DISCUSSION PAPER SERIES

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## ABSTRACT

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Since the September 11 attacks (9/11), the U.S. has seen a tightening of immigration policies. Previous studies find that stricter immigration enforcement has the unintended effect of pushing undocumented immigrants into self-employment. This paper builds on the literature to better understand the changes in the types of self-employment among Mexican immigrants triggered by the tightened immigration enforcement after 9/11. Using a difference-in-differences approach, and the recently developed measures by Fairlie and Fossen [2018] to distinguish between necessity and opportunity self-employment, we find that both necessity and opportunity self-employment increased among Mexican immigrants after 9/11. However, the effect is most prominent on necessity self-employment, consistent with the hypothesis that they are pushed into self-employment as a survival alternative.

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## INTRODUCTION

The September 11 terrorist attacks (9/11) have triggered an increase in anti-immigration sentiment and a tightening of immigration policies throughout the United States. At the federal level, while there has not been a comprehensive immigration reform, immigration enforcement has become much stricter, documented by sharply increased immigration raids and deportation across the country [Golash-Boza, 2011]. At the state and local level, an increasing number of states and local governments have taken up immigration issues in their own hands to implement more stringent immigration laws such as the mandated use of E-Verify or adopting the 287(g) program.[1] Mexican immigrants, the largest undocumented immigrant population in the U.S., have become the main target. Since these actions mainly target workplaces in the wage sector, studies find that they have negatively impacted undocumented immigrant's job market outcomes such as wages and employment rates [Orrenius and Zavodny, 2009; Amuedo-Dorantes and Bansak, 2012, 2014; Bohn and Lofstrom, 2013]. Among recent literature that examines undocumented immigrants' responses to such policy changes, Wang [2019] finds that, in response to the deteriorated job market opportunities, an increasing amount of undocumented immigrants (proxied by non-citizen Mexican immigrants) have become self-employed as an alternative to make a living after 9/11.

The 9/11 event and the stricter immigration enforcement that followed not only increased the amount of self-employment among Mexican immigrants, but may have also dramatically changed the nature of self-employment among this group. This paper builds on Wang [2019] to examine the effect of 9/11 on the changes in the types of self-employment taken up by Mexican immigrants. Because they are more likely to be pushed into self-employment due to lack of wage-sector opportunities stemming from stricter immigration policy and increased discrimination, we hypothesize that the composition of self-employment among this group may switch toward more necessity self-employment and away from opportunity self-employment.

The distinction between necessity and opportunity self-employment has gained popular-

ity in recent literature. Necessity self-employment is motivated by lack of options in the labor market and the need to make a living, whereas opportunity self-employment is motivated by profit opportunity. Such distinction helps better understand changes in business startup rate and its relationship with the business cycle, the role self-employment plays in the economy, and the heterogeneity in self-employment performance. While the conceptual distinction has existed for a long time, its empirical measurement faces challenge because it requires information on the motivation of self-employment in the data. Fairlie and Fossen [2018] recently propose an operational measure to identify necessity vs. opportunity self-employment in nationally representative data such as the Current Population Survey (CPS). In particular, they distinguish the two types of self-employment based on prior work status: necessity self-employment is defined as self-employment transitioned from unemployment, and opportunity self-employment as transitioned from wage-employment or not-in-the-labor-force status. They show that such distinction is "consistent with the standard theoretical economic model of entrepreneurship" and helps to reconcile the puzzling findings regarding the cyclicality of self-employment in the literature. These measures can be readily constructed using the CPS basic monthly data that are matched across any two consecutive months which provide information on month-to-month labor market transitions.

This paper utilizes these recently developed definitions of self-employment to examine the impact of 9/11 on the changes in the nature of self-employment among Mexican immigrants. Using the difference-in-differences approach and data from CPS basic monthly data from 1996 to 2006, we find evidence that both necessity and opportunity self-employment rates have increased among Mexican immigrants after 9/11 compared to less-educated Whites (the control group). The magnitude of increase is much larger among necessity self-employment, consistent with the hypothesis that Mexican immigrants are more likely to be pushed into self-employment due to lack of job opportunities. We point out that our difference-in-differences estimations capture the reduced-form total effects of 9/11, including all enforcement changes and potential increased discrimination that they trigger. Careful investigation of specific

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channels through which 9/11 affects our outcomes is by no means trivial and warrants careful future research. However, we do show that the effects are not observed on comparable immigrant groups that are either less likely undocumented or unlikely influenced by stricter immigration enforcement, providing indirect evidence that undocumented status and immigration enforcement may be the main mechanism.

While there is some evidence that opportunity self-employment also increases, we show that the definition of opportunity self-employment may capture a significant amount of necessity self-employment when applied to Mexican immigrants, a group with very strong labor market attachment and facing extra labor market constraints due to stricter immigration policies. For example, Mexican immigrants who perceive higher risks of being detected as undocumented immigrants may transition into self-employment directly from the wage sector to reduce such risks, as such will be defined as opportunity self-employment but may not necessarily be pursuing profit opportunities. Because of their strong labor market attachment, Mexican immigrants may also transition from wage-employment to unemployment to self-employment within a very short period of time, which creates the illusion that they have transitioned directly from wage-employment to self-employment from one month to the next.

The paper contributes to the literature in several important ways. First, this is the first paper to examine the effect of 9/11 and stricter immigration enforcement on the *nature* of self-employment among the largest immigrant group in the U.S.. We document a substantial rise in necessity self-employment among Mexican immigrants following 9/11. Understanding the type of self-employment and its change over time has important implications for studying the labor market performance and assimilation patterns of Mexican immigrants. For example, Lofstrom [2002] finds that self-employed immigrants assimilate at a much faster rate than their wage-employed counterparts. A change in the composition of self-employment toward the necessity type may diminish the role self-employment plays in immigrants' assimilation process.

Second, our paper documents a change in the self-employment patterns among Mexican

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immigrants triggered by the 9/11 event. This is important for understanding the overall trend of self-employment and its determinants among Mexican immigrants. Mexican immigrants' self-employment decision is an important topic in the entrepreneurship literature because they historically have very low self-employment rates.[2] Considering the important role self-employment plays in improving the economic status of disadvantaged minority groups [Fairlie, 2004; Lofstrom, 2002], studies have devoted attention to understanding the causes of the lower self-employment rates among Mexicans, for example, see Lofstrom and Wang [2009]. However, Davila et al. [2014] have documented a drastic recent change: from 1990 to 2012, the number of self-employed Mexican immigrants increased by more than five times, responsible for an exponential growth of Hispanic entrepreneurs in the U.S.. Our paper suggests that the stricter immigration enforcement after 9/11 is an important contributor to such a fast growth. In addition, while the growth appears to be encouraging, our findings suggest that it may not necessarily be a sign of improved labor market outcomes.

Third, we caution the use of necessity and opportunity self-employment measures proposed by Fairlie and Fossen [2018] when applying to groups with strong labor market attachment and extra labor market constraints. In the case of Mexican immigrants, we show evidence that the definition of opportunity self-employment may actually capture a large amount of necessity self-employment.

## LITERATURE REVIEW

Since the 9/11 event, the United States has seen a tightening of immigration policies and stricter enforcement at both the federal and state levels. A rapidly growing literature has tried to understand the effects of tightened immigration policies, either utilizing 9/11 as a natural experiment or exploring variations in state and local immigration policies. The general consensus is that tightened immigration policies deteriorate labor market outcomes for undocumented immigrants, lowering their wages and employment rates [Orrenius and Zavodny, 2009; Amuedo-Dorantes and Bansak, 2012, 2014; Bohn and Lofstrom, 2013]. Or-

renius and Zavodny [2009], using 9/11 as a natural experiment for tightened immigration policies and comparing the period January 1999-August 2001 to January 2003-August 2005, find a decrease in employment (by 5.7%), and weekly earnings (by 4.1% and 8.3%) among recent male Latin American immigrants relative to similarly low-skilled black and Hispanic natives. Amuedo-Dorantes and Bansak [2012, 2014] examine the labor market effect for states that adopt E-Verify mandates, and find decreases in the employment likelihood and wages of likely unauthorized workers of about the same magnitude as that found in Orrenius and Zavodny [2009]. Bohn and Lofstrom [2013] use the synthetic control method to examine the effect of the 2007 Legal Arizona Workers Act (LAWA) on labor market outcomes in Arizona, and find a decline of 11 percentage points in wage-sector employment among likely undocumented immigrants.

Building on this finding, recent literature has broadened to understanding various response mechanisms of undocumented immigrants to such restrictions. Several mechanisms have been identified.

A most direct response would be to migrate out of states that adopt more stringent immigration laws. Bohn et al. [2014], using monthly CPS data from 1998 to 2009, find that LAWA decreased the proportion of likely undocumented population by about 2 percentage points in Arizona, which amounts to a population loss of about 90,000. Similarly, Orrenius and Zavodny [2016] find a reduction in likely undocumented population in states that adopt the E-Verify mandates.

