

# Does Work Eligibility Work for Foreign-born Women? H-4 Visa Policy and Labor Outcomes

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**Abstract:** Foreign-born married women in the U.S. have historically lower labor force participation rates (LFPR) than comparable natives. In addition to family and individual characteristics discrepancies between foreign- and native-born women, foreign-born married women often face work restrictions according to their visa status in the U.S. This paper quantitatively explores the labor market effects of an H-4 Employment Authorization Document (EAD) policy change, which allowed spouses of certain H-1B visa holders to work legally in the United States. I use American Community Survey data from 2010-2019 and the difference-in-differences approach to compare labor outcomes for selected noncitizens and naturalized citizens before and after the policy change, controlling for family and individual characteristics. I find that this policy change significantly increased LFPR and employment-to-population ratio (EPR), indicating that visa work restrictions keep some foreign-born out of the labor market.

JEL classification: J15, J21

## 1. Introduction

The share of foreign-born workers in the U.S. civilian labor force has steadily increased in the past two decades, 17.4 percent in 2019 compared to 13.3 percent in 2000 (U.S. Bureau of Labor Statistics, 2020)<sup>1</sup>. While foreign-born men have higher labor force participation rates (LFPR) than natives, foreign-born women were less likely to be in the labor force than native-born women. The overall female labor force participation rate (LFPR) in the United States increased significantly over several decades and started decreasing slowly in the 2000s (Juhn and Simon, 2006; Toossi and Morisi, 2017). However, the gap between these two groups is consistent over time. In 2019, 54.8 percent of foreign-born women were on the labor market, 3 percent less than native-born women (U.S. BLS, 2020). The gap is even more prominent among married women. As Figure 1 shows, noncitizen married women have the lowest LFPR among married women. Thus, this raises one question: Why do foreign, especially noncitizen, married women have such a low LFPR?

Compared to natives, foreign-born individuals face more barriers in the labor market. One primary constraint is visa limitations, which determine the legal right to work. Many married female noncitizens who come with spouse visas are forced to be out of the labor market due to the work restrictions of most spouse visas for nonimmigrant workers (Appendix A1). H-4 (dependent family of H-1/2/3 nonimmigrants<sup>2</sup>) is one of the most common spouse visa types: as Appendix Table A2 shows, from 2015 to 2019, over 120,000 H-4 applications have been

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<sup>1</sup> Foreign-Born Workers: Labor Force Characteristics — 2019. USDL-20-0922

<sup>2</sup> H-1B: Temporary worker of distinguished merit and ability performing services other than as a registered nurse; H-1C: Shortage area nurse; H-2A: Temporary worker performing agricultural services; H-2B: Temporary worker performing other services; H-3: Trainees other than medical or academic.

approved each year. Before 2015, individuals residing in the U.S. with an H-4 visa were prohibited from working. In 2015, under the Obama administration, the work eligibility of H-4 visa holders changed. Beginning May 26, 2015, certain eligible H-4 dependent spouses of H-1B temporary workers can apply for employment authorization documents (EAD), with which they can work legally in the U.S. Specifically, new work authorization rules were extended to H-4 visa holders whose spouses are on H-1B and get approved Form I-140 (Immigrant Petition for Alien Workers) relax the work constraint, thus may help improve particular group's labor market performance.

In this paper, I exploit the H-4 EAD policy change to examine the effect of legal restrictions as well as other potential factors that drive low LFPR for foreign married women. In principle, the expected impact of H-4 EAD on labor market outcomes is not obvious. One might expect that the work authorization relaxes the labor market constraints, and therefore eligible individuals are more likely to participate in the labor force and be employed. However, foreign married women may choose to stay out of the labor market due to their own choices, such as family concerns, making the impact of the H-4 EAD policy not straightforward. Kornstad and Thoresen (2007) employ a discrete choice model for labor supply and childcare and find that mothers' labor participation rates decrease with non-labor income (family income other than mother's income) and childcare costs. Moreover, the number of children, especially young kids (Xie, 1997), and whether they have grandparents residing in the household to help with childcare are other potential determinants. In contrast to native-born mothers, foreign-borns are less likely to get child caring support from their parents (Wilson, 2012)<sup>3</sup>; therefore, they might be more

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<sup>3</sup> Wilson (2012) points out that native-born grandparents are more likely to be caregivers than foreign-born grandparents.

likely to stay out of the labor market, especially when they have preschool kids to take care of. Hu (2018) finds that foreign-born mothers with a coresiding parent have an around 7.4 percent higher labor force participation rate. There exist some other determinants in labor choice decisions. Education may be one of them. England et al. (2016) find that the most privileged high-skilled and high-paid women experience the highest motherhood penalty. High-educated women may face a higher opportunity cost of exiting the labor force since they may gain considerable income if employed. Moreover, original cultural influences also impact immigrant women's labor force participation rate (Read, 2004; Frank and Hou, 2015).

Although many previous studies have been done on female labor force participation decisions, most focus on women's individual choices to work, such as the effect of family, childcare, and birth country culture. None of them, to my knowledge, has studied the impact of H-4 EAD policy on female immigrants' working decisions. This study aims to explore whether work eligibility affects women's work choices, allowing for discrepancies among their backgrounds. Several papers investigate how other Immigration Acts affect the targeted population. For example, the Deferred Action for Childhood Arrivals (DACA), which provides temporary work authorization and reprieve from deportation for eligible undocumented immigrants, improves labor market outcomes (Pope, 2016; Amuedo-Dorantes and Antman, 2017). On the other hand, negative immigration enforcement like Secure Communities (S.C.) decreased the employment rate of undocumented male immigrants (East et al. 2020).

The paper uses the American Community Survey (ACS) data from 2010 to 2019 to explore the impact of this policy change. The analysis relies on a difference-in-differences approach comparing specific noncitizens who were likely eligible for the H-4 EAD to comparable naturalized citizens who were not affected by the policy change for sure. The results

show a significant increase in noncitizen female labor force participation rate and employment to population rate. Therefore, I can conclude the low participation rate of married foreign women is not only because of their individual choices but also because of legal restrictions on the ability to work. In other words, it provides some evidence that work restrictions keep some foreign-born women out of the labor market.

The paper is structured as follows. Section 2 briefly summarizes the policy background; Sections 3 and 4 describe the dataset and the methodology used; Section 5 discusses regression results; Section 6 presents robustness check results, and Section 7 concludes.

