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THE FOOD SECURITY CONSEQUENCE OF MANDATED EMPLOYMENT ELIGIBILITY VERIFICATION

Xia Si
Shanghai University of International Business and Economics, Shanghai 201600, China.

Abstract: This study investigated the impact of E-Verify mandates, which make it more difficult for certain undocumented workers to find a new job in the United States, on the food security status of both U.S citizens and non-citizens. Using a Difference in Difference approach and data from CPS's food security supplements, this study found that even though E-Verify mandates had no significant effects on family income, but they had unintended consequences on households' food security. E-Verify mandates reduced the food security of both U.S citizens and non-citizens residing in the U.S. The effect was consistent over different sub-types of food security measures.
Keywords: E-verify; Food security; Public policy; Program evaluation

1 INTRODUCTION

Authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), E-Verify is an online system administered by U.S. Department of Homeland Security that allows employers to determine the work-eligibility of their workers. When an employer submits information taken from a new employee's I-9 form, the system compares that information against 455 million records in the Social Security Administration database and 80 million records in the Department of Homeland Security's immigration databases. If an employee's information matches a record contained in one of the databases, that employee is then considered eligible to work in the United States. If there is a mismatch, E-Verify alerts the employer, and the employee must contact the government agencies to solve the mismatch within eight federal government working days. During this eight-day period, the employee may still be allowed to work. In theory, this system can detect any unauthorized workers attempting to work using fake documents.

The E-Verify system has evolved both regarding the information contained in the system and regulations related to the use of the system. In August 2007, the E-Verify system added facial image data to help prevent identity fraud. Between 2006 and 2016, 22 states passed laws or had executive orders that required employers to verify workers' employment eligibility by using the E-Verify system; hereafter, we refer to these laws as "E-Verify mandates." In many states, E-Verify mandates were introduced alongside legislation allowing for harsher punishment for employers who knowingly employ unauthorized workers. For example, in Arizona, violation of this rule may result in a 10-day temporary Arizona business license suspension upon the first offense followed by permanent Arizona business license suspension upon the second offense (Arizona Fair and Legal Employment Act HB 2779). Other examples include immediate cancellation of government contracts, reversion of unspent funds and monetary penalties (Idaho Executive Order 2009-10) and disqualification of certain tax credits on state income tax (Indiana SB 590). As a result of the mandates, E-Verify is now widely used. In the fiscal year 2017 (October 2016 – September 2017), United States Citizenship and Immigration Services reported that E-Verify processed 34,853,666 cases, and among those cases, 329,620 returned "Not Found Work Authorized."

As many E-Verify mandates laws have stated, E-Verify mandates were intended to reduce further hiring of undocumented immigrants and thus protect authorized workers. However, previous literature has reported mixed results. Using the Current Population Survey (CPS) data, Catalina Amuedo-Dorantes and Cynthia Bansak (2012) reported that announcement of E-Verify mandates significantly reduced the employment likelihood of likely unauthorized males and females, but its implementation had no effect on employment likelihood. The hourly wages of likely unauthorized women increased following the enactment of E-Verify mandates. Also, the mandate appeared to redistribute likely unauthorized workers towards industries that typically benefitted from special exclusion, such as food service and agriculture[1]. Pia M. Orrenius and Madeline Zavodny (2015) reported that implementation of E-Verify mandates reduced the average real hourly wage among male likely unauthorized Mexican immigrants. They also indicated that implementation of the mandate appeared to increase likely unauthorized female Mexican immigrant's probability of staying in the labor force and of switching employers. The announcement of E-Verify mandates (passing of laws, which is earlier than implementation) had no significant effect[2]. More recent studies show that the effects of E-Verify and other immigration enforcement policies are more complicated than a direct reduction in unauthorized employment. Churchill (2021) found that state E-Verify mandates reduced employment and employer-sponsored health insurance among likely unauthorized immigrants in the short run, although these effects became insignificant later, possibly due to selective outmigration[3]. Luo and Kostandini (2022) found heterogeneous wage effects from intensified immigration enforcement, with wage reductions concentrated among some immigrant workers and no clear wage gains for native workers[4]. East et al. (2023), studying Secure Communities, also found negative spillover effects on U.S.-born workers' employment and wages[5].