While there is a decrease in the number of undocumented immigration in states with more stringent immigration laws, there are still a significant proportion of undocumented immigrants who stayed in those states and in the country. Other response mechanisms may be in place to deal with the situation. Wang and Wang [2012] show that in response to the increased immigration crackdowns, Hispanic immigrants become more likely to marry a native after 9/11. Freedman et al. [2018], utilizing the Immigration Reform and Control Act of 1986 (IRCA), which provided amnesty to undocumented immigrants who have been living

in the United States for a long period of time but also introduced employment sanctions to firms who knowingly hire undocumented immigrants, find evidence that the undocumented immigrants who are likely negatively impacted by IRCA are more likely to resort to income-generating crimes such as selling drugs.

The findings of these unintended effects are interesting and important for better understanding the full effects of tightened immigration policies. But immigrants who intermarry or become criminals only represent a small percentage of the immigrant population after all. There may still exist other response mechanisms by the undocumented immigrants. Indeed, the literature has documented another important response mechanism: self-employment. Among various alternatives, self-employment seems more appealing as it allows undocumented workers to make a living and to stay under the radar without dramatically changing other aspects of their lives, such as migrating across states, changing marriage decisions, or becoming criminals. Studies have found a large increase in self-employment rates among groups that are likely to be undocumented immigrants when immigration policies become tougher. Bohn and Lofstrom [2013], using the synthetic control method and data from 1998 to 2009, find that the 2007 LAWA led to an 8.3 percentage points increase in the self-employment rate for likely unauthorized men in Arizona relative to the synthetic control group, which almost doubled the self-employment rate among this group. Wang [2019], using 9/11 as a natural experiment for stricter immigration enforcement and data from 1996 to 2006, finds that non-citizen Mexican immigrants are 40% more likely to enter into self-employment after 9/11 than less-educated Whites. This is consistent with and provides a potential explanation for the finding that less-educated immigrants, especially Mexican immigrants, have experienced a large increase in self-employment rate in recent years [Lofstrom, 2011; Davila et al., 2014].

This paper builds on this literature, and extends Wang [2019] by adding that the 9/11 event led to not only an increase in self-employment among undocumented immigrants, but also a change in the nature of their self-employment. Specifically, it marks the be-

ginning of a rise in necessity self-employment among Mexican immigrants. The finding of this paper contributes to a fuller understanding of various effects of tightened immigration policies. Understanding the changes in the nature of self-employment among Mexican immigrants has important implications on studies that try to understand the performance of the self-employed and assimilation patterns of immigrants in the U.S.. It also points out the importance of tightened immigration policies as a determinant of immigrants' self-employment choices. In addition, it contributes to a better understanding of how 9/11 affects various aspects of immigrants' lives.

## DATA

Since the necessity and opportunity self-employment definitions proposed by Fairlie and Fossen [2018] require information on labor market transitions across at least two close periods, this paper explores the panel aspect of the CPS basic monthly data by matching samples across any two consecutive months. The panel aspect of the CPS basic monthly data has not received much attention until recent years. A few recent studies have explored this feature to study labor market transitions. For example, Fairlie [2009] uses the matched CPS data to construct the monthly self-employment entry, named Kauffman Index of Entrepreneurial Activity. This approach is also used by Couch et al. [2018] to analyze racial differences in labor market transitions, and by Wang [2018, 2019] to analyze the self-employment dynamics among various immigrant population. Fairlie and Fossen [2018] recently propose using the matched CPS basic monthly data to distinguish between necessity and opportunity self-employment. We follow this approach and use the same data for our study. The sample period includes years from 1996 to 2006 to study the changes before and after 9/11.

We start by matching the data across months. CPS basic monthly data have a "rolling panel" design. In each basic monthly data file, there are eight rotation groups. Each rotation group is interviewed for four consecutive months, leaves the sample for eight months, and then is interviewed again for four more consecutive months. The rotation group that is

interviewed the fourth time leaves the sample temporarily, and the group that is interviewed the eighth time leaves the sample permanently. As a result, six out of eight rotation groups of each month's sample (75%) can be matched to the following month. Following Madrian and Lefgren [2000], we match the data based on household ID, household number, and person's line number within the household, and check the sex, age, and race of the observations to ensure a correct match. Longitudinal weights are then used throughout the analysis to account for the loss of observations during the matching process.

Using the matched data, we create the dependent variables of interest: necessity self-employment and opportunity self-employment. Self-employment status is equal to 1 if one's main job (the longest held) during the interview month is self-employment (including both incorporated and unincorporated businesses), and 0 otherwise. Since necessity self-employment is defined as entering into self-employment directly from being unemployed, the potential necessity self-employment sample is conditional on being unemployed. Necessity self-employment is then defined as equal to 1 if an individual transitions from unemployment to self-employment, and 0 otherwise. The potential opportunity self-employment sample is conditional on being either wage-employment or out-of-the-labor-force. Opportunity self-employment is then defined as equal to 1 if an individual in the potential pool transitions to self-employment, and 0 otherwise.

After matching the data across months to create the dependent variables, the data are used as pooled cross-sections for the analysis. We further exclude the month of September 2001 which is when 9/11 occurred, and restrict the sample to males who are in their prime working ages (ages 18 to 55) and not in the armed force or group quarters.

The treatment group, Mexican immigrants, is defined as male immigrants whose country of origin is Mexico. This group is highly representative of undocumented immigrants.[3] Due to the high concentration of undocumented immigrants, this group should experience the largest impact from the tightened immigration policies after 9/11.

We use less-educated Whites as the control group, following Wang [2019] who shows that

this group is very comparable to Mexican immigrants in their pre-9/11 labor market choices and satisfies the parallel-trend assumption. It includes all male, non-Hispanic, native-born Whites who have 12 years or less of education. We exclude those second-generation immigrants from Muslim-majority countries but may report themselves as native-born Whites, since previous studies have shown that they are also affected by 9/11 [Kaushal et al., 2007; Wang, 2018].

Following Wang [2019], we construct several control variables that are not directly available in the CPS data. "Years of Education" (Educ) is constructed by taking the midpoints of the reported intervals. Similarly, "Years Since Migration" (YSM) is constructed by taking the middle year of each interval of the year-of-entry variable and subtracting it from the year of survey. The variable is set equal to 0 for natives. "Married" is a dummy variable defined as equal to 1 if the individual is married with spouse present or absent, and 0 otherwise. Using the 2000 Census PUMS 5 percent data, we construct the proportions of non-English speakers by Metropolitan Statistical Areas (MSA) (NoengProp) and the proportions of Hispanics by MSA (HispProp). We also collect two state-level business cycle variables, the monthly unemployment rates (UnempRate) and quarterly income per capita (IncomePerCap). Unemployment rates are obtained from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS) program. The per capita income data are obtained from the Bureau of Economic Analysis (BEA), adjusted for inflation and measured in thousands of dollars. Since income per capita is only available quarterly, we match the quarterly data to their respective months.

Table 1 shows the summary statistics of necessity and opportunity self-employment rates by the treatment and control groups before and after 9/11. For both less-educated Whites and Mexican immigrants before 9/11, about 2.5% of the unemployed enter into self-employment. While the rate remains constant for the less-educated Whites after 9/11, Mexican immigrants' transition rate from unemployment to self-employment increases by 1.24 percentage points, a 53% increase. Among the wage-employed and not-in-the-labor-

force group, that is, the potential opportunity self-employment pool, the self-employment entry rate is much lower, about 0.42% for less-educated Whites and 0.35% for Mexican immigrants before 9/11. There is no significant change among less-educated Whites after 9/11, but there is an increase of 0.1 percentage points among Mexican immigrants, which is a 29% increase.

Table 2 shows the summary statistics of the key demographic and other control variables by groups before and after 9/11 for both the potential necessity self-employment (the unemployed) and the potential opportunity self-employment (the wage-employed or not-in-the-labor-force) samples. Compared to less-educated Whites, Mexican immigrants have fewer years of education, more likely to be married, and more likely to live in urban areas and metropolitan areas with a higher proportion of Hispanics or non-English speakers. Potential opportunity entrants tend to be older and more likely to be married than potential necessity entrants. Among the potential necessity entrants, Mexican immigrants are a bit older than less-educated Whites. This is the contrary among the potential opportunity entrants. The pre- and post-9/11 comparison shows that the means of these key characteristics barely change over time, suggesting that the samples are comparable before and after 9/11 and that there is no systematic change in the composition of the groups.