## **2. Policy Background**

The H-4 visa is a nonimmigrant (i.e., temporary) visa; according to the U.S. Citizenship and Immigration Service (USCIS), the dependent spouses and minor children (under age 21) of all H visa holders can apply for an H-4 visa<sup>4</sup>. Although H visa includes H-1B for high-skilled workers, H-2A and H-2B for agriculture and non-agriculture workers, and H-3 for not medical nor academic trainees, H-4s are mostly family members of H-1B workers (Bier, 2020). H-4 status is entirely tied to the primary H-1B worker's visa status. If the H-1B worker's visa expires, the H-4 visa holders must also leave. H-1B visas must be sponsored by a U.S. employer and are granted for three years initially. The H-1B visa may be extended but generally cannot be more than six years in total. American Competitiveness in the 21st Century Act (AC21) provides two cases where H-1B nonimmigrants can extend their H-1B status beyond six years under section 106(a) or 104(c) if their green card process was initiated prior to their sixth year<sup>5</sup>.

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<sup>4</sup> Spouse or child of student (F1) can apply for F2 visa; Spouse or child of exchange visitor (J1) can apply for J2 visa. Both F2 and J2 visas are not accepted to employment.

<sup>5</sup> 104(c): provides for three-year extensions of H-1B status if he/she has an approved I-140 petition but cannot adjust status because of the application per-country limits.

Before 2015, H-4 visa holders could not legally work in the United States. In 2015, the Obama Administration passed a rule granting the eligibility of certain H-4 visa holders to apply for EAD, which allows them to work in the U.S. labor market legally. Beginning May 26, 2015, H-4 dependent spouses of H-1B nonimmigrants can file Form I-765, Application for Employment Authorization, as long as they meet the following criteria: 1) The H-1B worker is the principal beneficiary of an approved Form I-140 (Immigrant Petition for Alien Worker)<sup>6</sup>; 2) Or the worker has been granted H-1B status under sections 106(a) and (b) of the AC21<sup>7</sup>. The Trump Administration sought to revoke this working permit, but the change required Office of Management and Budget (OMB) review that was not completed during the Trump presidency. The Biden Administration ended the Trump Administration efforts to revoke this program<sup>8</sup>.

According to the USCIS, around 130,000 H-4 visas are issued each year (Appendix Table A2). Bier (2020) argues that about 90,000 H-4 visa holders have received EAD by 2019. More than 90% of them are from India. This high ratio is caused by the fact that Indians have the longest wait time for a green card after an approved Immigration Petition Form I-140 due to a large applicant pool and limit amount issued each year. H-4 EAD workers are highly educated, with more than 90% having at least a bachelor's degree. One main argument is whether this policy change will harm native workers or not. Brannon and McGee (2019) conducted a cost-benefit analysis and pointed out that authorizing temporary work permits for the spouses of H-1B

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106(a): provides one-year increments for beneficiaries if the labor certification application or immigrant petition was filed on behalf of the applicant and 365 days or more have elapsed since then.

<sup>6</sup> Alien workers may file Form I-140 to ask USCIS to classify themselves as eligible for an immigrant visa based on employment.

<sup>7</sup> These sections of the law allow an H1B nonimmigrant to extend status beyond the six-year standard limit in one-year increments. Eligibility for these one-year extensions is based on the H1B spouse being the beneficiary of either a PERM labor certification (PERM LC) application or an I-140 immigrant petition that was filed at least 365 days prior to the end of the sixth year of H1B status.

<sup>8</sup> See <https://www.natlawreview.com/article/h-4-visa-spouses-can-continue-to-work-relief-under-biden-administration> for details.

visa holders is not harmful; on the contrary, rescinding H-4 EADs would hurt the U.S. economy and U.S. taxpayers.

### 3. Data

In this paper, I use the American Community Survey (ACS) conducted by the U.S. Census Bureau and accessible from IPUMS (Ruggles et al. 2021) to get individual labor market and demographics data. The sample period covers 2010 to 2019, where 2016 – 2019 is defined as the post-policy period<sup>9</sup>. Figure 1 shows the married female labor force participation rate over time for various groups. According to Figure 1, noncitizens (including green card holders and temporary residents) have lower LFPR than citizens. Among the four groups: "Born in the U.S.", "Born outside the U.S. with U.S. parents", "Naturalized Citizens", and "Noncitizens", noncitizen workers are the least likely to enter the labor force. One striking pattern is that noncitizens seem to be the only group with increasing LFPR after 2015, while the rest experience decreases or remains stable.

Since the ACS does not provide detailed visa type information and only a specific group (H-4 visa holders who are the spouses of H-1B workers awaiting legal permanent residence) are affected, one main challenge with ACS data is how to identify the targeted population of the policy. I use individual demographic traits of both women and their spouses to define the analytic sample and better capture the treated group. First of all, the sample is refined to women who are younger than 60 to exclude people who are not in the labor force because of retirement. The youngest individual in the sample is 16 in the survey year. Besides, H-4 workers should be married because of the spouse visa feature. Additionally, both H-4 EADs and their H-1B spouses

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<sup>9</sup> Although the policy took effect on May 26, 2015, there is no information about the exact month when ACS collects the annual data.

are noncitizens. The vast majority of H-4 EAD holders are women<sup>10</sup>, suggesting noncitizen married women might be the primary beneficiaries. On the contrary, U.S. permanent residents or naturalized citizens do not have this barrier of working. In general, the possibility for immigrants receiving green cards increases with the years they have resided in the U.S. If they stay in the U.S. long enough, they may become permanent residents. According to UCSIS, foreign workers can stay with H-1B status no longer than six years. Therefore, the sample was further confined to those who entered the United States within ten years.

H-4 visa and H-4 EAD are entirely tied with the spouse's H-1B status, thus putting restrictions on the husband's side is needed. Recent-arrived noncitizens are more likely to stay with an F-1 student visa or on OPT (Optional Practical Training) during the first several years. Since H-1B workers typically have at least a bachelor's degree; It is possible that many of them arrived in the U.S. with a student visa first and switched to H-1B later. From these aspects, I refine the sample to women whose spouses came to the U.S. in the past 6-10 years. If individuals work more than 35 hours per week, they are treated as full-time workers. Since H-1B is an employment-based visa, the sample only includes women whose husband is full-time employed. Moreover, H-1B workers are usually highly skilled and highly educated. From 2007-2017, 3,382,644 out of 3,401,117 H-1B applicants had a bachelor's or higher degree<sup>11</sup>. Based on that, some records are dropped if the husband's education level is lower than a bachelor's degree to reduce noise.

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<sup>10</sup> See website: [https://www.uscis.gov/sites/default/files/document/foia/I-765\\_Applicants\\_for\\_Employment\\_Authorization\\_for\\_H-4\\_Non-Immigrants\\_by\\_Gender\\_for\\_FY2015-FY2018.pdf](https://www.uscis.gov/sites/default/files/document/foia/I-765_Applicants_for_Employment_Authorization_for_H-4_Non-Immigrants_by_Gender_for_FY2015-FY2018.pdf)

<sup>11</sup> See <https://www.uscis.gov/sites/default/files/document/data/h-1b-2007-2017-trend-tables.pdf>. Data of 2017 is by June 30<sup>th</sup>, 2017.

