of June 2012 to qualify. We identify immigrants who meet all other DACA eligibility criteria but exceed this age threshold. We then measure the population share of these age-ineligible immigrants and estimate a version of equation 1 that includes DACA age-ineligible share $\times$ year fixed effects, thus controlling for shocks affecting noncitizen childhood arrivals. By including this control, we isolate the effect from changes in immigration across areas with similar numbers of noncitizen childhood arrivals. Identification comes from differences in the age composition of these arrivals, as some municipalities had slightly younger cohorts. We similarly find significant increases in the number of naturalized citizens when using this approach (see the "Age-Ineligible" coefficients and confidence intervals in Figure 3), providing reassuring evidence that we are capturing the effects of exposure to DACA.

Second, we control for shocks to general immigration levels. We create matched pairs of CPUMAs using nearest-neighbor matching based on baseline immigrant and noncitizen population shares in 2005 and include pair $\times$ year fixed effects. Including these 500+ CPUMA-pair *times* year fixed effects, allows us to control flexibly for shocks affecting areas with high overall immigration and noncitizen immigration. Even among such similar geographies in terms of immigration, the impact of exposure to DACA remains large and significant (see "Immigrant Share Pair" and "Noncitizen Share Pair" coefficients and confidence intervals in Figure 3).

Robustness to Regional and Economic Shocks. Given the geographic variation in the DACA-eligible population, we also present results that account for regional shocks. Specifically, we estimate a version of equation 1 which includes census division $\times$ year fixed effects. To address the impact of the Great Recession, which impacted immigration patterns (Cadena and Kovak (2016) and Caballero et al. (2023)), we control for the change in the employment rate from 2006 to 2010 by year fixed effects. The results when including these controls (see "Great Recession" and "Census Division Shocks" coefficients and confidence intervals in Figure 3) remain consistent with our core findings.

5 Channels and Mechanisms

How and why would DACA exposure lead to an increase in the naturalized citizen share? In this subsection we study potential channels and mechanisms.

5.1 Channels for the Increase in Number of Naturalized Citizens

We first explore the channel(s) through which DACA increases the number of naturalized citizens. The increase in the number of naturalized citizens could occur through two channels: (1) changes in the in-migration or out-migration of already naturalized immigrants, and (2) increased naturalization of noncitizens. To study these channels, we estimate the effects of DACA on the in-migration and out-migration rates of naturalized citizens and the naturalization rates of noncitizens.

Changes in Migration of Naturalized Citizens. Areas with large DACA-eligible populations could become more attractive destinations for naturalized citizens. If more naturalized citizens move to—or fewer move away from—these areas, this could explain the overall increase in the number of naturalized citizens.

Using information on the PUMA of residence one year prior, we calculate the naturalized citizen in-migrant share as the number of naturalized citizens moving to CPUMA c from $t-1$ to t relative to the baseline population in 2005 ($100 \times \frac{in-migrants_{ct}}{pop_{c2005}}$) and the naturalized citizen out-migrant share as the number of naturalized citizens in CPUMA c in $t-1$ that moved to a different CPUMA in t ($100 \times \frac{out-migrants_{ct}}{pop_{c2005}}$).

Panels (a) and (b) of Figure 4 show the effect of DACA on these migration shares. The results suggest that DACA did not meaningfully increase or decrease the in-migration or out-migration of naturalized citizens, indicating that the increase in the number of naturalized citizens in high DACA-exposure areas is not driven by changes in migration patterns.

It is worth noting that the out-migration share reflects migration to other destination CPUMAs in the U.S. and does not capture international migration. However, emigration among noncitizens is relatively low. In 2019, an estimated 3.2 million U.S. citizens (both citizens-at-birth and naturalized citizens) were living abroad (United Nations Department of Economic and Social Affairs, Population Division 2019), accounting for only 1 percent. Therefore, emigration cannot explain the large increase in the number of naturalized citizens resulting from DACA.

Increased Naturalization of Non-Citizens. We show that the increase in the number of naturalized citizens appears to be driven by increased naturalization rates of noncitizens. To do this, we estimate a version of equation 1 at the individual-level. We follow Amuedo-Dorantes and Lopez (2021) and use the sample of individuals that could have recently naturalized using the IPUMS ACS data. Specifically, we limit the sample to noncitizens or naturalized citizens from

2008-2019[7] that naturalized in the current or previous year ages 18 or older that had been in the U.S. for at least five years. With this sample, we estimate the following individual-level event study equation:

$$y_{ict} = \alpha_c + \sum_{\tau=2007-08}^{2018-19} \beta_\tau \text{DACA Share}_c \times 1\{t \in \tau\} + X_{ct} + Z_{it} + \varepsilon_{ict} \tag{2}$$

where y_{ict} is an indicator (multiplied by 100) for naturalizing in the current or previous year based on their reported year of naturalization. This individual-level specification mirrors the baseline CPUMA-level event study specification, including CPUMA fixed effects (α_c) and time-varying CPUMA controls (X_{ct}) and additionally includes controls for individual characteristics, Z_{it}, which may predict naturalization. These include a linear control for age and years since immigration, gender, birth country, and education level fixed effects. When estimating this equation, we cluster standard errors at the CPUMA-year level.