These findings suggest that immigration enforcement may reduce local labor supply and economic activity rather than simply transfer jobs from unauthorized to authorized workers.

Although the goal of the E-Verify mandates was to limit employment of unauthorized workers, the extant literature suggests that there may have been more complicated unintended consequences. Chloe N. East and Andrea Velásquez (2022) indicated that federal enforcement policy like E-Verify may reduce the labor supply of college-educated U.S.-born mothers with young children[6]. Food security, especially since 2007, has become a significant issue among low-income households in the United States. According to USDA, food insecurity level before 2007 had been steadily around 11 percent. During the 2007 financial recession, food insecurity rates rose rapidly, and as of 2018 remain three percentage point higher than the pre-recession level. Recent research also documents unintended consequences of immigration enforcement beyond labor-market outcomes. Strully et al. (2020) found that E-Verify mandates were associated with declines in birthweight and gestational age among infants of likely undocumented immigrant mothers, as well as infants of native-born mothers[7]. Amuedo-Dorantes et al. (2022) similarly found that immigration enforcement adversely affected infant health, especially when exposure occurred during pregnancy[8]. These studies suggest that enforcement policies may affect household well-being through stress, reduced access to services, or broader local economic changes. Therefore, E-Verify mandates may affect food security even when their effects on measured income or employment are small.

Newer research on immigrant food insecurity also suggests that non-citizen households may be especially vulnerable to policy and labor-market shocks. Liu et al. (2024) found that recent and long-term immigrants had higher adjusted prevalence of food insecurity than U.S.-born citizens[9]. Zhou et al. (2026) showed that unemployment increases food insecurity and that non-citizen immigrant households are disproportionately affected[10]. Sharareh et al. (2023) further found that immigrants, especially non-citizens, face higher risks of food insecurity and that SNAP participation is important in reducing disparities[11]. These findings support the possibility that E-Verify mandates may worsen food security through economic uncertainty and limited access to safety-net programs.

The contribution of this study is two-fold. First, it is the first to address the unintended consequences of E-Verify mandates on food security. Compared to monetary measures, food security directly represents the economic hardship and potential health effects on low-income households which are especially vulnerable to the unintended consequence of the policy change. Second, this study is the first to address the impact of E-Verify mandates on families rather than individuals, and these household-level impacts are examined for both citizen and non-citizen households. Finally, this study revealed that the unintended consequences of this policy do not come through the reduction of income of the directly impacted population.

2 HYPOTHESIS

E-Verify mandates might impact food security in several ways. If implemented as intended, E-Verify mandates should affect employment. The mandates may also affect the prices of goods and services which would indirectly affect food security. Finally, E-Verify mandates might indirectly cause strain on the local community social safety net.

E-Verify mandates might decrease employment among unauthorized workers and increase employment among authorized workers. These joint effects would occur if E-Verify mandates caused employers to substitute authorized workers for unauthorized workers and will lead to heterogeneous impacts on food security for authorized and unauthorized worker populations. Among authorized workers, the income of previously underemployed or unemployed workers would increase, and their food security would also improve. On the other hand, the food security level of unauthorized workers would decrease, along with their income. However, the effect of E-Verify on changes in employment among authorized and unauthorized workers depends on the extent to which E-Verify mandates were enforced, and the degree to which informal or "black market" labor markets developed to circumvent the effects of the E-Verify mandates.

Second, E-Verify mandates might have increased the costs of producing, distributing, and selling food. This would have occurred if E-Verify mandates reduced the labor supply in the food/agriculture, transportation, and retail sectors. Previous work shows that these sectors employed a large number of unauthorized workers before the E-Verify mandates [12]. This effect might have been especially significant in some "food desert" communities, where local access to grocery stores is limited. Increased food costs would likely increase food insecurity rates for both authorized and unauthorized populations.