The last restriction is the interviewee's birthplace. In 2019, 125,999 H-4 visas were issued, where 106,162 were distributed to Indians<sup>12</sup>, suggesting that Indian people are the leading group to apply and get H-4 EADs. About 90,000 H-4 visa holders received EAD by 2019; more than 90% are from India (Bier,2020). Based on this fact, Indian women who arrive recently may benefit the most from this policy change comparing to other groups. Under this situation, I focus on the women born in India and married to an Indian husband. In summary, the treatment group is defined as Indian-born noncitizen women who arrived in the U.S. within the previous ten years and had married to a full-time employed Indian-born noncitizen husband who came to the U.S. during the last 6-10 years and had at least a bachelor's degree.

For the control group, I include women if either or both are naturalized citizens. Naturalized citizens have similarities with noncitizens but do not face the same labor market legal restrictions and were not treated by the E-4 EAD policy change. All other criteria are the same as the treated group except for the birthplace. Sample size issues arise if applying the same birthplace restriction to the control group. Immigrants must hold green cards for three or five years before they are qualified to apply for naturalization to become U.S. citizens<sup>13</sup>. Considering that Indian people have the longest waiting time after their immigrant petitions have been approved, it is rare for them to get a green card and then become a naturalized citizen within ten years<sup>14</sup>. Restricting the control group to Indian-born naturalized citizens and their spouses yields

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<sup>12</sup> Numbers come from Nonimmigrant Visa Statistics, Bureau of Consular Affairs, U.S. Department of State. <https://travel.state.gov/content/travel/en/legal/visa-law0/visa-statistics/nonimmigrant-visa-statistics.html>

<sup>13</sup> To apply for naturalization to become a U.S. citizen, individuals must be a lawful permanent resident for at least three years (married to a U.S. citizen) or five years immediately before starting naturalization application. They also have to continuously reside and physically present in the U.S. and satisfy some other requirements.

<sup>14</sup> See <https://travel.state.gov/content/travel/en/legal/visa-law0/visa-bulletin/2021/visa-bulletin-for-january-2021.html>. As for January 2021, for EB-2 applicants, those who were born in India can start filing applications for adjustment of status if their I-140 form is approved by October 8<sup>th</sup>, 2009.

few observations, results in noisy estimates, and prevents inference. To deal with this problem, I expand the birthplace restriction for the control group from India to all of Asia. People from other nearby countries have much shorter waiting queues, giving the same period, they have larger chances to become naturalized citizens. Thus, the control group is constructed like the treatment group except that 1) the control group includes married women who are naturalized or married to a naturalized citizen (or both) and 2) the control group comprises Asian-born women with Asian-born spouses instead of restricted to Indian-born women with Indian-born spouses.

Figure 2 shows the married women's LFPR for treated and untreated women in the sample. According to the figure, noncitizens have a lower LFPR which is consistent with the general case. A notable pattern is that the gap between treated and control group is narrowing starting from 2016 when the policy for H-4 work permit changes.

## 4. Methodology

### 4.1 Labor Force

The difference-in-differences (DID) approach is used to estimate the impact of the H-4 policy change on specific married foreign-born female labor force participation rates. The sample used here is defined in Section 3. I first estimate the model without any controls for individual characteristics:

$$Labor\ force_{it} = \alpha + \gamma_t + \lambda Eligible_{it} + \beta Eligible_{it} * Post_t + \epsilon_{it} \quad (1)$$

Here  $Labor\ force_{it}$  is a binary variable indicating whether individual  $i$  is in the labor force in year  $t$ , equals 0 if not.  $\gamma_t$  is a set of year effects, which are controlled for via a set of year dummy variables. Women are intended to be treated if  $Eligible_{it}$  equals to 1 and will not be affected for sure otherwise.  $Post_t$  equals to 1 if year  $t$  is later than 2015 and is 0 otherwise.  $\beta$  here estimates

the intention-to-treat (ITT) effect since some women in the defined treatment group may not actually be affected.

Other household and individual characteristics may also alter women's labor choice. The basic DID results might not be accurate if this is true. I next extend the model to include controls for personal and family characteristics:

$$Labor\ force_{it} = \alpha + \gamma_t + \lambda Eligible_{it} + \beta Eligible_{it} * Post_t + \mathbf{X}_{it}\boldsymbol{\delta} + \epsilon_{it} \quad (2)$$

where  $\gamma_t$ ,  $Eligible_{it}$  and  $Post_t$  are defined like above.  $\mathbf{X}_{it}$  includes a series of household and individual characteristics.

Control variables include educational attainment (years of school completed), years stayed in the U.S., age, country of origin (culture influence representatives), net household income (household income minus wife's earned income), potential grandparents' childcare support (whether grandparent lives in the same household), own kids, number of own children younger than five, spouse's education attainment and years spent in the United States, as well as year fixed effect.  $Years\ of\ school\ completed_{it}$  represents completed school years, 16,18 and 23 stand for bachelor, master and Ph.D. degree respectively; 1-12 indicates grade 1-12; Highly educated women are more likely to be in the labor market since they have more chances to gain higher wages, and the opportunity cost of exiting the labor force is relatively higher.  $Year\ in\ US_{it}$  denotes the number of years that women stayed in the U.S., ranges from 0-10;  $Age_{it}$  is a categorical variable ranging from 15-59 with intervals <20, 20-24, 25-29...50-54, 55-59. Age may also impact labor force participation due to childbearing and child-rearing patterns.  $Net\ households\ income_{it}$  is a numeric variable that captures total family income minus the wife's earned income, which is in 10,000 dollars.  $Grandparent\ present_{it}$ , indicates whether potential grandparent childcare support exists, and it equals 1 if an individual  $i$ 's mother/father or

mother/father in law lives in the same household;  $Child_{it}$  is a dummy for whether the couple have kids or not.  $No. of children < 5_{it}$  shows the total number of own kids under age 5 in the household; Husbands' completed school years are 16,18 or 23, and the range of husbands' years in the U.S. range from 6-10 due to construction. The last control is the birthplace ( $Birthplace_i$ ), a set of dummies; I use it as a proxy for individual origin country culture influence.

The summary statistics are shown in Table 1. The treatment group accounts for 69 percent of the sample. The average age is 34.5. The average completed school years is more than 16, indicating that the mean education level is a bachelor's degree. 71 percent have their own children at home but are more likely older than 5. Besides, 8.4 percent have coresident grandparents in the household.