Figure 6 presents the results from equation 2. The estimates show no significant differential trends in naturalization rates before DACA. Immediately after DACA, naturalization rates increased significantly in areas with a larger DACA-eligible population share relative to areas with a smaller share. In the 2012-2013 period, a 1 p.p. increase in the DACA-eligible share raised naturalization rates by approximately 0.5 percentage points, a 6.8 percent increase relative to the sample mean naturalization rate. The results indicate that DACA continued to boost naturalization rates through the 2014-2015 and 2016-2017 periods, though at a smaller magnitude. By 2018-2019, the effect of DACA on naturalization rates disappeared. These patterns are consistent with the CPUMA-level results in Figure 2, panel (c), which show a sharp initial increase in the number of naturalized citizens that slows in subsequent years before leveling off in the 2018-2019 period.

As with the baseline results, the response to DACA is nearly immediate. How could individuals respond so quickly to the policy and naturalize? First, there could be some anticipation that a pro-immigrant policy would be implemented under President Obama, leading individuals to begin the naturalization process as soon as the first hint of such a policy was discussed. Second, the process to naturalize for those eligible-to-naturalize can be only a few months. As soon as eligible-to-naturalize individuals knew of the policy, they could begin the process and be naturalized shortly after. That the effect of DACA on naturalization diminished and disappeared in by 2018-2019 also aligns with the atmosphere of that time. President Trump rescinded DACA in 2017, which could lead to individuals being apprehensive of engaging with the immigration system.

5.2 Why did DACA Increase Naturalization?

We now turn to exploring the potential explanations as to why DACA increased naturalization.

[7]The year of naturalization variable is available starting in 2008.

One possibility is that DACA status led to increased naturalization. In other words, the increase in naturalization was driven by DACA beneficiaries. This possibility seems unlikely to explain our results as DACA does not offer a direct pathway to citizenship. According to the Congressional Research Service, by 2019, only 4,000 DACA beneficiaries had naturalized, which cannot explain the large increase in naturalization we observe.

A second possibility is that exposure to DACA led to changes in the economic returns to citizenship. We find that exposure to DACA did not increase the labor market returns to citizenship, suggesting this is not the likely explanation. Table 2 presents results on the effects of exposure to DACA on citizen/noncitizen gaps in log earnings (columns 1-2), log hourly wages (columns 3-4), employment rates (columns 5-6), and the number of hours worked (columns 7-8). We calculate these gaps at the CPUMA-year level. In even-numbered columns, we residualize these labor market outcomes on several characteristics including a square in age, years since immigration, a Hispanic indicator, birthplace and education level $\times$ gender fixed effects. The results show that there is no meaningful change in the returns to citizenship across any of these labor market outcomes, which suggests that the increase in naturalization is likely not driven due to increased economic incentives.

Instead we provide suggestive evidence for a third possibility: that by protecting undocumented immigrants, DACA may have encouraged DACA eligible immigrants' contacts to naturalize. There are three potential reasons why DACA eligibility may have encouraged others to naturalize.

First, DACA may have increased the incentives to naturalize for legal permanent residents with DACA eligible contacts. One of many benefits of citizenship is the relative ease of sponsoring relatives for green cards. However, there are difficulties in sponsoring undocumented immigrants living in the U.S., especially those who entered illegally. DACA provided new pathways for eligible immigrants to become sponsored. DACA beneficiaries who entered the U.S. illegally were granted access to Advance Parole, which allows them to travel abroad and re-enter legally, making it possible for them to be sponsored for a green card or legal status.

Second, DACA may have also decreased the perceived barriers of naturalization. As mentioned in Section 2.2, part of the naturalization process includes submitting an application. The N-400 application requires applicants to provide information about themselves, including information on their household members. Those living in mixed-status households may fear that submitting this application could lead to their household undocumented family members being detained. By protecting eligible immigrants, DACA may have reduced these fears.

Lastly, DACA likely reduced uncertainty regarding the immigration status for eligible immigrants as well as their close contacts. This may have encouraged their close contacts to commit to living long-term in the U.S., potentially culminating in their naturalization. We explore this possibility below.

Exposure to DACA Eligible Household Members. To shed light on this mechanism, we leverage variation across households in exposure to DACA eligible household members. We also take advantage of the age-eligibility condition that individuals had to be 30 or younger as of June 2012, when DACA was established.

We identify households in the ACS data with foreign-born childhood arrivals. These are individuals meeting the following observable DACA eligibility criteria: 1.) in school or having at least a high school degree, 2.) arriving in the U.S. before the age of 16 and before 2007, and 3.) being 15 years or older at the time of the survey.

We then identify immigrants living in households with these foreign-born childhood arrivals and limit the sample to noncitizens or naturalized citizens that naturalized in the current or previous year ages 18 or older that had been in the U.S. for at least five years from 2008-2019.[8] We also drop the foreign-born childhood arrivals themselves from the sample so that we can identify the spillover effects of living with a DACA eligible household member.