Finally, both employment shocks and food cost shocks potentially associated with the implementation of the E-Verify mandates might produce an additional negative indirect shock to the local social safety-net. Most social safety-net systems provide some form of food assistance to combat food insecurity. The level of food assistance may be insufficient if the number of food-insecure households increases, and/or the cost of food increases. Further, the organizational capacity of local safety-net systems may be compromised as portions of the community are forced to leave. Evidence for this out flow of labor force was documented in 2007 when restrictions on unauthorized workers increased in Arizona [13]. These factors might indirectly increase food insecurity for both authorized and unauthorized populations.

Given these mechanisms through which E-Verify mandates might impact food security rates, we have several hypotheses regarding how E-Verify might affect households. First, we hypothesize that E-Verify mandates will decrease the income of unauthorized workers and decrease their households' food security level. Next, we hypothesize that E-Verify mandates will increase the income of workers who compete with unauthorized workers. Finally, we hypothesize an overall increase of food insecurity following the implementation of E-Verify mandates. This effect will be attenuated by the potential increase in employment among authorized workers, but even this group of workers whom the policy is likely to benefit

might be adversely affected by higher food costs and potential inadequacy of the social safety net to respond to increased needs among unauthorized workers following implementation of the E-Verify mandate.

3 DATA

This study combined data from the December Food Security Supplement of the Current Population Survey (CPS) from 2004 to 2016 with E-Verify implementation data from the National Conference of State Legislatures (NCSL). We avoided using data after 2016 to avoid confounded effect of the Trump Administration's anti-immigration policy. NCSL data showed that between 2006 and 2016, 22 states implemented laws or executive orders requiring certain employers to use E-Verify to verify the identity of new employees. Among these 22 states, there were 3 different types of implementation of E-Verify mandates: 5 of the states required all employers to verify the identity of new employees (hereafter "all employer" mandates); 14 states only required public sector employers and some of their contractors to use E-Verify (hereafter "public sector only" mandates); 4 states initially imposed public sector only mandates and later switched to be all employer mandate states. Figure 1 list the detailed time and type of states which required the use of E-Verify. Different states implemented E-Verify at different times.

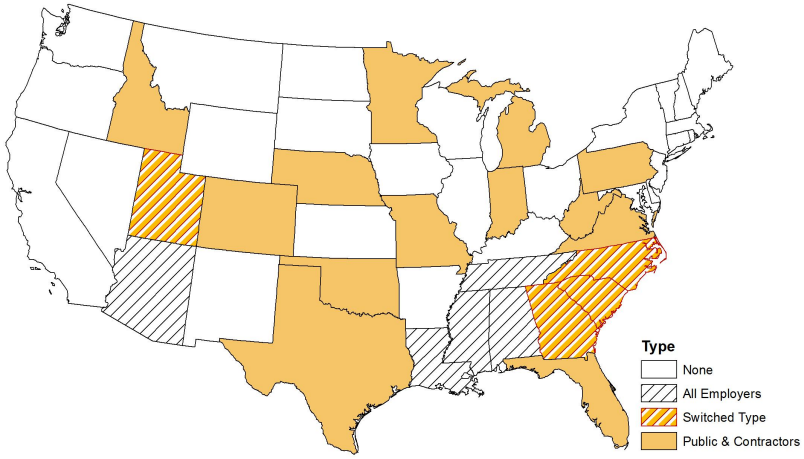

Figure 1 States Implemented E-Verify Mandates between 2004 and 2016
Source: NCLS

The CPS is a monthly survey of U.S. households conducted by the United States Census Bureau. Beginning in 2001, CPS added the Food Security Supplement, which is a set of questions used to measure food security. The Food Security Supplement is asked during the December CPS survey administration. Food security is measured using an 18-item food security questionnaire developed by the US Department of Agriculture (USDA). These questions were designed to comprehensively evaluate if households surveyed had physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The answers to these questions were then converted to food security categories using standard USDA guidelines [14]. Households are categorized as food secure, marginally food secure, food insecure without hunger, or food secure with hunger. Food secure or marginally food secure households reported little or no indications of food-access problems or limitations. Households that are food insecure without hunger reported reduced quality, variety, or desirability of diet. However, households in this category reported little or no indication of reduced food intake. Households that are food insecure with hunger reported multiple indications of disrupted eating patterns and reduced food intake. Households with children are also asked about the food security of children in the households, and responses were used to create separate food security measures for children and adults in a household. The food insecurity rate is calculated as the number of individuals categorized as being food insecure with or without hunger divided by the total number of individuals sampled. We also looked into different food security measures calculated based on questions with different recall. Food security measures with a 12-months recall are based on questions asking interviewees about their food situation in the past 12 months. Food security measures with a 30-days recall are based on questions asking interviewees about their food situation in the past 30 days.