A critical assumption in the above model is that the relationship between individual covariates and the dependent variables is linear and constant. However, the continuous controls may not reflect the true relationship well. One possibility comes from the number of young kids; the second baby may have less impact on a family than the first one since they already had experience dealing with young kids. Another possibility may be from net household income: if other family members' income is relatively high, an additional unit of net income will not make much difference on woman's labor force participation choice. Moreover, an extra year in high school may not accumulate the same human capital as in college, thus may not have a constant effect on labor outcomes. Therefore, I employ an alternative model similar to equation (2) to alleviate the potential inaccuracies caused by using categorical  $X$ s.

In this alternative model, I switch controls from numerical variables to categorical ones. Year in U.S. is now a binary variable: if a woman stayed in the U.S. less than 5 years, she belongs to group 0; otherwise, she will be in group 1. For the number of children, I divide it into

four groups: 0/1 indicates a woman has 0/1 kids younger than 5 respectively; 2 means she has more than 1 young child. For household income variable, I sort it by quartiles: minimum to the first quartile is 0; the first quartile to median goes to 1; median to the third quartile is 3, and the third quartile to maximum goes to 3. The school attainment is divided into 6 categories: 0 is for those who do not graduate from high school; 1 is for women with high school diplomas; 2 is for some college, and 3 to 5 denote having bachelor, master, or Ph.D. degree. Husbands' education is bachelor, master or Ph.D. degree for 0-2 respectively. Husbands arriving within 6-8 years and more than 8 years are separated into two groups. Child, grandparent support, and age variables are the same as before.

An important assumption that DID method being valid is the common trend assumption. The treatment group and control group are supposed to have parallel trends in both pre- and post-periods if there were no policy changes. In this specific setting, the change in married female labor force participation rate over time should be parallel between noncitizens and naturalized citizens before 2015. Figure 2 provides some evidence for the validity of the assumption; there is no significant violation. I will revisit this assumption using event study analysis as a robustness check.

#### **4.2 Other dependent variables**

In addition to the labor force participation rate, the H-4 working permit policy change can possibly affect other labor market factors. For example, being able to work legally may increase the possibility for those foreign-born women to be employed. On the other side, with more people crowding into the labor market, the market might become more competitive. Moreover, wages might be influenced by this change. Higher labor supply may decrease wages for employees; on the other side, the eligibility to work may bring more opportunities, helping high-

educated women match with higher-paying jobs. To investigate these impacts, I apply the same model as in Section 4.1 but with different dependent variables:

$$Y_{it} = \alpha + \gamma_t + \lambda Eligible_{it} + \beta Eligible_{it} * Post_t + X_{it}\delta + \epsilon_{it} \quad (3)$$

For effects on employment-to-population,  $Y_{it}$  is employment status: 1 indicates that women are currently employed, while 0 is for unemployed or not in the labor force. To find the policy change impact on wages, I choose  $Y = \ln(wage)$ , where the wage is total personal earned income. All independent variables are defined as before.

## 5. Results

Tables 2-4 show the DID regression results for LFPR, EPR, and wages, respectively. In these three tables, Columns (1) is the result for the model without any individual controls in all three tables. The estimator that I am most interested in is the coefficient of interaction for eligible and post dummy. In Table 2, consistent with Figure 2, gaining eligibility to apply for temporary working permits has a significant effect on increasing intend-to-treat married women's labor force participation. Coefficient estimates and standard errors for regressions with covariates are shown in columns (2) and (3). All regressions use survey weights; the standard errors are robust to heteroskedasticity and cluster by living states. Ignoring the influence of other factors, the H-4 policy change caused LFPR to increase by around 15 percentage points(pp). Since there are many other factors like the number of children and educational attainment that may also alter women's labor choice, the estimated effect of the policy may be exaggerated if just ignoring those variables. As Table 2 shows, after controlling household and individual covariates, the impact of the H-4 EAD policy shrinks, but its significance remains. This temporary work permit has increased married female noncitizens' LFPR by around 10 pp compared to the pre-period. It

suggests that the lower LFPR of married female noncitizens is partly due to the external constraints, i.e., they are willing to work but forced to exit the labor force due to their visa status. If there is no visa limitation, more married female noncitizen workers will be in the labor market. On the other side, women may choose not to be in the labor force regarding their own situation. The complete DID results are in Appendix Table B. Gaining childcare support from their parents or parents in law, women may spend less time on childcare, and 13 pp more will be in the labor force. The number of younger kids is negatively correlated with the probability of being in the labor market. Parents need to spend time and money taking care of their children, and the cost is increasing with the number of children. This may be the reason that more kids in the family will lower the probability of mothers being in the labor force. One more year prior residence in the U.S. can bring 4.5 pp more eligible female noncitizens to the labor market; one explanation is that people who stay longer in the U.S. have accommodated better and acquired more skills that U.S. employers require. The higher educated female has higher LFPR. Women from richer households have a lower chance to work. It seems that the policy change has a significant positive effect on married female noncitizen labor force participation rate. The LFPR depends not only on the outside policy constraints but also on their own situation.

Estimated results of impacts on EPR are listed in Table 3. Again, column (1) is the result for the model without any individual controls, while columns (2) and (3) include the full model with controls. Like LFPR, the H-4 policy change has a significant positive effect on increasing the employment to population ratio. This legal working permit can increase the probability of married female noncitizens being employed by 8 pp. Besides, the influences of individual and family characteristics have same directions as LFPR. Full estimates are in Appendix Table B. Table 4 presents the results of estimating Eq. (3) with  $\ln(wage)$  as the dependent variable. The

sample size reduces to 4494 since it only includes women who are employed. According to Table 4, the policy did not generate a significant impact on wages for the eligible group. On the other side, women's wage tends to increase with higher education and longer period stayed in the U.S. Although many foreign-borns major in STEM (science, technology, engineering, and mathematics) fields, employment in STEM industries does not experience a disproportional increase after the policy was enacted. As Appendix Table C shows, around 4 pp more women are employed and in STEM companies, but there is not enough evidence of a shift towards STEM for employed women. DID estimates with categorical covariates for LFPR, EPR and wage are close to the continuous one. The estimations from the model with dummy covariates are more conservative and seem to be more plausible for some controls like net household income; I focus on the dummy covariates in the rest of the paper.

## **6. Robustness Checks**

### **6.1 Event Study Analysis**

The difference in differences estimator is defined as the change in average outcome in the treatment group from pre- to post-intervention periods subtracts the changes in the control group from pre- to post-intervention periods. One crucial assumption in DID empirical strategy is that treatment group and control group would maintain parallel trends of female labor force participation rates/employment to population ratio without the H-4 EAD working permit policy change. Therefore, the difference in female LFPR/EPR of naturalized citizens before and after policy change is a good proxy for the counterfactual change in noncitizen female LFPR/EPR. If the parallel trend assumption fails, then the DID estimators might be biased and even completely opposite of the true treatment effect. It is often impossible to test the common trend assumption in the post-period since the counterfactual data is not available. However, the common trend in

the pre-policy period can be tested. To investigate if this is the case, I run the following event study regression:

$$Y_{it} = \alpha + \gamma_t + \lambda Eligible_{it} + \sum_{t \neq 2015} \beta_t Eligible_{it} \times I(Year = t) + \mathbf{X}_{it} \boldsymbol{\delta} + \epsilon_{it} \quad (4)$$

Here  $I(Year = t)$  is the indicator function and equals 1 if it is year  $t$ . All other variables are categorical, defined the same as in Section 4.