To identify the effects of living with a DACA eligible household member, we follow several papers in the DACA literature which exploit this age-eligibility threshold and compare the naturalization rates for immigrants in households with age-eligible foreign-born childhood arrivals relative to immigrants in household with age-ineligible foreign-born childhood arrivals before and after DACA.

One potential concern is that age-eligible immigrants are younger than age-ineligible immigrants and it is possible that the counterfactual trends in naturalization rates for those who live with younger household members may be different than the trends for those who live with slightly older household members. To address this, we use an additional layer of variation that has been used in the DACA literature, which is whether your immigrant household member is a citizen or a noncitizen (Kuka et al. 2020). Between these two groups, the noncitizens stand to benefit directly from DACA. Combining these two pieces of identifying variation provides the following triple-difference estimator:

$$\delta^{DDD} = [(r_{e,nc}^{Post} - r_{e,nc}^{Pre}) - (r_{i,nc}^{Post} - r_{i,nc}^{Pre})] - [(r_{e,c}^{Post} - r_{e,c}^{Pre}) - (r_{i,c}^{Post} - r_{i,c}^{Pre})] \tag{3}$$

where $r_{j,k}$ is the naturalization rate for immigrants living in one of the four corresponding household types, where j corresponds to the eligibility status of the household's childhood arrival (age-eligible (e) or age-ineligible (i)) and k corresponds to the citizenship status (citizen (c) or noncitizen (nc)). The post-period is from 2012-2019 and the pre-period is from 2008-2011.

[8]The year of naturalization variable is available starting in 2008.

We estimate the triple difference of interest in the following regression specification:

$$y_{ict} = \alpha_{ct} + X_{it} + \beta_1 Eligible_{h(i)} + \beta_2 Noncitizen_{h(i)} + \beta_3(Eligible_{h(i)} \times Noncitizen_{h(i)}) + \beta_4(Eligible_{h(i)} \times Post_t) + \beta_5(Noncitizen_{h(i)} \times Post_t) + \beta_6(Eligible_{h(i)} \times Noncitizen_{h(i)} \times Post_t) + \varepsilon_{ict} \quad (4)$$

where y_{ict} is an indicator if an observation naturalized in the current or previous year, $Eligible_{h(i)}$ indicates if the household childhood arrival is age-eligible, $Noncitizen_{h(i)}$ indicates if the household childhood arrival is a non-citizen, and $Post_t$ indicates survey years after DACA's implementation in 2012. As in Section 5.1, we additionally include controls for individual-level characteristics, Z_{it}, including age, household size, years since immigration, and birth country and education level fixed effects. We also include CPUMA $\times$ year fixed effects and Bartik labor demand shocks for immigrants. The coefficient of interest, β_6, represents the desired triple-difference from Equation 3, quantifying the change in naturalization rates for immigrants residing with age-eligible noncitizen childhood arrivals compared to age-ineligible noncitizen childhood arrivals, compared to the same difference for citizen childhood arrivals.

The results, shown dynamically in Figure 7, suggest a positive and significant effects on the naturalization rate for immigrants living in households with DACA-eligible immigrants. In particular, the naturalization rate for immigrants residing with age-eligible non-citizen childhood arrivals increased by approximately 4.5 p.p. compared to those residing with age-ineligible non-citizen childhood arrivals, compared to the same difference for citizen childhood arrivals.

The dynamic result is summarized in Table 3. Column 1 presents the baseline results with no individual controls. Column 2 adds the individual controls discussed above. Columns 3 and 4 repeat the analysis on the sample limited to households with one type of childhood arrival. Across all specifications, the results show consistent positive and significant effects on the probability of naturalizing. This evidence is consistent with DACA eligibility encouraging naturalization among recipients' contacts.

6 Conclusion

This paper provides the first causal estimates on how DACA impacted immigration-related outcomes, including immigration and naturalization. We exploit geographic variation in exposure to DACA-eligible immigrants and a difference-in-differences design and find exposure to DACA-eligible immigrants led to a significant increase in the number of naturalized citizens but did not increase the number of noncitizens. This increase in the number of naturalized citizens in high exposure areas is driven by increased naturalization among previous noncitizens rather than by changes in migration patterns of already naturalized citizens.

We provide evidence supporting the idea that DACA encouraged the contacts of DACA-eligible immigrants to naturalize. In particular, DACA may have increased the incentives to naturalize due to the ability to sponsor DACA-eligible recipients for legal status, while also reducing uncertainty or fear around naturalizing while residing in a mixed-status household. We find naturalization increases among individuals residing in households with a noncitizen childhood arrival who meets DACA's age requirements, compared to those in households with childhood arrivals who do not meet the age or citizenship requirements. These findings are important given the ongoing immigration climate in the U.S., coupled with DACA's uncertain future.