In our full sample, the number of observation is 541,528 recorded between 2004 and 2016. Among those observations, 427,363 records are in the citizen sample, and 114,165 are in the non-citizen sample. 156,652 records have children and answered questions related to children's food security and thus are in our children's food security sample. Table 1 shows summary statistics. In our full sample, 21.8 percent are African American, and 26.5 percent are Hispanic. 9.3 percent of individuals have ever served in the military. 60.9 percent of individuals report that they have senior in their household and 85.4 percent of individuals report that they have children in their household. 39.1 percent individuals have a college degree or better, 53.9 percent have education level equal to or beyond high school, but less than a college degree. The mean household income variable is our data is a categorical variable ranging from 0 to 16. Each category represents a range of family income. The median category is 11, which indicates a family income of $40,000 - $49,999. 37 percent individuals have family income less than $25,000.

Table 1 Summary Statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	Mean	S.D	Min	Max
Treated	541,528	0.182	0.386	0	1
Treated (All Employer)	541,528	0.0590	0.236	0	1
Treated (Public Only)	541,528	0.123	0.329	0	1
African American	541,528	0.218	0.413	0	1
Hispanic	541,528	0.265	0.441	0	1
Military	541,528	0.0926	0.290	0	1
Senior[1]	541,528	0.609	0.488	0	1
Children[1]	541,528	0.854	0.353	0	1
College Degree	541,528	0.391	0.488	0	1
High School	541,528	0.539	0.498	0	1
Family Income[2]	541,528	9.633	4.749	0	16
Family Income Below $25,000[3]	541,528	0.3695	0.4827	0	1

Note: [1]Senior and Children indicate whether individuals have seniors or children living in their household. [2]Family Income is a categorical variable, 9.6 is between category 9 (30,000-34,999) and category 10 (35,000-39,999). The median family income category is 11, which indicates family income between $40,000 and $49,999. [3]Family Income Below $25,000 is an indicator variable which assume the value of one if family income category is less than the $25,000-$29,999 category.

Table 2 shows the food security status before the implementation of E-Verify mandates. Based on individuals' answer to questions and standard USDA guideline, 12.34 percent of individuals were food insecure in the 12 months before data collection. Among them, 7.7 percent were food insecure without hunger, and 4.63 percent were food insecure with hunger. This number decreased to 6.98 percent, 4.18 percent, and 2.8 percent, respectively when asking only about food security in the past 30 days. The food security status for adults and children followed different patterns. With a 12-month recall, the adult food insecurity rate was 11.55 percent while children food insecurity rate was 9 percent. However, children had a higher probability of "food insecure without hunger" status, and much lower probability of "food insecure with hunger" status compare to adults. These numbers indicate a tendency to prioritize children's food needs within a household.

Table 2 Average Food Security Status Before E-Verify Mandate

Food Security Measure	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger	Observations
Overall Food Security, 12-Months Recall	87.66%	7.70%	4.63%	539,850
Adults Food Security, 12-Months Recall	88.44%	6.68%	4.87%	492,007
Children Food Security, 12-Months Recall	91.00%	8.10%	0.90%	156,652
Overall Food Security, 30-Days Recall	93.01%	4.18%	2.80%	491,996
Adults Food Security, 30-Days Recall	93.51%	3.60%	2.89%	491,993
Children Food Security, 30-Days Recall	94.83%	4.58%	0.59%	156,611