The estimated coefficients and 95% confidence intervals for all interaction variables are displayed in Figure 3. Panel A is for LFPR, and Panel B is for EPR. The results show no significant change for targeted women in the pre-implementation period as the confidence interval of  $Eligible_{it} \times I(Year = t)$  contains 0 in 2010-2015. Thus, the DID estimates impact is not likely to be biased by differential pre-existing trends. The exact coefficients are shown in Table 5.

The E.S. analysis also helps to identify how the policy impact changes over time and when it fades away. According to Table 5, the policy was most influential in 2016, the first year after it came out, bringing targeted married female noncitizen LFPR up about 17pp and EPR up about 12pp. The magnitude of both DID and E.S. estimators seem to be large but still reasonable. Back-of-envelop estimates listed in Appendix Table D calculate the number of new labor force participants and employees from 2016-2019, which confirm that new labor force does not exceed the newly issued H-4 EADs each year. In 2016, around 12800 eligible women entered the labor force, the number is decreasing in the following years. The size of the treated population is approximated by the sum of people in the treatment group and their survey weights. The treatment group here are those intended to treat but may not actually be affected. It is possible that some treated people are out of this treatment group. Furthermore, the H-4 EAD recipients

are not only women (although most of them are women). Therefore, the back of envelop calculations provided here are just rough estimates. Comparing the number of H-4 EAD issued and estimated new labor, it still provides some evidence that legal restriction and individual characteristics determine foreign married women's working decision.

## 6.2 Sensitivity Analysis

As noted earlier, the ACS does not contain detailed information about visa type, and the restrictions applied to restrict sample are mainly based on the policy criteria. Thus, I conduct several “placebo” tests to check the robustness of the results. First, I relax the husbands’ arrival time to 5-10 and 4-10 years. Table 6 panel A lists the results for both LFPR and EPR. Loose restriction brings more observations in the sample; the ITT effect on LFPR/EPR is watering down to 6/5 pp and 5/4 pp. It seems plausible since more untreated individuals are brought to the treatment group. Secondly, I include both Chinese and Philippines in the treatment group since they are the second and third largest group receiving H-4 visas (USCIS). As in Table 6 panel B, adding Chinese women who satisfy other conditions generates the same size ITT effect, while further adding Philippines lowers the impact slightly.

One may argue that the systematic difference in LFPR/EPR before and after comes from other policy shocks during the same period. Here I conduct a "placebo" test with women whose husband is not highly educated, i.e., the husband has at most high school diploma or attended some college as the "fake" treatment group. Other restrictions (arriving year, employment status, etc.) are still imposed. Since H-4 EAD can only be applied by H-1B workers' spouses and H-1B generally require at least a bachelor's degree, it is almost impossible that the policy change would affect spouses of low-educated workers. Due to the sample size issue, I relax the birthplace restriction to all Asia countries for the treatment group. The criteria for the control

group remain unchanged. The same regression model with linear controls is done using this sample. Low-educated sample results are present in Table 7. Columns (2) and (4) include individual characteristics controls. As shown in the table, I find no evidence that the H-4 policy change in 2015 has a significant impact on either labor force participation or employment for foreign women with low-educated husbands.

### 6.3 Logit DID

In the above linear probability model (LPM), both labor force participation and employment status are binary variables and can only be 0 or 1. Linear model sometimes predicts dependent variable to be less than 0 or more than 1. And the violation of normality may cause biased estimates and invalid inference. The use of robust standard errors may be helpful. Moreover, I run the following logit DID model and compare it to LPM to see if the linear model setup causes significant bias. Unlike the main analysis, I use post-period dummy instead of year fixed effect and exclude birthplace control due to the limiting ability of the logit model to accommodate fixed effects:

$$\text{logit } p(Y_{\{it\}} = 1) = \alpha \text{Post}_t + \lambda \text{Eligible}_{it} + \beta \text{Eligible}_{it} * \text{Post}_t + \mathbf{X}_{it}\boldsymbol{\delta} + \epsilon_{it} \quad (5)$$

To estimate the ITT effect, I follow Puhani (2012):

$$\text{Treatment Effect} = f(\alpha + \lambda + \beta + \mathbf{X}_{it}\boldsymbol{\delta}) - f(\alpha + \lambda + \mathbf{X}_{it}\boldsymbol{\delta}) \quad (6)$$

Where  $f$  is the standard logistic function, i.e.,  $f = \frac{e^x}{e^x+1}$ .

Results are in Appendix Table E. The probability that the predicted value for the dependent variable is out of range 0 and 1 is pretty small, around 2%. In addition, Linear DID and logit DID

give similar estimates, with logit estimations being slightly larger. There is no strong evidence that LPM would cause significant bias.

## **7. Conclusion**

In this paper, I use an H-4 visa work eligibility policy change as a quasi-experiment to analyze the effect on eligible married foreign women's labor market outcomes. The results from the difference-in-difference regression analysis suggest that after implementing the employment authorization for certain H-4 dependent spouses in 2015, the married female noncitizen LFPR and EPR increased. This positive impact provides evidence that part of foreign women is kept out of the labor force by policy restrictions. Other personal characteristics also influence their work choices. The story of foreign women's employment status is similar. After the new H-4 administration release, EPR for the targeted population increased when other variables were controlled. The policy has an ambiguous impact on wages. It can be concluded that both policy restrictions and individual choices affect some performances of married female noncitizens in the U.S. labor market. Future analysis on other related outcomes such as occupation switch may be helpful to evaluate the policy influence fully. This analysis may help policymakers form an expectation on what impacts the immigration policies still under discussion will bring, such as assigning work permission to all H-4 visa holders.