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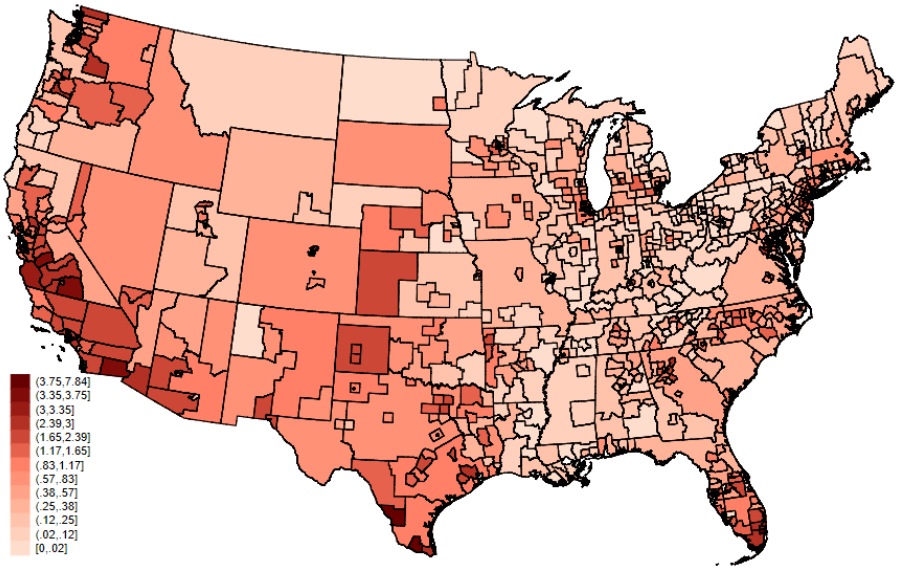
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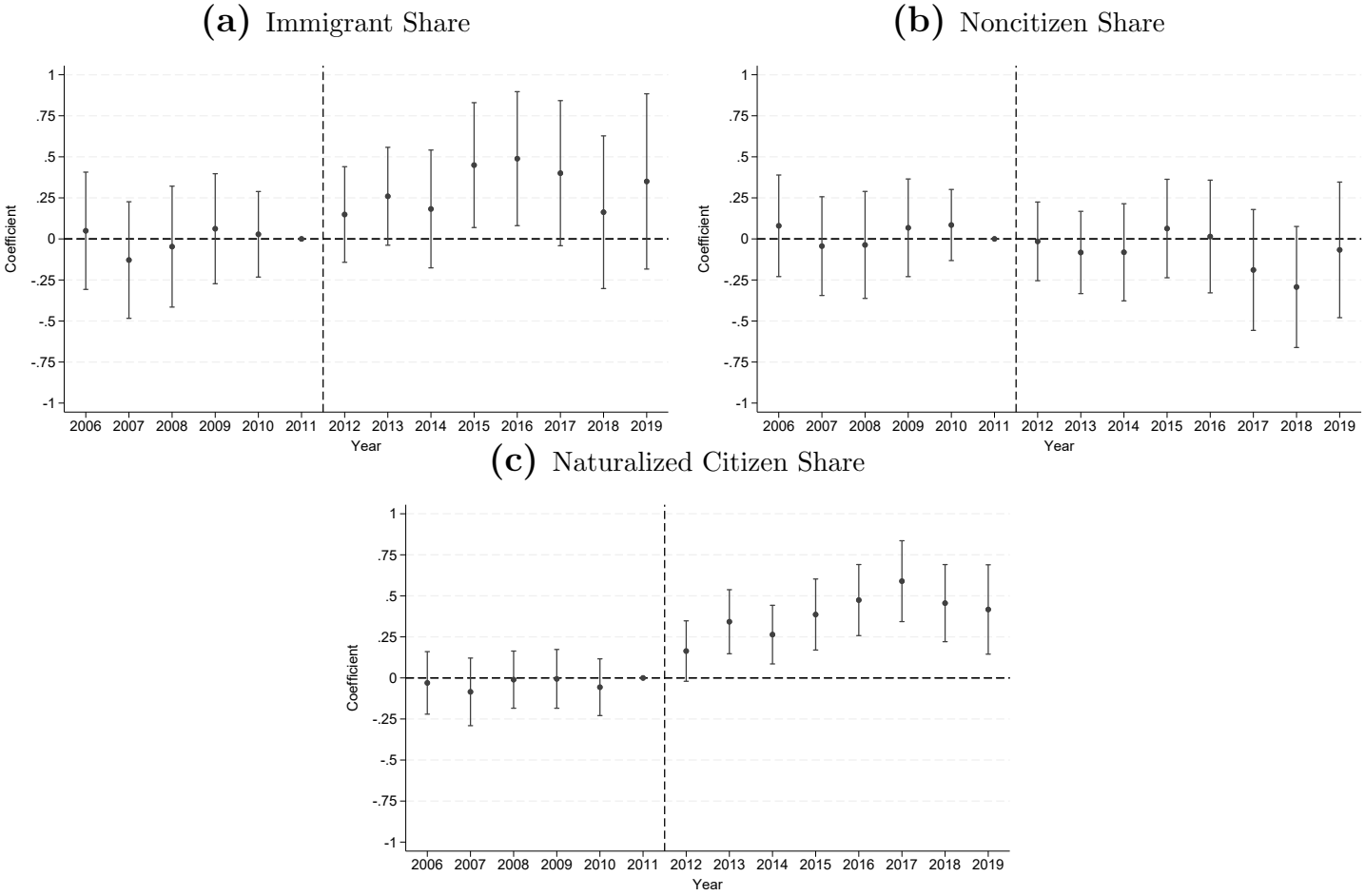
Figures