**METHOD**

Analyzing the effect of 9/11 on the nature of self-employment among Mexican immigrants calls for the difference-in-differences (DID) estimation method. A valid control group provides a counter-factual of what would have happened to the treatment group in the absence of the event. By comparing the treatment group to the control group over time, the DID method controls for both *observable* and *unobservable* factors that affect both groups in a similar way. Examples of such factors in the self-employment analysis include the economic recession that started in March 2001 and ended in November 2001 [Hall et al., 2003], or changes in self-employment policies over time. It is important to note that, while many

other factors could affect self-employment, it is not necessary to control for all of them, as the effects of confounding variables can be removed using the DID identification as long as the effects are similar between the treatment and control groups over time [Lee, 2016]. Other confounding variables that may have systematically different effects across groups over time should be controlled for to ensure the comparability of the treatment and control groups [Wooldridge, 2010; Kitchens et al., 2019].

## Model Specification

We follow Wang [2019] closely in the model specifications and the choice of control variables. The empirical model takes the following form:

$$Y_{ist} = \beta_0 + \beta_1 Mex_i \times Post911_t + \beta_2 Mex_i$$
$$+ X_{ist}\Lambda + T_t + S_s + \epsilon_{ist}$$

(0.1)

where $Y_{ist}$ is a measure of one of two outcomes, necessity self-employment and opportunity self-employment, estimated separately based on the respective potential entrants sample. Necessity self-employment is equal to 1 if individual $i$ in state $s$ who is unemployed enters into self-employment at time $t$, and 0 if an unemployed individual does not enter into self-employment. Opportunity self-employment is equal to 1 if a wage-employed or not-in-the-labor-force individual $i$ in state $s$ enters into self-employment at time $t$, and 0 if such individual does not enter into self-employment. $Mex_i$ is a dummy variable equal to 1 if individual $i$ is a Mexican immigrant and 0 if in the control group. $Post911_t$ is a dummy variable equal to 1 if the observation is after 9/11 and 0 otherwise.[4] $Mex_i \times Post911_t$ is the interaction term of Mexican immigrant and post-9/11 dummy variables. The coefficient of interest, $\beta_1$, is the DID estimator. It measures the effect of 9/11 on Mexican immigrants' self-employment outcomes compared to the control group.

$X_{ist}$ is a vector of control variables, including individual characteristics $D_{ist}$, geographic characteristics $G_{ist}$, and business cycle characteristics $B_{st}$. Specifically, $D_{ist}$ is a set of de-

mographic characteristics including age, age squared (Age2), marital status (Married), years since migration (YSM), and years of education (Educ). These characteristics may contribute to the differences in self-employment choices across groups. Controlling for them thus addresses the potential confounding effects due to possible changes in the composition of Mexican immigrants over time. $G_{ist}$ is a set of geographic characteristics that may affect self-employment outcomes, including a dummy variable indicating whether individual $i$ lives in a metropolitan area (Metro), the proportions of non-English speakers by MSA (NoengProp), and the proportions of Hispanics by MSA (HispProp). Controlling for these variables accounts for the potentially different tendency of Mexican immigrants and Whites to concentrate in these areas over time. $B_{st}$ is a set of variables controlling for business cycle, including monthly state-level unemployment rates ($Unempst$) and quarterly state-level per capita income ($Incomecapst$), and the interactions of these variables with the Mexican immigrant dummy variable. These variables capture the common business cycle effect such as the 2001 recession, as well as potential differential effects of business cycle on Mexican immigrants and less-educated Whites. Couch and Fairlie [2010] and Couch et al. [2018] find evidence that minority groups have different patterns of labor market transitions than Whites do over the business cycle. Hence we control for such possibility by controlling for the interaction of business cycle variables and the Mexican immigrant dummy variable. The business cycle variables are centered around the mean ($B_{st} - \overline{B_{st}}$) for easier interpretations. As a result, the coefficient on the variable $Mex$ alone now measures how Mexican immigrants differ from less-educated Whites in states and time with *average* unemployment rates and per capita income, instead of with *zero* unemployment rates and per capita income.

Year-month fixed effects $T_t$ and state fixed effects $S_s$ control for any remaining unobserved year-month- and state-specific heterogeneity. For example, state fixed effects control for the fact that Mexican immigrants tend to concentrate in several states and may face different self-employment opportunities. Year-month fixed effects would control for any national changes common to each state such as national time trend.[5] The main effect of $Post911_t$ is subsumed

into the year-month fixed effects. Standard errors are heteroskedasticity-robust and clustered at the state level.

**Validity of Control Group**

For the DID approach to control for potential confounding factors, the validity of the control group requires the satisfaction of two conditions: 1) the control group's self-employment outcomes should not be affected by the stricter immigration policies or anti-immigration discrimination that followed 9/11, and 2) the control group should have the same underlying trend as the treatment group before 9/11—the parallel-trend assumption. It is important to note that the parallel-trend assumption does not preclude the situation where the two groups differ in self-employment choices, it only requires that the *trends* are parallel between the two groups in the absence of the event.

We use less-educated Whites as the main control group as it is least likely to be affected by stricter immigration policies and discrimination and most similar to Mexican immigrants. Summary statistics above show that neither the necessity or opportunity self-employment rate changes among the less-educated Whites after 9/11, suggesting limited effects of the event on this group. Wang [2019] also shows that less-educated Whites and Mexican immigrant are very comparable in their industry composition, with both groups highly concentrated in manufacturing, retail trade, and construction. Similar industry composition implies that they are subject to the same business cycle shocks and industry-specific self-employment policies, therefore likely to exhibit similar self-employment trends.

We further perform both visual and statistical tests of the parallel-trend assumption. We first provide a visual test of the necessity and opportunity self-employment trends between less-educated Whites and Mexican immigrants. The top figure of Figure 1 shows the regression-adjusted monthly necessity self-employment entry rates by groups. The vertical line represents the timing of 9/11. The necessity self-employment entry rates among Mexican immigrants are very similar to that among less-educated Whites and fluctuate in

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a parallel way before 9/11, supporting the parallel-trend assumption. It is also clear that after 9/11, Mexican immigrants have much higher necessity entry rates than less-educated Whites. This pattern is highlighted in the bottom figure where we present the difference in monthly necessity entry rates between Mexican immigrants and less-educated Whites $(\overline{NecessityEntry_{Mex}} - \overline{NecessityEntry_{White}})$. The differences in the necessity entry rates between the two groups hover around 0 before 9/11, and exhibit a stable and flat trend. This is followed by a clear surge after 9/11, indicating Mexican immigrants' necessity entry rates substantially increase and become higher than that of less-educated Whites. Figure 2 shows similar evidence for the opportunity self-employment entry rates. The opportunity self-employment entry rates among Mexican immigrants lie slightly below those of less-educated Whites before 9/11, but become very similar after 9/11. The pre-9/11 parallel trend is also confirmed as shown by the flat and stable trend in the bottom of Figure 2.

In addition to the visual tests, we also conduct a series of falsification tests. If Mexican immigrants and less-educated Whites have similar trends before 9/11, then the DID estimates using artificial break points in the period before 9/11 should be insignificant and small. We restrict the sample period to before 9/11 (from January 1996 to August 2001), leave at least 20 months at the beginning and 20 months at the end to preserve a large enough pre- and post-event periods. Then we use any month from the 21st to the 47th months as the artificial break point to conduct the DID estimation. This generates a total of 27 falsification tests. The 27 DID estimates are collected in Appendix Table A1. Model 1 shows the necessity self-employment DID estimates, and Model 2 shows the opportunity self-employment DID estimates. Out of 27 DID estimates for each outcome, none is statistically significant, providing strong evidence that there is no pre-existing increase in either type of self-employment among Mexican immigrants compared to less-educated Whites in the pre-9/11 period.

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**RESULTS**

We estimate the regression models for necessity self-employment and opportunity self-employment outcomes separately, using their respective potential entrant samples. The necessity self-employment analysis is conditional on being unemployed, whereas the opportunity self-employment analysis is conditional on being wage-employed or not-in-the-labor-force.

**Main Finding**

Table 3 shows the DID results for necessity self-employment. Model 1 presents the basic DID model without any control variables, Model 2 include demographic and geographical control variables, Model 3 adds state and year-month fixed effects, and Model 4 adds business cycle variables.[6] The coefficient of interest is that of the interaction term $Mex * Post911$. The DID estimate without control variables shows that unemployed Mexican immigrants are 1.57 percentage points more likely to enter into self-employment than less-educated Whites after 9/11. The estimates are consistent across model specifications: adding additional sets of control variables does not significantly change the DID estimates. This is true even after controlling for the interaction terms of business cycle variables and the Mexican immigrant dummy variable, suggesting that differential response to business cycle is unlikely driving the increase in necessity self-employment among Mexican immigrants. In the full model that includes all control variables, the magnitude of the increase is 1.55 percentage points, which is a 66% increase.