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Figure 1 Married Female Labor Participation Rate for different groups, 2010-2019

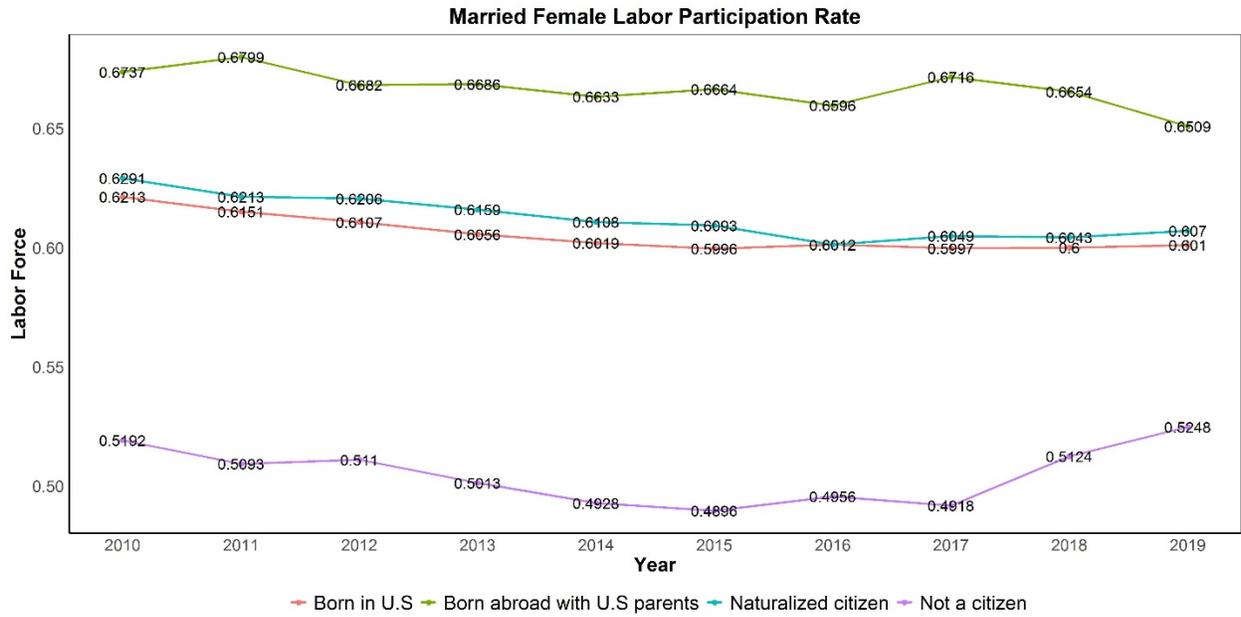


Figure 2 Married Female Labor Force Participation Rate for Selected Immigrants, 2010-2019

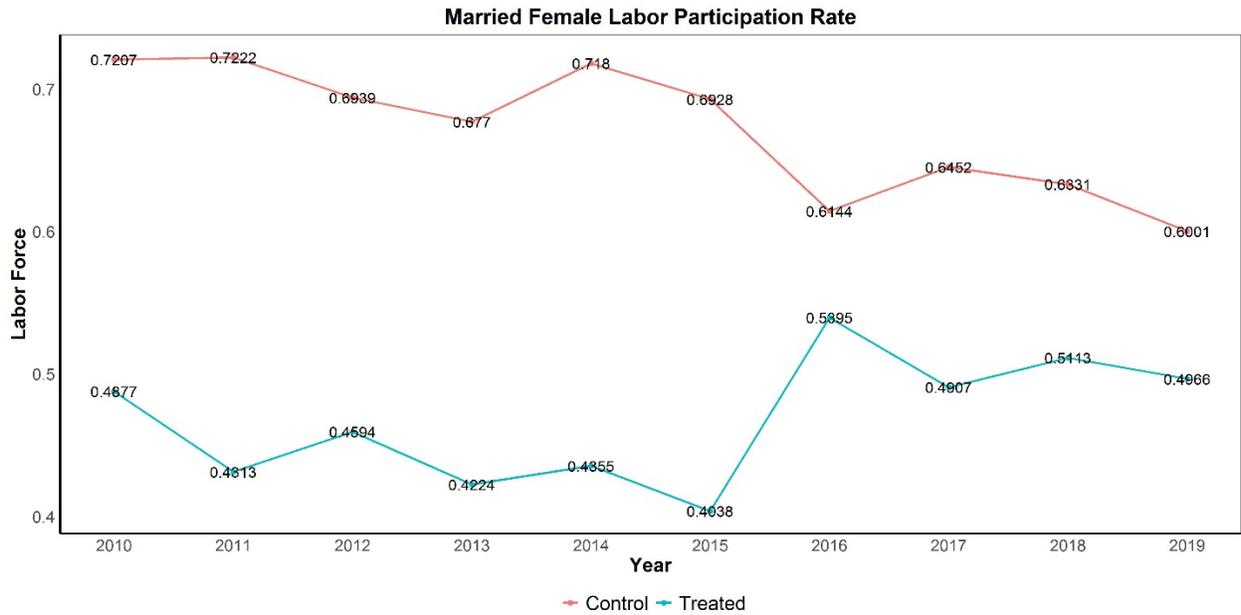
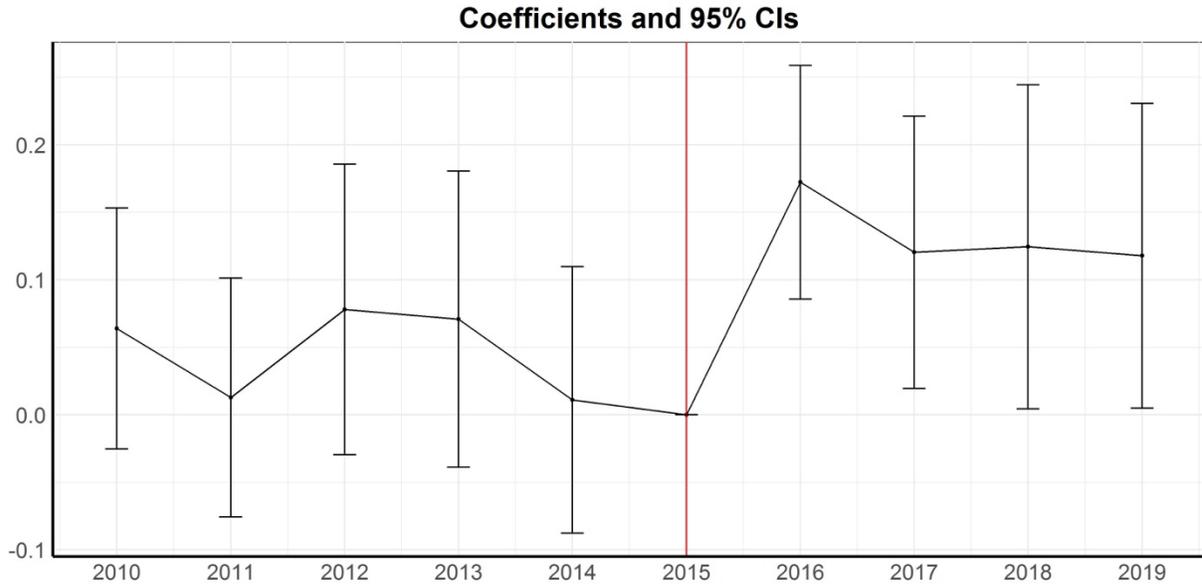