Figure (1) DACA Eligible Share



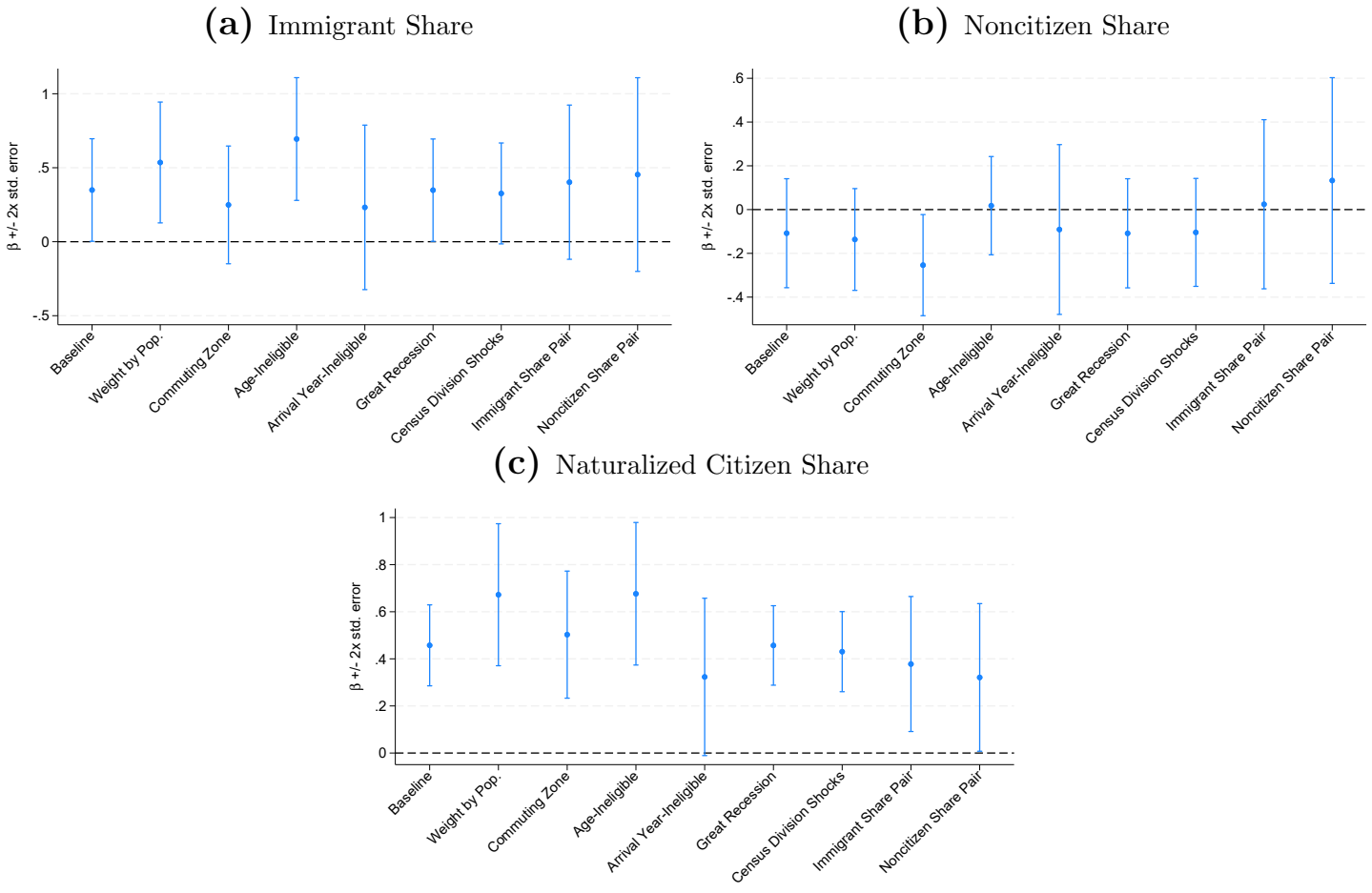
Notes: This map shows the DACA eligible population share in 2005. The geographic units are Consistent Public Use Microdata Areas (CPUMAs).

Figure (2) Effects of DACA on Immigration



Notes: These figures show point estimates of coefficients and 95 percent confidence intervals from event study regressions similar to equation 1 which separately estimates interactions between the year and the DACA eligible share. 2011 is the omitted year. The dependent variables are the immigrant share, the noncitizen share, and the naturalized citizen share in panels (a), (b), and (c) respectively. Regressions includes CPUMA fixed effects, Bartik labor demand shocks for immigrants, noncitizens, and naturalized citizens, and the following baseline (pre-DACA) controls interacted with year fixed effects: immigrant population share tercile; Black, Hispanic, poverty, and college-educated shares; and the natural log of the population. Standard errors are clustered at the CPUMA level. The dashed line demarcates the implementation of DACA.