It is also interesting to note the effects of the control variables on necessity self-employment. Age, marital status, and years since migration show statistically significant effects. The likelihood of necessity self-employment exhibits an inverse-U shape with age, as suggested by the significant negative coefficient of the $Age2$ variable. Married individuals are more likely to transition from unemployment to self-employment, perhaps due to stronger labor market attachment and the need to support the family. Immigrants who are in the country for a longer period of time are less likely to transition from unemployment to self-employment.

This may be because they have more knowledge about the labor market and better networks than the newly arrived to keep searching for jobs in the wage sector. Citizenship, education level, geographical areas, and business cycles seem to have little explanation power in this choice.

Table 4 shows the regression results for opportunity self-employment. Mexican immigrants are about 0.1 percentage points more likely to transition from the wage-sector or out-of-labor-force to self-employment than less-educated Whites after 9/11. Again, adding different sets of control variables does not change the DID estimate significantly. While the effect is much smaller in magnitude than necessity self-employment, it still represents a 29% increase.

Similar to necessity self-employment, the likelihood of opportunity self-employment exhibits an inverse-U pattern with age. But other variables show different effects. Married individual are actually less likely to transition from wage-sector or out-of-the-labor-force to self-employment. This may be because self-employment involves higher risks compared to wage-sector jobs and that married men seek stability to support family.[7] In addition, immigrants who are in the country for a longer period of time are more likely to take up opportunity self-employment, although the magnitude of the effect is very small. Education also plays a role here. More educated individuals and those who live in metropolitan areas are less likely to take up opportunity self-employment, perhaps due to availability of jobs to these groups.

In sum, the results indicate that both necessity and opportunity self-employment rates increase among Mexican immigrants compared to less-educated Whites after 9/11. The effect is most prominent on necessity self-employment, providing evidence that Mexican immigrants are pushed into self-employment. Below we conduct robustness checks of these results.

**Robustness Check**

***Definition of self-employment*** To make sure the results are not driven by the specific way we define self-employment, we test whether different definitions of self-employment may affect the results. First, we exclude self-employment in the agricultural sector. These are typically farmers or farm helpers, among whom Mexican immigrants have a high concentration. But self-employment in this sector does not necessarily represent business start ups. To see if the results may be driven by a substantial change in self-employment in the agricultural sector, we exclude the self-employment entries into this sector. Model 1 of Table 5 shows the results. Panel A shows the results of necessity self-employment, and Panel B opportunity self-employment. After excluding the agricultural self-employment, the DID estimates become larger for both necessity and opportunity self-employment, suggesting that Mexican immigrants in non-farm sectors actually experience an even larger increase in both types of self-employment.

Second, we redefine self-employment as equal to 1 only if an individual works for at least 15 hours a week in self-employment. This is so that self-employment only counts those who are serious enough about the business to put in more time. While this definition is appropriate for documenting business startup rates as in Fairlie and Fossen [2018], we do want to capture those who are pushed into self-employment but cannot find enough work, so that the estimates capture the full response of Mexican immigrants to stricter immigration enforcement. Nonetheless, we test whether the results are sensitive to this definition. Model 2 of Table 5 shows that the results are not sensitive to this definition.

***Alternative Control Group*** In addition, we use an alternative control group, Blacks, to assess the robustness of our results. While Wang [2019] shows that Blacks are actually less comparable to Mexican immigrants than less-educated Whites in terms of their labor market choices, they still exhibit some similarity and face similar business barriers as Mexican immigrants. Using Blacks as an alternative control group, Model 3 of Table 5 shows that

Mexican immigrants are 1.72 percentage points more likely to transition from unemployment to self-employment than Blacks. This is a 74% increase, which is much larger than when using less-educated Whites as the control group. For opportunity self-employment, the magnitude remains the same, and the coefficient becomes insignificant for a two-tail test, but remains statistically significant at the 10% level in a one-tail test.

***Mechanisms*** The DID estimates measure the total changes in the years after 9/11. Considering that the data contain a long period of five years after 9/11, the estimates may arguably capture the effects of some other factors than just 9/11. To address this concern, we restrict the sample to a shorter time period immediately after 9/11, up to 2004. Model 1 in Table 6 shows the results. Panel A presents the results for necessity self-employment, whereas Panel B presents those for opportunity self-employment. The DID estimates actually become larger when using the shorter time period, suggesting the observed effects closely followed 9/11, rather than by other factors that occurred later.

We further analyze the main mechanisms of the 9/11 effects. The post-9/11 periods are marked by two prominent changes: 1) stricter immigration enforcement; and 2) the rise of anti-immigration sentiment. They may both affect Mexican immigrants' labor market opportunities and thereby their self-employment choices. While identifying the channels through which 9/11 affects our outcomes is by no means trivial, we provide indirect evidence to show that immigration enforcement may be the main mechanism.[8]

Since most of the immigration enforcement actions target undocumented immigrants, immigration enforcement effect should concentrate on undocumented immigrants. Ideally, we could try to identify undocumented status among immigrants instead of using Mexican immigrants as a proxy for undocumented immigrants. Borjas [2017] provides a measure to identify undocumented immigrants in the CPS data. However, his measure can only be used with Annual Social and Economic Supplement (ASEC) of the CPS or the American Community Survey (ACS), but not the CPS basic monthly data. To examine whether the effects stem

from stronger enforcement on undocumented immigrants or from anti-immigration sentiment, we use two alternative treatment groups of immigrants who would experience different degrees of these two effects: 1) non-Mexican Hispanic immigrants; and 2) immigrants from Europe, Canada, Australia, and New Zealand. First, Non-Mexican Hispanic immigrants are less likely undocumented and therefore less subject to the impacts of immigration enforcement.[9] In addition, because they have similar cultural and language backgrounds as Mexican immigrants, they should experience similar discrimination effect from anti-immigration sentiment. Using non-Mexican Hispanic immigrants as an alternative treatment group therefore allows us to compare the results for two groups with similar discrimination effects. The difference between these two groups would point to the stricter immigration enforcement effects. Second, immigrants from Europe, Canada, Australia, and New Zealand tend to be documented immigrants and therefore unlikely subject to immigration enforcement. They are also less likely to be subject to the impact of discrimination because of their similarity to native Whites. Using this group of immigrants as an alternative treatment group allows us to see the effects of any other post-9/11 factors than enforcement and discrimination.

Models 2 and 3 in Table 6 show the results. Model 2 uses non-Mexican Hispanic immigrants as the treatment group, and Model 3 uses immigrants from Europe, Canada, Australia, and New Zealand as the treatment group. The results show that, contrary to Mexican immigrants, the 9/11 events have no effects on any of these two groups. This suggests that the increase of self-employment among Mexican immigrants is unlikely driven by anti-immigration sentiment or other factors after 9/11. Instead, it is likely due to the large undocumented population among Mexican immigrants and immigration enforcement.

Overall, the results are robust to various definitions of self-employment, an alternative control group, and a more restricted time period. The mechanism analysis suggests that these effects are not found on immigrant populations that are more likely documented than Mexican immigrant, suggesting immigration enforcement as the main mechanism.

***Event-study Framework*** To further understand the timing of the effects and to provide extra evidence on the parallel-trend assumption, we estimate the effects using an event-study framework by including leads and lags. The event-study model takes the following form:

$$
\begin{aligned}
Y_{ist} =& \beta_0 + \sum_{p=1}^{2} \beta_p Mex_i \times Post911_{-p} + \sum_{q=1}^{5} \beta_q Mex_i \times Post911_{+q} \\
& + \gamma Mex_i + X_{ist}\Lambda + T_t + S_s + \epsilon_{ist}
\end{aligned}
\tag{0.2}
$$

where $Mex_i \times Post911_{-p}$ represents the interaction effect of Mexican immigrants and the $p$th year before 9/11, $Mex_i \times Post911_{+q}$ represents the interaction effect of Mexican immigrants and the $q$th year after 9/11. The base time frame is the first two years of the sample, from January 1996 to December 1998. The two-years-before-9/11 period extends from January 1999 to December 1999, and the year before 9/11 extends from January 2000 to before 9/11. The post-9/11 period is divided into five periods.

The results are shown in Model 1 (necessity self-employment) and Model 2 (opportunity self-employment) of Table 7. In both models, there are no significant differences between Mexican immigrants and less-educated Whites in the pre-9/11 periods. This result again supports the assumption that there are no pre-existing trends before 9/11. Examining the timing of the effects, the results show that necessity self-employment among Mexican immigrants substantially increases in the third and fourth year after 9/11, whereas opportunity self-employment increases in the first year.

The event-study and various robustness checks confirm the results in the main finding. Next, we discuss the potential heterogeneity in opportunity self-employment.