Figure 3 Coefficients and 95% Confidence Intervals from Event Study Analysis

**Panel A. Labor force**



**Panel B. Employment**

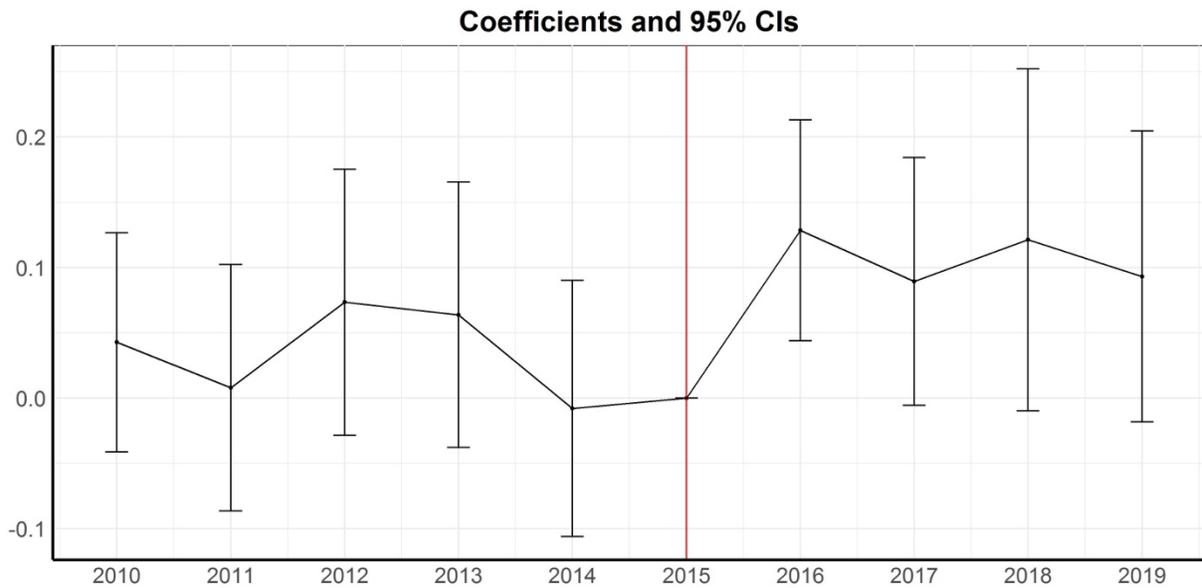


Table 1 Summary Statistics

Variable	Mean	Std. Dev.
Labor force participation	0.544	0.498
Employment	0.497	0.500
Eligible	0.689	0.463
Year of school complete	16.58	2.28
Years in U.S.	6.298	2.69
Husband's education	17.39	1.67
Husband's years in U.S.	8.076	1.43
Potential grandparents' childcare (Grandparents reside in the same household)	0.084	0.278
Child	0.710	0.454
No. of children <5	0.476	0.612
Net household income	10.42	6.878
Age	34.45	7.262

Note: Net household income is in 10 thousand dollars. Sample is restricted to women who are aged between 16-59 and from Asia, arrived in U.S. within the past 10 years and married to a fully employed Indian husband who arrived U.S. in the past 6-10 years and with at least bachelor's degree.

Table 2 DID Results for Labor Force Participation

<i>Dependent:</i>	<i>Labor Force Participation</i>		
	(1) No Control	(2) Continuous	(3) Dummies
Eligible*Post	0.151*** (0.029)	0.102*** (0.025)	0.096*** (0.024)
Eligible	-0.265*** (0.022)	-0.239*** (0.019)	-0.241*** (0.020)
Controls	No	Yes	Yes
Observations		9059	

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table 3 DID Results for Employment

<i>Dependent:</i>	<i>Employment</i>		
	(1) No Control	(2) Continuous	(3) Dummies
Eligible*Post	0.140*** (0.027)	0.085*** (0.024)	0.080*** (0.023)
Eligible	-0.261*** (0.022)	-0.230*** (0.021)	-0.232*** (0.021)
Controls	No	Yes	Yes
Observations		9059	

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table 4 DID Results for ln(wage)

<i>Dependent:</i>	<i>Ln(wage)</i>		
	(1) No Control	(2) Continuous	(3) Dummies
Eligible*Post	0.246** (0.120)	0.098 (0.120)	0.081 (0.121)
Eligible	0.394*** (0.044)	0.228** (0.099)	0.142 (0.101)
Controls	No	Yes	Yes
Observations		4494	

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table 5 Event Study Analysis

Dependent	(1)	(2)
	Labor force	Employment
Eligible	-0.279*** (0.038)	-0.259*** (0.039)
Eligible *2010	0.064 (0.046)	0.043 (0.043)
Eligible *2011	0.013 (0.045)	0.008 (0.048)
Eligible *2012	0.078 (0.055)	0.073 (0.052)
Eligible *2013	0.071 (0.056)	0.064 (0.052)
Eligible *2014	0.011 (0.050)	-0.008 (0.050)
Eligible *2016	0.173*** (0.044)	0.128*** (0.043)
Eligible *2017	0.120** (0.051)	0.089* (0.048)
Eligible *2018	0.124** (0.061)	0.121* (0.067)
Eligible *2019	0.118** (0.058)	0.093 (0.057)
Controls		Yes
Observations		9059

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table 6 Placebo Test with alternative constraints

Dependent:	Labor Force		Employment	
A. Treatment group arriving year				
	(1)5-10	(2)4-10	(3)5-10	(4) 4-10
Eligible*Post	0.063** (0.026)	0.053** (0.027)	0.049** (0.025)	0.042* (0.024)
Eligible	-0.227*** (0.020)	-0.218*** (0.021)	-0.217*** (0.022)	-0.206*** (0.025)
Observations	10756	12412	10756	12412
B. Treatment group birthplace				
	(1) IN&CH	(2) IN&CH%PH	(3) IN&CH	(4) IN&CH%PH
Eligible*Post	0.095*** (0.026)	0.087*** (0.027)	0.082*** (0.026)	0.075*** (0.026)
Eligible	-0.217*** (0.017)	-0.193*** (0.015)	-0.203*** (0.019)	-0.180*** (0.019)
Observations	10807	11421	10807	11421

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table 7 Placebo Test with Low-Educated Sample

	Labor force		Employment	
	(1)	(2)	(3)	(4)
Eligible*Post	0.002 (0.036)	0.013 (0.029)	-0.001 (0.039)	0.012 (0.033)
Eligible	-0.027 (0.021)	-0.044** (0.019)	-0.013 (0.021)	-0.036* (0.019)
Controls	No	Yes	No	Yes
Observations	5838			