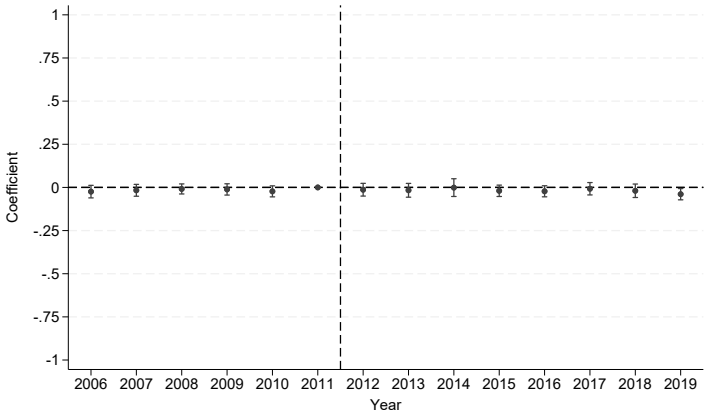
Figure (3) Robustness of Main Results



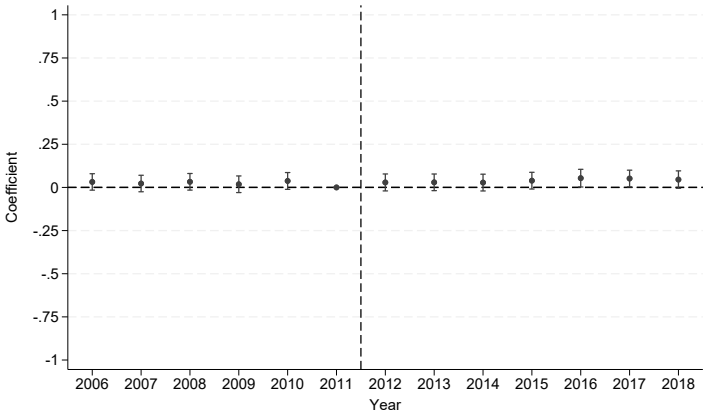
Notes: These figures show point estimates of coefficients and 95 percent confidence intervals estimating equation 1. The outcome in panel (a) is the immigrant share, in panel (b) is the noncitizen share, and in panel (c) is the naturalized citizen share. Each coefficient represents the estimate from a different regression. The first coefficient reproduces the baseline results including CPUMA fixed effects, Bartik labor demand shocks for immigrants, noncitizens, and naturalized citizens, and the following baseline (pre-DACA) controls interacted with year fixed effects: immigrant population share tercile; Black, Hispanic, poverty, and college-educated shares; and the natural log of the population. The "Weight by Pop." coefficients weight the regression by the CPUMA population. The "Commuting Zone" coefficients conducts the analysis at the commuting zone level. The "Age-Ineligible" coefficients include the DACA age-ineligible share by year fixed effects. The "Arrival Year-Ineligible" coefficients include the DACA arrival year-ineligible share by year fixed effects. The "Great Recession" coefficients include controls for the Great Recession severity as discussed in the text. The "Census Division Shocks" includes census division by year fixed effects. The "Immigrant Share Pair" and "Noncitizen Share Pair" matches each CPUMA to its nearest neighbor based on immigrant share and noncitizen share, respectively, and then includes these pair by year fixed effects. Standard errors are clustered at the CPUMA level. The dashed line demarcates the implementation of DACA.

Figure (4) In-Migration and Out-Migration of Naturalized Citizens

(a) Naturalized Citizen In-Migrant Share



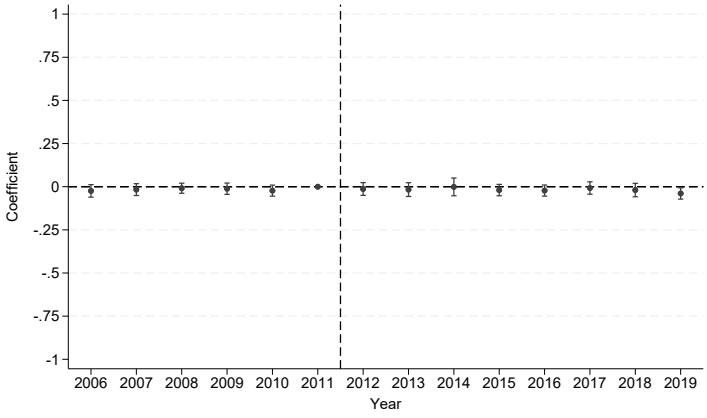
(b) Naturalized Citizen Out-Migrant Share