## HETEROGENEITY AMONG OPPORTUNITY SELF-EMPLOYMENT

When immigration enforcement becomes tougher after 9/11, it is expected that necessity self-employment would increase among Mexican immigrants, as the workers who are displaced

of work may find it harder to find new jobs under such an environment and thus turn to self-employment as a survival alternative. However, why would opportunity self-employment also increase? We propose that the measure of opportunity self-employment defined by Fairlie and Fossen [2018] may be too broad that it actually captures both necessity and opportunity self-employment. This may be especially true for Mexican immigrants, a group highly representative of undocumented immigrants, who have very strong labor market attachment and face extra labor market constraints due to tightened immigration policies.

First, Mexican immigrants are one of the groups that have the strongest labor market attachment. As such, they may transition from wage-employment to unemployment to self-employment within a very short period of time. Since the necessity and opportunity self-employment measures are based on labor market transitions from one month to the next, multiple transitions that occur within a month may be captured as opportunity self-employment.

Second, tightened immigration policies create extra labor market constraints for Mexican immigrants that may lead to transitions from various work status into self-employment. When immigration policies tighten, undocumented immigrants may be pushed into self-employment via two channels: the demand channel and the supply channel. Below we discuss how each mechanism may manifest itself in either the necessity self-employment or opportunity self-employment measures.

The demand for undocumented immigrants would decrease as stricter immigration enforcement discourages firms from hiring them. A decrease in demand for these immigrants in the formal job market may force them to instead choose self-employment to make a living. This demand side effect would likely appear as an increase in necessity self-employment, that is, an increase in the transitions from unemployment to self-employment.

The supply of undocumented immigrants in the formal job market may also decrease when the risks of being detected as undocumented increase. Out of fears of detection and deportation, undocumented immigrants may proactively search for work alternatives to allow

them to stay under the radar. Self-employment would seem like the next best alternative as it allows them to work without authorization. The supply side effect would likely appear as an increase in opportunity self-employment, that is, an increase in the transitions from wage-employment or not-in-the-labor-force status to self-employment.

While it would appear that both necessity and opportunity self-employment rates increase in response to the stricter immigration enforcement, the opportunity self-employment measure may actually capture those who choose to enter into self-employment out of necessity or fear instead of pursuing profit opportunities. It is difficult to directly test the motivation of self-employment in the CPS data. However, we provide some evidence of this explanation by examining the heterogeneity among opportunity self-employment.

To test if opportunity self-employment among Mexican immigrants includes necessity self-employment, that is, those who are pushed into self-employment due to fear of immigration raids and its consequences, we examine whether a high-risk group of Mexican immigrants, who are more likely to be subject to the impact of stricter immigration policies and who have more to lose if detected and deported, are driving the increase in opportunity self-employment among Mexican immigrants. We define the high-risk group as Mexican immigrants with less than a high school degree or married with spouse present. Since the majority of undocumented immigrants have less than a high school degree, the less-educated Mexican immigrants are more likely to be undocumented and affected by stricter immigration policy. On the other hand, Mexican immigrants who are married with a spouse present will have more at stake and be more risk averse when considering immigration enforcement and its consequences compared to those who are single or married but the spouse is not present. They may therefore be more proactive and search for safer work alternatives. We group them into the high-risk group to see if they may be driving the increase in opportunity self-employment. If so, then it provides indirect evidence that the increase in opportunity self-employment is at least partly driven by necessity instead of profit opportunities.

We modify the model by adding an $HR$ dummy variable representing the high-risk group–

either with less than high school education or married with a spouse present. We then include pair-wise interaction terms between $HR$, $Mex$, and $Post911$, as well as the interaction term of all three variables $HR * Mex * Post911$, which measures the difference in the effects of 9/11 between the high-risk Mexican immigrants and non-high-risk Mexican immigrants compared to less-educated Whites. About 84% of the wage-employed or not-in-the-labor-force Mexican immigrant sample fall into the high-risk group. Model 1 of Table 8 presents the results. The coefficient on $HR * Mex$ measures the difference between high-risk and non-high-risk Mexican immigrants before 9/11. It is not statistically significant, suggesting that these two groups' opportunity self-employment rates are similar before 9/11. The coefficient on $Mex * Post911$ represents the effect of 9/11 on non-high-risk group, which is statistically insignificant, suggesting that this is not the group driving the increase in opportunity self-employment. However, the coefficient on $HR * Mex * Post911$ shows that the high-risk Mexican immigrants experience a 0.08 percentage point increase in opportunity self-employment after 9/11 compared to the non-high-risk Mexican immigrants relative to the control group. This seems to support the hypothesis that the increase in opportunity self-employment is mainly driven by a group that are more likely undocumented and have more at stake.

We further examine the type of industries into which Mexican immigrants enter. Following Lofstrom and Wang [2009], we categorize industries into low barrier industries which require low levels of financial capital, and high barrier industries which require higher levels of financial capital.[10] Low barrier industries, while requiring low levels of financial capital, also tend to have lower profit returns. If Mexican immigrants who enter into self-employment after 9/11 tend to focus more on low-barrier industries, then it may suggest that they are not necessarily driven by profit opportunities.

We estimate a multinomial logit model among the potential opportunity entrants where the dependent variable has 3 categories: does not enter into self-employment, enter into low barrier industries, and enter into high barrier industries. No entry is the base case.

$Mex * Post911$ measures the effect of 9/11 on the type of industries Mexican immigrants enter into. Model 2 in Table 8 shows the results. We report relative risk ratios instead of marginal effects as the interaction effects complicate the calculation of marginal effects in these types of models [Ai and Norton, 2003; Buis, 2010]. The coefficients on $Mex$ shows that, among the wage-employed and not-in-the-labor-force individuals, Mexican immigrants are about half as likely to enter into either low-barrier or high-barrier industries than less-educated Whites before 9/11. However, the DID estimate, $Mex * Post911$, shows that Mexican immigrants are about 1.4 times more likely to enter into low-barrier industries than less-educated Whites after 9/11, and it is statistically significant. On the other hand, there is no significant change in Mexican immigrants' entrance into high-barrier industries after 9/11.

Analyzing the heterogeneity among Mexican immigrants' opportunity self-employment reveals that this measure may in fact capture some necessity self-employment stemming from the stricter immigration enforcement. While the definitions of necessity and opportunity self-employment based on prior work status may do a good job documenting the overall trend of self-employment and its relationship with the business cycle, the findings here caution the use of these definitions in specific demographic groups that have very strong labor market attachment or extra labor market constraints.

**CONCLUSION**

This paper examines the effect of 9/11 on the nature of self-employment among Mexican immigrants. We adopt the recently developed operational measures of necessity and opportunity self-employment by Fairlie and Fossen [2018], which distinguish between these two types of self-employment based on prior work status: necessity self-employment is transitioned from unemployment status, whereas opportunity is transitioned from wage-employment or not-in-the-labor-force status. We find that both necessity and opportunity self-employment rates increase among Mexican immigrants compared to the less-educated Whites after 9/11.

The effect is most prominent on necessity self-employment (a 66% increase), and smaller on opportunity self-employment (a 29% increase). This finding is robust to a variety of model specifications and self-employment definitions. We show evidence that the main mechanism is the tightened immigration enforcement after 9/11.

We provide an explanation for the puzzling effects of stricter enforcement after 9/11 on Mexican immigrants' opportunity self-employment. We propose that the definition of opportunity self-employment may be too broad that it captures both necessity and opportunity self-employment. We provide indirect evidence supporting this explanation, and caution the use of such measures in population subgroups that have very strong labor market attachment and extra labor market constraints.

The finding in this paper points out that 9/11 has a significant impact on the self-employment outcomes of likely undocumented immigrants, and tightened immigration enforcement plays an important role in shaping the types of self-employment among this group. The finding of a substantial increase in necessity self-employment after 9/11 also has important implications for future studies that try to understand the labor market performance and assimilation patterns of immigrants.

## Notes

[1]See Orrenius and Zavodny [2009] for a thorough review of immigration policy changes after 9/11.

[2]According to estimates by Fairlie and Woodruff [2007] using 2000 Census data, Mexican immigrants' self-employment rate is about 6%, much lower than the national average of 11%.

[3]In 2009, about 62 percent of the estimated 10.8 million undocumented immigrants in the United States were Mexicans, and among the 11.4 million Mexican immigrants, over half (about 55 percent) were undocumented immigrants [Terrazas, 2010].

[4]The main effect of $Post911_t$ is subsumed into the year-month fixed effects, therefore does not appear separately in the model.

[5]In fact, they would also control for any federal-level enforcement measures such as border patrol or spending. Adding the year-month fixed effects would thus exclude the effects of this type of enforcement changes on self-employment. However, our results show that inclusion of these fixed effects does not impact

our estimates, suggesting that the changes in this type of enforcement at the federal level play a limited role on Mexican immigrants' self-employment decisions.

[6]In Models 1 and 2, year-month fixed effects are not included, therefore we include $Post911$ dummy variable in the model. This term is absorbed by the year-month fixed effects in Models 3 and 4, and therefore not presented in these models.