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

## Appendix:

Table A1 Other Nonimmigrant Work Visas

	Description	Dependent Spouses and	Spouse and Children eligible
CW-1	Commonwealth of Northern Mariana Islands transitional worker	CW-2	No
E-1	Treaty trader, spouse, and children	E-1	
E-2	Treaty investor, spouse and children	E-2	
E-2C	Commonwealth of the Northern Mariana Islands investor, spouse and children	E-2C	
E-3	Australian specialty occupation professional	E-3	
I	Representative of foreign information media, spouse and children	I	
L-1	Intracompany transferee (executive, managerial, and specialized personnel continuing employment with	L-2	Yes
O-1	Person with extraordinary ability in the sciences, art, education, business, or athletics	O-3	No
O-2	Person accompanying and assisting in the artistic or athletic performance by O1	O-3	No
P-1	Internationally recognized athlete or member of an internationally recognized entertainment group	P-4	No
P-2	Artist or entertainer in a reciprocal exchange program	P-4	No

P-3	Artist or entertainer in a culturally unique program	P-4	No
Q-1	Participant in an International Cultural Exchange Program	Not Applicable	
R-1	Person in a religious occupation	R-2	No
TN	North American Free Trade Agreement (NAFTA) temporary professionals from Mexico and Canada.	T.D.	No

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Sources: Visa categories information is from [USCIS](#), Department of Homeland Security.

Table A2 H visa Classifications and Number Issued by Year

	Class	Spouse	2015	2016	2017	2018	2019
H-1B	Temporary worker of distinguished merit and ability performing services other than as a registered nurse	H-4	172,748	180,057	179,049	179,660	188,123
H-1C	Shortage area nurse	H-4	0	0	0	0	0
H-2A	Temporary worker performing agricultural services	H-4	108,144	134,368	161,583	196,409	204,801
H-2B	Temporary worker performing other services	H-4	69,684	84,627	83,600	83,774	97,623
H-3	Trainees other than medical or academic.	H-4	1,669	1,435	1,232	1,036	1,035
H-4	Spouse or child of H1B/B1/C, H2A/B, or H3	-	124,484	131,051	136,393	130,814	125,999

Sources: Nonimmigrant Visas Issued by Classification (Including Border Crossing Cards): Fiscal Years 2015 - 2019; Department of Homeland Security.

Table B Complete DID Results

<i>Dependent:</i>	<i>LFP</i>			<i>Employment</i>		
	(1) <i>No Control</i>	(2) <i>Continuous</i>	(3) <i>Dummy</i>	(4) <i>No Control</i>	(5) <i>Continuous</i>	(6) <i>Dummy</i>
Eligible*Post	0.151*** (0.029)	0.102*** (0.025)	0.096*** (0.024)	0.140*** (0.027)	0.085*** (0.024)	0.080*** (0.023)
Eligible	-0.265*** (0.022)	-0.239*** (0.019)	-0.241*** (0.020)	-0.261*** (0.022)	-0.230*** (0.021)	-0.232*** (0.021)
Grandparent Present		0.134*** (0.021)	0.137*** (0.023)		0.133*** (0.024)	0.137*** (0.025)
Year in U.S.		0.045*** (0.003)			0.050*** (0.003)	
5-10 years			0.206*** (0.013)			0.235*** (0.012)
Husband's Years In U.S.		-0.006 (0.004)			-0.008** (0.004)	
			0.030*** (0.011)			0.028** (0.011)
Net H.H. Income		-0.001 (0.001)			-0.002 (0.001)	
1 <sup>st</sup> quartile-median			-0.071*** (0.016)			-0.073*** (0.016)
Median-3 <sup>rd</sup> quartile			-0.038** (0.018)			-0.044** (0.018)
3 <sup>rd</sup> quartile-max			-0.030 (0.020)			-0.045** (0.022)
Education		0.030*** (0.003)			0.026*** (0.002)	
High school diploma			0.118** (0.058)			0.104* (0.060)
Some college			0.150*** (0.038)			0.144*** (0.040)
Bachelor			0.241*** (0.036)			0.215*** (0.038)
Master/Professional			0.322*** (0.035)			0.283*** (0.035)
Ph.D.			0.440*** (0.044)			0.411*** (0.046)
Husband's Education		0.005 (0.004)			0.008** (0.004)	
Master/Professional			0.030* (0.017)			0.033* (0.017)
Ph.D.			0.008 (0.028)			0.022 (0.026)

Child		-0.181***	-0.168***		-0.176***	-0.164***
		(0.024)	(0.026)		(0.027)	(0.028)
No. of Children <5		-0.036**			-0.030*	
		(0.014)			(0.016)	
1			-0.038*			-0.033
			(0.019)			(0.021)
>=2			-0.092***			-0.081**
			(0.031)			(0.034)
Age	No	Yes	Yes	No	Yes	Yes
Birthplace fixed effec	No	Yes	Yes	No	Yes	Yes
Observations		9059				

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table C Policy Effect on STEM Field Employment

	<i>No Control</i>	<i>Continuous</i>	<i>Dummy</i>
<b>A. Joint outcome of STEM and employment</b>			
Eligible*Post	0.041*** (0.014)	0.039*** (0.013)	0.037*** (0.012)
Eligible	0.151*** (0.009)	0.055*** (0.017)	0.031* (0.016)
Observations	9059		
<b>B. Employed subsample, dependent variable is STEM</b>			
Eligible*Post	-0.001 (0.028)	0.024 (0.029)	0.020 (0.026)
Eligible	0.445*** (0.018)	0.245*** (0.023)	0.201*** (0.021)
Observations	4500		

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state.

Table D Back of the Envelope Estimates

Year	2016	2017	2018	2019
Eligible Population	74094	84445	77783	78340
Additional labor force	12818	10133	9645	9244
Additional Employment	9484	7515	9411	7285
H-4 EAD(Initial)	31627	27449	24403	20837
H-4 EAD(Initial+ Renewal)	31627+9628 =41255	27449+18913 =46362	24403+29041 =53444	20837+26605 =47442

Note: Eligible population size is approximated by people in the treatment group and their survey weights. H-4 EAD data come from USCIS.

Table E Comparisons between LPM and Logit DID Results

Dependent:	Labor Force		Employment	
	(1) No control	(2) With control	(3) No control	(4) With control
<b>LPM</b>				
Eligible*Post	0.151*** (0.029)	0.116*** (0.026)	0.140*** (0.027)	0.108*** (0.024)
% $\hat{y}$ out of 0-1	0	2.24%	0	1.55%
<b>Logit</b>				
Eligible*Post	0.647*** (0.129)	0.562*** (0.144)	0.583*** (0.113)	0.502*** (0.124)
Treatment effect	0.157	0.126	0.138	0.111

Note: \*p<0.1, \*\*p<0.05, \*\*\* p<0.01. All standard errors are robust to heteroskedasticity and clustered by state. To align up with the logit model, I exclude birthplace in both LPM and logit model.