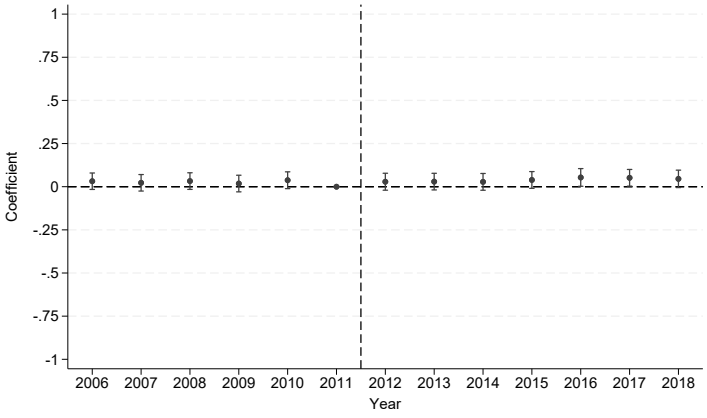
Notes: These figures show point estimates of coefficients and 95 percent confidence intervals from event study regressions similar to equation 1 which separately estimates interactions between the year and the DACA eligible share. 2011 is the omitted year. The dependent variables are the naturalized citizen in-migrant (number of naturalized citizens moving to CPUMA c from $t-1$ to t) share and the naturalized citizen out-migrant (number of naturalized citizens in CPUMA c in $t-1$ that moved to a different CPUMA in t) share in panels (a) and (b) respectively. Regressions includes CPUMA fixed effects, Bartik labor demand shocks for immigrants, noncitizens, and naturalized citizens, and the following baseline (pre-DACA) controls interacted with year fixed effects: immigrant population share tercile; Black, Hispanic, poverty, and college-educated shares; and the natural log of the population. Standard errors are clustered at the CPUMA level. The dashed line demarcates the implementation of DACA.

Figure (5) In-Migration and Out-Migration of Noncitizens

(a) Noncitizen In-Migrant Share

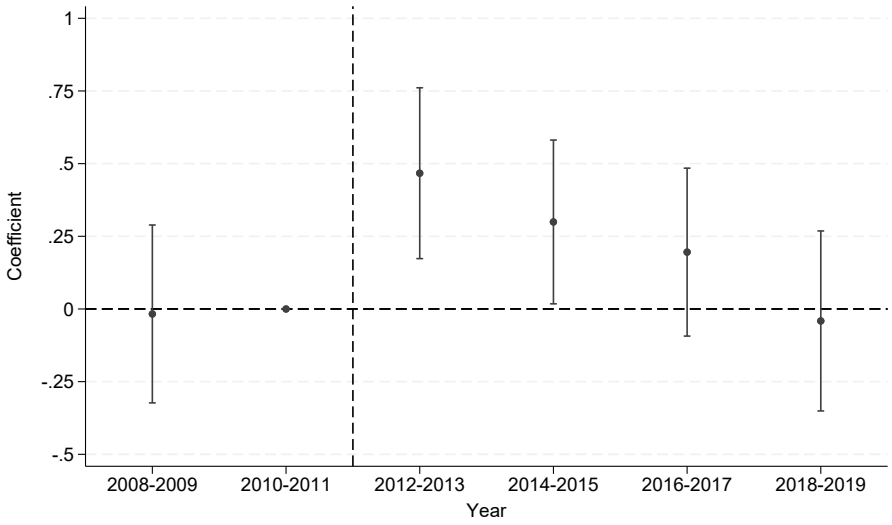


(b) Noncitizen Out-Migrant Share



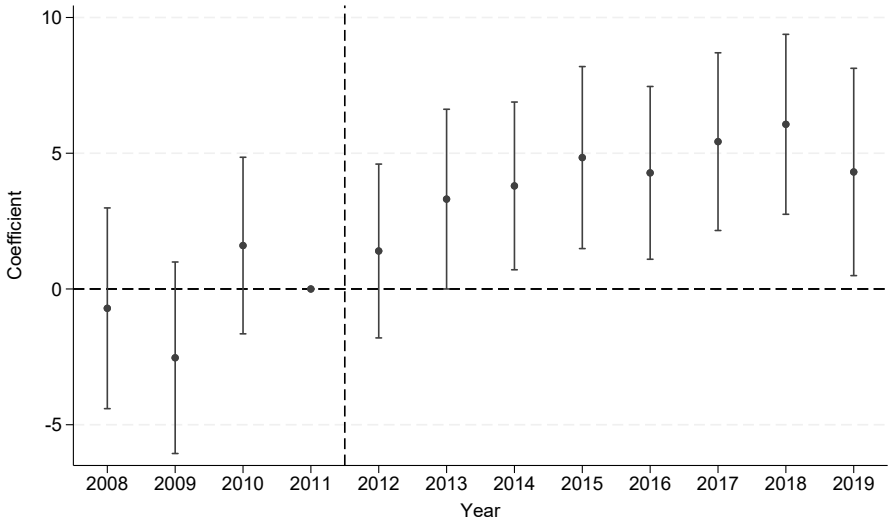
Notes: These figures show point estimates of coefficients and 95 percent confidence intervals from event study regressions similar to equation 1 which separately estimates interactions between the year and the DACA eligible share. 2011 is the omitted year. The dependent variables are the noncitizen in-migrant (number of naturalized citizens moving to CPUMA c from $t-1$ to t) share and the naturalized citizen out-migrant (number of naturalized citizens in CPUMA c in $t-1$ that moved to a different CPUMA in t) share in panels (a) and (b) respectively. Regressions includes CPUMA fixed effects, Bartik labor demand shocks for immigrants, noncitizens, and naturalized citizens, and the following baseline (pre-DACA) controls interacted with year fixed effects: immigrant population share tercile; Black, Hispanic, poverty, and college-educated shares; and the natural log of the population. Standard errors are clustered at the CPUMA level. The dashed line demarcates the implementation of DACA.