[7]The contrasting effects of marital status on the different types of self-employment are interesting. The effects do not appear to be specific to Mexican immigrants only; we add interaction terms of Mexican immigrants and the marital status variable, and find that Mexican immigrants marital status do not have any different effects on necessity or opportunity self-employment than the control group. Since marital status is not the focus of the paper, we leave this for future research.

[8]We could collect state and local enforcement measures to directly examine the effects of enforcement on self-employment. However, simply adding such channel variables in our model would not necessarily identify the impacts of the variables, but could even affect the estimates of the variables of main interest since each channel is an intermediate outcome itself, and thus would be a bad control [Angrist and Pischke, 2009]. As such, we leave this important investigation to more careful future research.

[9]According to Hoefer et al. [2006], in 2000, about 4.7 million undocumented immigrants living in the U.S. were from Mexico, and only about 2 million were from other countries in Central and South America and the Caribbeans (our definition of non-Mexican Hispanics). Radford and Noe-Bustamante [2019] estimate that out of the 31.1 million immigrants (both documented and undocumented) living in the U.S. in 2000, about 29% were Mexican (about 9 million) and 22% were non-Mexican Hispanic immigrants (about 6.84 million). In other words, more than half of all Mexican immigrants were undocumented, whereas the ratio is less than 30% among non-Mexican Hispanic immigrants.

[10]Low barrier industries: Construction, Retail Trade, Repair Services, and Personal Services. High barrier industries: Agriculture, Transportation/communications, Wholesale trade, Business services, Entertainment/recreation services, Finance/Insurance/Real estate, Manufacturing, Professional/Related services or Other.

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Table 1: SUMMARY STATISTICS: NECESSITY AND OPPORTUNITY SELF-EMPLOYMENT BY GROUPS

| | Less-Educated Whites | | Mexican Immigrants | |
|---|---|---|---|---|
| | Pre-911 | Post-911 | Pre-911 | Post-911 |
| Necessity SE (From Unemployed) | 0.0265 | 0.0233 | 0.0234 | 0.0358 |
| N | 19,575 | 24,545 | 2,442 | 2,961 |
| | | | | |
| Opportunity SE (From Wage-Employed or NILF) | 0.0042 | 0.0044 | 0.0035 | 0.0045 |
| N | 381,695 | 383,030 | 46,084 | 61,229 |

[1] Longitudinal weights are applied.

Table 2: SUMMARY STATISTICS: KEY CONTROL VARIABLES

| | Potential Necessity Entrants | | | | Potential Opportunity Entrants | | | |
| | Less-Educated Whites | | Mexican Immigrants | | Less-Educated Whites | | Mexican Immigrants | |
| | Pre-911 | Post-911 | Pre-911 | Post-911 | Pre-911 | Post-911 | Pre-911 | Post-911 |
|---|---|---|---|---|---|---|---|---|
| Age | 31.46 | 31.99 | 32.19 | 33.53 | 35.62 | 36.35 | 33.19 | 33.83 |
| | (10.95) | (11.17) | (9.84) | (9.83) | (10.86) | (11.30) | (9.37) | (9.43) |
| Years of Education | 11.38 | 11.49 | 8.29 | 8.64 | 11.53 | 11.58 | 8.86 | 9.28 |
| | (1.19) | (1.09) | (3.85) | (3.77) | (1.28) | (1.24) | (3.96) | (3.77) |
| Married | 0.33 | 0.31 | 0.59 | 0.62 | 0.54 | 0.50 | 0.65 | 0.65 |
| | (0.47) | (0.46) | (0.49) | (0.49) | (0.50) | (0.50) | (0.48) | (0.48) |
| Citizenship | 1.00 | 1.00 | 0.13 | 0.14 | 1.00 | 1.00 | 0.18 | 0.18 |
| | (0.00) | (0.00) | (0.34) | (0.35) | (0.00) | (0.00) | (0.38) | (0.39) |
| Years Since Migration | 0.00 | 0.00 | 13.70 | 13.70 | 0.00 | 0.00 | 13.63 | 13.72 |
| | (0.00) | (0.00) | (9.11) | (9.74) | (0.00) | (0.00) | (9.19) | (9.79) |
| Metropolitan Area | 0.70 | 0.71 | 0.92 | 0.91 | 0.72 | 0.72 | 0.91 | 0.91 |
| | (0.46) | (0.45) | (0.28) | (0.28) | (0.45) | (0.45) | (0.29) | (0.29) |
| Proportion of Hispanics in MSA | 0.09 | 0.08 | 0.33 | 0.29 | 0.09 | 0.08 | 0.30 | 0.26 |
| | (0.11) | (0.10) | (0.19) | (0.19) | (0.10) | (0.10) | (0.17) | (0.16) |
| Proportion of Non-English Speakers in MSA | 0.03 | 0.03 | 0.09 | 0.08 | 0.03 | 0.03 | 0.09 | 0.07 |
| | (0.03) | (0.03) | (0.05) | (0.04) | (0.03) | (0.03) | (0.04) | (0.04) |
| N | 19,575 | 24,545 | 2,442 | 2,961 | 381,695 | 383,030 | 46,084 | 61,229 |

[1] Longitudinal weights are applied.

Table 3: Necessity Self-Employment (Conditional on Unemployed)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Mex*Post911 | 0.0157*** | 0.0150*** | 0.0148*** | 0.0155*** |
| | (0.0032) | (0.0033) | (0.0032) | (0.0033) |
| Mex | -0.0031 | -0.0099 | -0.0133* | -0.0132* |
| | (0.0053) | (0.0073) | (0.0070) | (0.0069) |
| Post911 | -0.0033* | -0.0033* | | |
| | (0.0018) | (0.0019) | | |
| Age | | 0.0035*** | 0.0036*** | 0.0036*** |
| | | (0.0007) | (0.0006) | (0.0006) |
| Age2 | | -0.0038*** | -0.0039*** | -0.0039*** |
| | | (0.0010) | (0.0009) | (0.0009) |
| Married | | 0.0068*** | 0.0071*** | 0.0071*** |
| | | (0.0018) | (0.0018) | (0.0018) |
| Citizen | | -0.0049 | -0.0068 | -0.0069 |
| | | (0.0057) | (0.0059) | (0.0059) |
| YSM | | -0.0005*** | -0.0004* | -0.0004* |
| | | (0.0002) | (0.0002) | (0.0002) |
| Educ | | -0.0006 | -0.0004 | -0.0004 |
| | | (0.0005) | (0.0004) | (0.0004) |
| Metro | | -0.0035 | -0.0028 | -0.0028 |
| | | (0.0021) | (0.0022) | (0.0022) |
| Hispanic Proportion | | 0.0683*** | 0.0087 | 0.0079 |
| | | (0.0235) | (0.0274) | (0.0262) |
| Non-English Speaking Proportion | | -0.1803*** | 0.0421 | 0.0469 |
| | | (0.0625) | (0.0693) | (0.0637) |
| UnempRate*Mex | | | | -0.0010 |
| | | | | (0.0019) |
| IncomePC*Mex | | | | -0.0003 |
| | | | | (0.0006) |
| UnempRate | | | | -0.0006 |
| | | | | (0.0012) |
| IncomePC | | | | 0.0011 |
| | | | | (0.0009) |
| State FE | | | ✓ | ✓ |
| Year-month FE | | | ✓ | ✓ |
| Control Group | | | Less-Educated Whites | |
| N | | | 49,523 | |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

Table 4: OPPORTUNITY SELF-EMPLOYMENT (CONDITIONAL ON WAGE-EMPLOYED OR OUT-OF-THE-LABOR-FORCE)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Mex*Post911 | 0.0008** | 0.0011** | 0.0010** | 0.0011* |
| | (0.0004) | (0.0004) | (0.0004) | (0.0006) |
| Mex | -0.0007*** | -0.0025*** | -0.0025*** | -0.0025*** |
| | (0.0003) | (0.0007) | (0.0007) | (0.0008) |
| Post911 | 0.0002 | 0.0002 | | |
| | (0.0002) | (0.0002) | | |
| Age | | 0.0004*** | 0.0004*** | 0.0004*** |
| | | (0.0001) | (0.0001) | (0.0001) |
| Age2 | | -0.0004*** | -0.0004*** | -0.0004*** |
| | | (0.0001) | (0.0001) | (0.0001) |
| Married | | -0.0011*** | -0.0011*** | -0.0011*** |
| | | (0.0002) | (0.0002) | (0.0002) |
| Citizen | | -0.0006 | -0.0006 | -0.0006 |
| | | (0.0005) | (0.0006) | (0.0006) |
| YSM | | 0.0000* | 0.0000* | 0.0000* |
| | | (0.0000) | (0.0000) | (0.0000) |
| Educ | | -0.0001*** | -0.0001*** | -0.0001*** |
| | | (0.0000) | (0.0000) | (0.0000) |
| Metro | | -0.0007*** | -0.0005** | -0.0005** |
| | | (0.0002) | (0.0002) | (0.0002) |
| Hispanic Proportion | | 0.0028 | 0.0008 | 0.0008 |
| | | (0.0020) | (0.0030) | (0.0030) |
| Non-English Speaking Proportion | | 0.0055 | 0.0150 | 0.0153* |
| | | (0.0071) | (0.0094) | (0.0090) |
| UnempRate*Mex | | | | -0.0001 |
| | | | | (0.0002) |
| IncomePC*Mex | | | | -0.0000 |
| | | | | (0.0001) |
| UnempRate | | | | 0.0001 |
| | | | | (0.0002) |
| IncomePC | | | | 0.0001 |
| | | | | (0.0001) |
| State FE | | | ✓ | ✓ |
| Year-month FE | | | ✓ | ✓ |
| Control Group | | Less-Educated Whites | | |
| N | | 872,038 | | |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

Table 5: Robustness Checks

|  | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| **Panel A: Necessity Self-Employment** | | | |
|  | Exclude Agriculture | At Least 15 Hours of SE | Black |
| Mex*Post911 | 0.0165*** | 0.0116*** | 0.0172*** |
|  | (0.0043) | (0.0034) | (0.0047) |
| Control Variables |  | All |  |
| N | 46,572 | 48,915 | 23,675 |
| **Panel B: Opportunity Self-Employment** | | | |
|  | Exclude Agriculture | At Least 15 Hours of SE | Black |
| Mex*Post911 | 0.0014** | 0.0009* | 0.0011 |
|  | (0.0006) | (0.0005) | (0.0008) |
| Control Variables |  | All |  |
| N | 832,136 | 870,674 | 309,022 |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

Table 6: Robustness Checks-Mechanism

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| **Panel A: Necessity Self-Employment** | | | |
| Immigrant*Post911 | 0.0183*** | 0.0069 | -0.0320 |
| | (0.0042) | (0.0044) | (0.0248) |
| Treatment Group | Mexican Immigrants | Other Hispanic Immigrants | European/Canadian/ Australian/New Zealand Immigrants |
| Control Group | Less-Educated Whites | Less-Educated Whites | Less-Educated Whites |
| Sample Period | 1996-2004 | Full | Full |
| N | 40,391 | 48,195 | 44,208 |
| **Panel B: Opportunity Self-Employment** | | | |
| Immigrant*Post911 | 0.0012* | -0.0001 | 0.0029 |
| | (0.0007) | (0.0005) | (0.0061) |
| Treatment Group | Mexican Immigrants | Other Hispanic Immigrants | European/Canadian/ Australian/New Zealand Immigrants |
| Control Group | Less-Educated Whites | Less-Educated Whites | Less-Educated Whites |
| Sample Period | 1996-2004 | Full | Full |
| N | 710,591 | 835,431 | 766,229 |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. The full set of control variables are included in all models. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

Table 7: ROBUSTNESS CHECKS: EVENT-STUDY FRAMEWORK

| | Model 1<br>Necessity Self-Employment | Model 2<br>Opportunity Self-Employment |
|---|---|---|
| Mex*Post911_-2 | 0.0110 | 0.0004 |
| | (0.0117) | (0.0008) |
| Mex*Post911_-1 | -0.0098 | -0.0000 |
| | (0.0060) | (0.0009) |
| Mex*Post911_+1 | 0.0099 | 0.0017* |
| | (0.0068) | (0.0009) |
| Mex*Post911_+2 | 0.0071 | 0.0002 |
| | (0.0056) | (0.0011) |
| Mex*Post911_+3 | 0.0300*** | 0.0014 |
| | (0.0069) | (0.0009) |
| Mex*Post911_+4 | 0.0209** | 0.0011 |
| | (0.0085) | (0.0010) |
| Mex*Post911_+5 | 0.0033 | 0.0012 |
| | (0.0080) | (0.0011) |
| Base Period | 1996-1998 | |
| N | 49,523 | 872,038 |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

Table 8: HETEROGENEITY IN OPPORTUNITY SELF-EMPLOYMENT

| | Model 1 | Model 2 | |
| | High Risk Population | Multinomial Logit | |
| | | Low Barrier | High Barrier |
|---|---|---|---|
| Mex*Post911 | 0.0004 | 1.4274** | 1.1611 |
| | (0.0008) | (0.2438) | (0.1737) |
| Mex | -0.0021** | 0.5063*** | 0.5209** |
| | (0.0009) | (0.1006) | (0.1461) |
| HR | -0.0003 | | |
| | (0.0002) | | |
| HR*Mex | -0.0005 | | |
| | (0.0004) | | |
| HR*Post911 | -0.0001 | | |
| | (0.0003) | | |
| HR*Mex*Post911 | 0.0008* | | |
| | (0.0005) | | |
| Control Variables | | All | |
| Control Group | | Less-educated Whites | |
| N | | 872,038 | |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.

[2] High risk population is defined as Mexican immigrants with less than 12 years of education or married with a spouse present.

[3] In Model 2, relative risk ratios are reported. Low barrier industries are defined as: Construction, Retail Trade, Repair Services, and Personal Services. High barrier industries are defined as: Agriculture, Transportation/communications, Wholesale trade, Business services, Entertainment/recreation services, Finance/Insurance/Real estate, Manufacturing, Professional/Related services or Other.
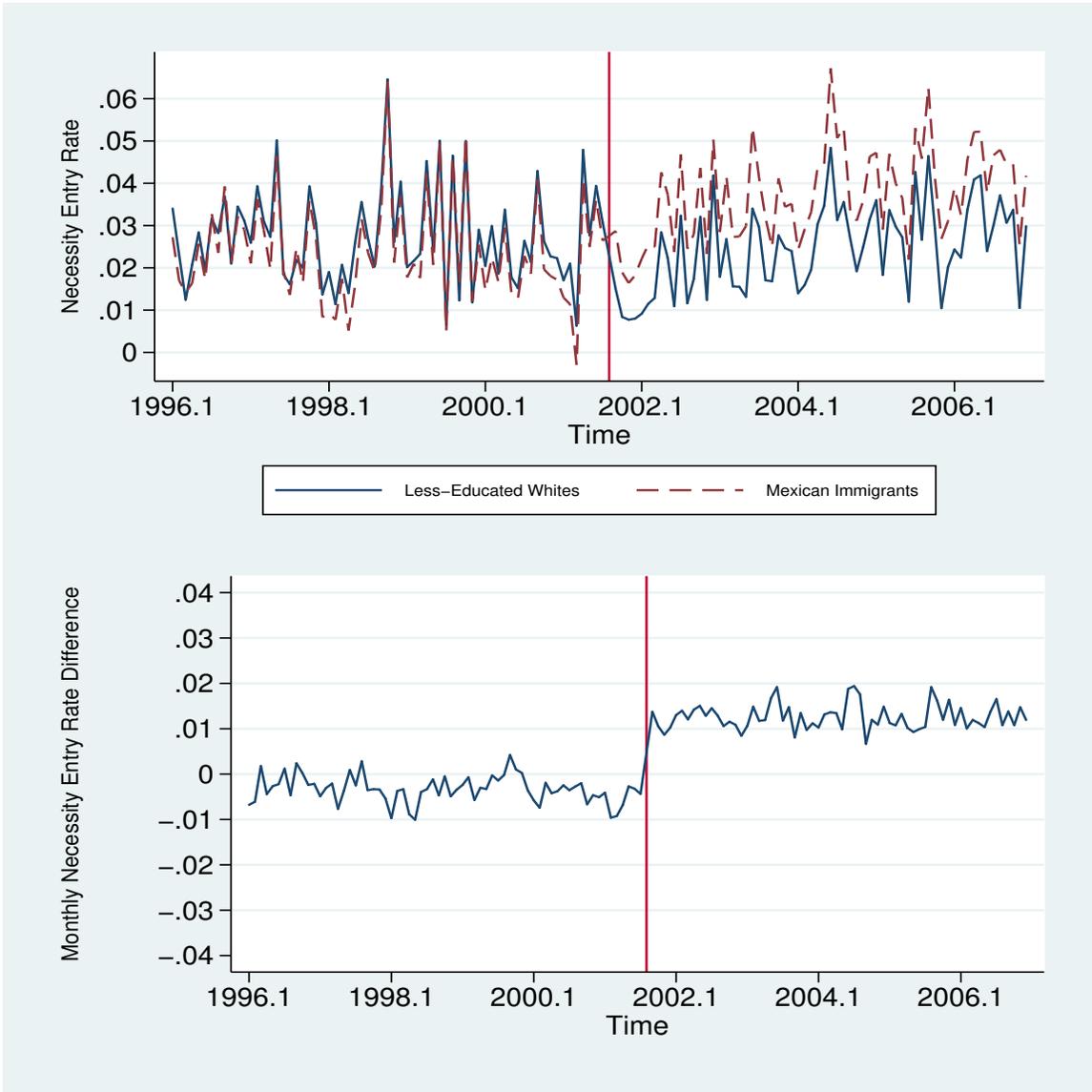
Figure 1: Necessity Self-Employment Entry Rate Trends by Groups