Figure (6) Effect of DACA Exposure on Naturalization Hazard



Notes: This figure shows point estimates of coefficients and 95 percent confidence intervals from an event study regression similar to equation 2 which separately estimates interactions between two-year period indicators and the DACA eligible share. 2010-2011 is the omitted two-year period. The dependent variable is an indicator (× 100) for whether the individual naturalized in the current or previous year. The regression includes CPUMA fixed effects, Bartik labor demand shocks for immigrants, noncitizens, and naturalized citizens, and the following baseline (pre-DACA) controls interacted with year fixed effects: immigrant population share tercile; Black, Hispanic, poverty, and college-educated shares; and the natural log of the population. Standard errors are clustered at the CPUMA-year level. The dashed line demarcates the implementation of DACA.

Figure (7) Effect of Exposure to DACA Eligibile Household Members on Naturalization Hazard



Notes: This figure shows point estimates of coefficients and 95 percent confidence intervals from an event study regression similar to equation 4 which separately estimates triple interactions between the year, the household member age-eligible indicator, and the household member non-citizen indicator. 2011 is the omitted year. The dependent variable is an indicator (× 100) for whether the individual naturalized in the current or previous year. The regression includes CPUMA × year fixed effects, Bartik labor demand shocks for immigrants, and the following individual controls: age, household size, years since immigration, and birth country and education level fixed effects. Standard errors are clustered at the CPUMA-year level. The dashed line demarcates the implementation of DACA.

Tables

Table (1) Effects of DACA on Immigration

	Naturalized Share		Noncitizen Share		Immigrant Share	
	(1)	(2)	(3)	(4)	(5)	(6)
DACA Eligible Share × Post	0.450***	0.457***	-0.116	-0.108	0.334*	0.349**
	(0.088)	(0.088)	(0.127)	(0.127)	(0.178)	(0.177)
CPUMA FEs	Yes	Yes	Yes	Yes	Yes	Yes
Immig. Share Tercile x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Baseline CPUMA Controls x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Bartik Controls		Yes		Yes		Yes
Dep. Var. Mean	6.749	6.749	7.352	7.352	14.102	14.102
Observations	14,014	14,014	14,014	14,014	14,014	14,014

Notes: This table shows results from estimating Equation 1. The dependent variables are the immigrant share (columns 1-2), the noncitizen share (columns 3-4), and the naturalized citizen share (columns 5-6). In each column, the sample is composed of the panel of CPUMAs for the years 2006-2011 and 2013-2019. The baseline (pre-DACA) controls include the Black, Hispanic, poverty, and college-educated shares and the natural log of the population. Standard errors are clustered at the CPUMA level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

Table (2) Effect of DACA on Labor Market Returns to Citizenship

	Δln(earnings)		Δln(hourly wage)		%Δemployment rate		%Δhours worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DACA Eligible Share × Post	0.001	-0.006	0.001	-0.005	0.001	-0.002	-0.010	-0.009
	(0.008)	(0.006)	(0.006)	(0.004)	(0.005)	(0.004)	(0.014)	(0.009)
CPUMA FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Immig. Share Tercile x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CPUMA Controls x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bartik Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Residualized		Yes		Yes		Yes		Yes
Dep. Var. Mean	0.345	0.067	0.270	0.034	0.138	0.105	0.132	0.100
Observations	13,886	13,886	13,886	13,886	13,904	13,904	13,925	13,925

Notes: This table shows results from estimating equation 1. The dependent variables are the difference in mean log earnings (columns 1-2), the difference in mean log hourly wage (columns 3-4), the percentage difference in employment rates (columns 5-6), and the percentage difference in mean hours worked (columns 7-8) between citizens and non-citizens. In the even-numbered columns, each labor market outcome is residualized on a square in age, years since migration, and birth country and gender × education fixed effects. In each column, the sample is composed of the panel of CPUMAs for the years 2006-2011 and 2013-2019 for the which there is a non-missing value in the dependent variable. The baseline (pre-DACA) controls include the Black, Hispanic, poverty, and college-educated shares and the natural log of the population. Standard errors are clustered at the CPUMA level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

Table (3) Effect of Living With DACA Eligible Household Member on Naturalization Hazard

			One Child Arrival	
	(1)	(2)	(3)	(4)
Eligible × Noncitizen × Post	4.504***	4.787***	4.436***	4.761***
	(0.779)	(0.761)	(0.836)	(0.818)
CPUMA x Year FEs	Yes	Yes	Yes	Yes
Individual Controls and FEs		Yes		Yes
Dep. Var. Mean	6.819	6.819	6.948	6.948
Observations	257,835	257,832	225,105	225,105

Notes: This table shows results from estimating Equation 4. The dependent variable is an indicator equal to one if the respondent naturalized in the current or previous year. In each column, the sample is composed of non-citizens or naturalized citizens that naturalized in the current or previous year living with foreign-born childhood arrivals from 2008-2011 and from 2013-2019. Columns 3 and 4 further restrict this sample to individuals only living with one foreign-born childhood arrival. The baseline (pre-DACA) controls include the Black, Hispanic, poverty, and college-educated shares and the natural log of the population. Individual controls include gender, age, and education and birth country fixed effects. Standard errors are clustered at the CPUMA level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.