Notes: The top figure shows regression-adjusted monthly necessity entry rates by groups (19962006). Solid line represents less-educated Whites; dashed line represents Mexican Immigrants. The necessity entry rates have been regression-adjusted for age, age squared, marital status, years since migration, education, metropolitan dummy, proportion of Hispanics in the MSA, proportion of non-English speakers in the MSA, state monthly unemployment rates, state quarterly income per capita, state and year-month dummies. The bottom figure shows the monthly difference in the regression-adjusted necessity entry rates between Mexican immigrants and less-educated Whites.
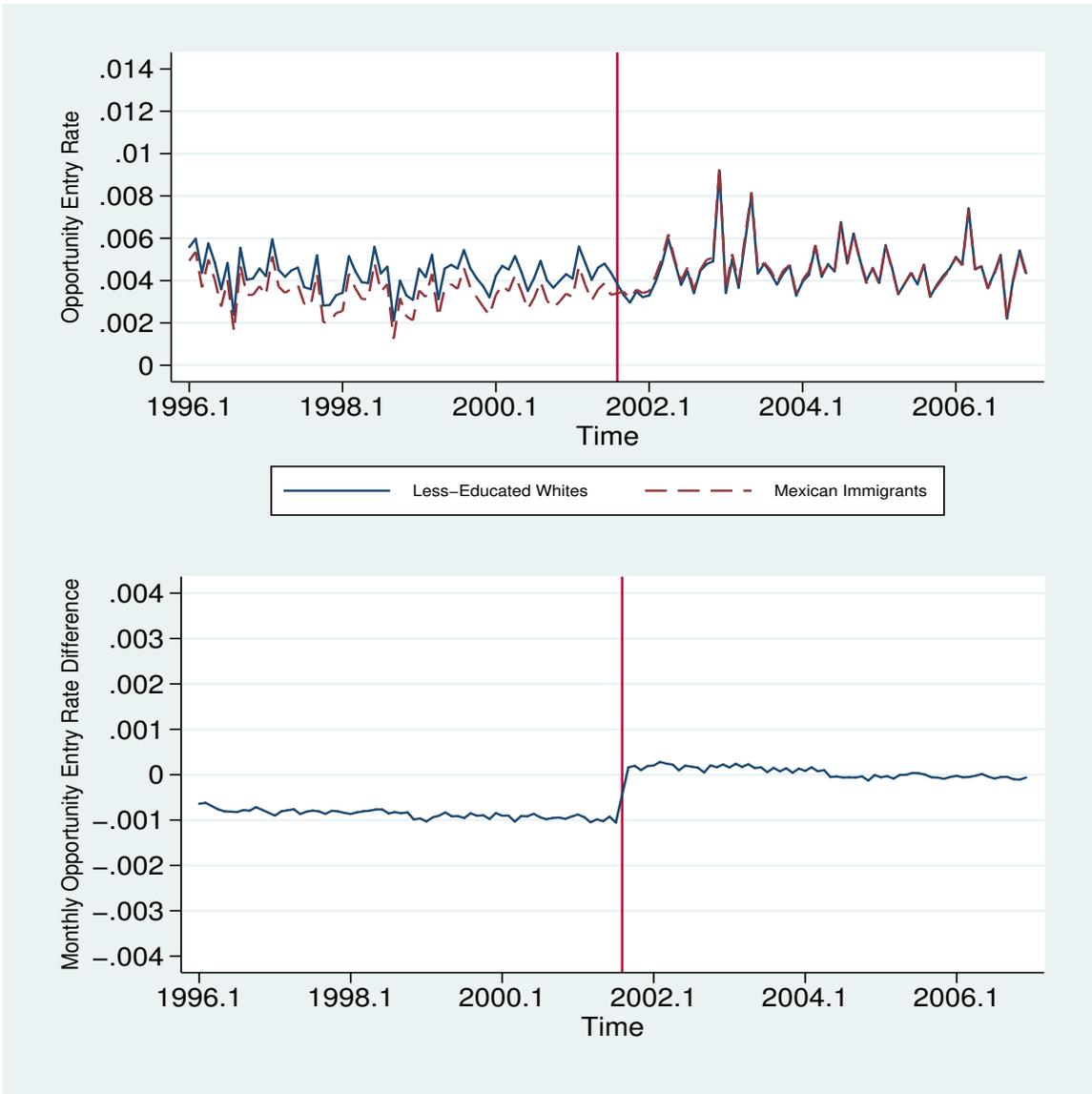
Figure 2: Opportunity Self-Employment Entry Rate Trends by Groups

Notes: The top figure shows regression-adjusted monthly opportunity entry rates by groups (1996–2006). Solid line represents less-educated Whites; dashed line represents Mexican Immigrants. The opportunity entry rates have been regression-adjusted for age, age squared, marital status, years since migration, education, metropolitan dummy, proportion of Hispanics in the MSA, proportion of non-English speakers in the MSA, state monthly unemployment rates, state quarterly income per capita, state and year-month dummies. The bottom figure shows the monthly difference in the regression-adjusted opportunity entry rates between Mexican immigrants and less-educated Whites.

Table A1: Falsification tests using pre-9/11 sample

|  | Model 1 | Model 2 |
|---|---|---|
| Y | Necessity | Opportunity |
| Mex*Post21 | 0.0050 | 0.0005 |
|  | (0.0091) | (0.0007) |
| Mex*Post22 | 0.0098 | 0.0007 |
|  | (0.0096) | (0.0007) |
| Mex*Post23 | 0.0075 | 0.0002 |
|  | (0.0110) | (0.0006) |
| Mex*Post24 | 0.0085 | -0.0002 |
|  | (0.0103) | (0.0008) |
| Mex*Post25 | 0.0097 | -0.0005 |
|  | (0.0101) | (0.0009) |
| Mex*Post26 | 0.0080 | -0.0005 |
|  | (0.0090) | (0.0008) |
| Mex*Post27 | 0.0107 | -0.0007 |
|  | (0.0093) | (0.0008) |
| Mex*Post28 | 0.0078 | -0.0011 |
|  | (0.0075) | (0.0008) |
| Mex*Post29 | 0.0046 | -0.0009 |
|  | (0.0065) | (0.0007) |
| Mex*Post30 | 0.0087 | -0.0006 |
|  | (0.0076) | (0.0007) |
| Mex*Post31 | 0.0008 | -0.0003 |
|  | (0.0065) | (0.0006) |
| Mex*Post32 | -0.0051 | -0.0001 |
|  | (0.0056) | (0.0007) |
| Mex*Post33 | -0.0014 | -0.0001 |
|  | (0.0053) | (0.0007) |
| Mex*Post34 | -0.0028 | -0.0000 |
|  | (0.0061) | (0.0007) |
| Mex*Post35 | -0.0005 | 0.0003 |
|  | (0.0058) | (0.0007) |
| Mex*Post36 | 0.0012 | 0.0002 |
|  | (0.0067) | (0.0007) |
| Mex*Post37 | 0.0013 | 0.0006 |
|  | (0.0054) | (0.0007) |

| | | |
|---|---|---|
| Mex*Post38 | 0.0010 | 0.0007 |
| | (0.0050) | (0.0007) |
| Mex*Post39 | -0.0011 | 0.0007 |
| | (0.0064) | (0.0008) |
| Mex*Post40 | 0.0027 | 0.0008 |
| | (0.0066) | (0.0007) |
| Mex*Post41 | 0.0052 | 0.0005 |
| | (0.0065) | (0.0008) |
| Mex*Post42 | -0.0122 | 0.0010 |
| | (0.0090) | (0.0008) |
| Mex*Post43 | -0.0121 | 0.0010 |
| | (0.0089) | (0.0009) |
| Mex*Post44 | -0.0152 | 0.0005 |
| | (0.0122) | (0.0010) |
| Mex*Post45 | -0.0136 | 0.0004 |
| | (0.0126) | (0.0009) |
| Mex*Post46 | -0.0135 | 0.0001 |
| | (0.0108) | (0.0008) |
| Mex*Post47 | -0.0124 | 0.0002 |
| | (0.0112) | (0.0009) |
| Treatment Group | Mexican Immigrants | |
| Control Group | Less-educated Whites | |

[1] Longitudinal weights are applied. Reported in parentheses are robust standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$.