4 METHODOLOGY

Variation in E-Verify implementation across states and years was used to estimate the impact of E-Verify on food security rates, using an approach similar to Amuedo Dorantes and Bansak (2012). Specifically, we estimated:

$$y_{ist}=\alpha+\beta treated_{st}+X_{ist}\gamma+state_s+yeardummy_t+state_s t+\varepsilon_{ist} \quad (1)$$

Where $y_{ist}$is the family income / food security category of household i in state s at year t, $treated_{st}$ is an indicator variable that assumes the value of 1 if state s at year t had implemented E-Verify mandates and assumes the value of 0 otherwise. $state_s$ is a series of state dummy variables, $yeardummy_t$ is a series of year dummy variables. We allow for state specific temporal trends in the outcome variable through the inclusion of $state_{st}$. X_{ist} is a vector of household level controls including variables shown is Table 1. In subsequent models, $treated_{st}$ was included as a vector to include separate indicators of treatment for all employer mandates ($treated\_all_{st}$) and public sector only mandates ($treated\_public_{st}$). Specifically, we estimated:

$$y_{ist}=\alpha+\beta_1 treated\_all_{st}+\beta_2 treated\_public_{st}+X_{ist}\gamma+state_s+yeardummy_t+state_s t+\varepsilon_{ist} \quad (2)$$

For states that switched from public sector only mandates to all employer mandates, their status changed from $treated\_all_{st}$= 0 and $treated\_public_{st}$= 1 to $treated\_all_{st}$= 1 and $treated\_public_{st}$= 0.

To make sure that we had a precise definition of treatment, we dropped observations in the year in which a state implemented E-Verify. For example, Minnesota implemented E-Verify mandate in July 2011. We define individuals in Minnesota before 2011 as untreated and individuals in Minnesota after 2011 as treated. We dropped Minnesota observation in 2011 since 2011 observations mixed treated months and untreated months, which makes some outcome variables, like overall food security in the past 12 months, inconsistent with the same variable in other years.

In our identification strategy, we assume that after controlling for individual characteristics, unobserved variables that vary across both states and years and can potentially affect food security are not correlated with whether a state decides to implement an E-Verify mandate. This assumption also means that a state does not make decision on whether to implement E-Verify based on the future change in food security status in this state. Since E-Verify mandate laws are immigration policy which target unauthorized workers, we believe it is very unlikely that food security is among the considerations when making such decisions. If this assumption holds, then β in equation (1) would capture the overall treatment effect of E-Verify mandate. We estimated all specifications as Ordered Probit Models since the food security category is an ordered variable, and higher categories indicate higher food insecurity levels. To check the robustness of the specification, we also included the effect of a "Placebo Treatment", where we randomly assigned treatment. We found that the estimated treatment effect is small and insignificant in the placebo test across different specification.

5 RESULTS

Table 3 presents results from equation (1) estimated as a Probit model with an indicator variable which assume the value of 1 when family income being less than $25,000 as the dependent variable. We used Probit model and turned family income category variable into a binary variable in this case since there are 16 categories on family income, making it hard to show the marginal effect on each category in an Ordered Probit Model. We choose 25,000 as the cutoff point because in our data, the income category of $20,000-$24,999 covers the average federal poverty line for average families. Column (1) shows results that pooled both types of E-Verify mandate as a single treatment variable, whereas other columns show the results from specifications that separate the two kinds of E-Verify mandates. Column (3), (4) and (5) present results from stratified samples based on citizenship: Citizen, Non-Citizen (all race/ethnicity) and Non-Citizen Hispanic, respectively. Throughout the different specifications, the estimated treatment effect on the probability of having less than $25,000 family income was small and insignificant. The E-Verify mandates had no significant impact on both U.S. citizens and Non-citizens' family income. Even estimates for the non-citizen Hispanic sample showed no significant effect. We also included an OLS version of the estimation in Table 1&2 with family income category as the dependent variable. The result is consistent with results in Table 3. The result is Table 4 shows the estimated average marginal effect from equation (1) and equation (2) as Probit models with the "have job" dummy variable as the dependent variable. Similar to Table 3, Table 4 shows that the E-Verify mandate has no significant effect on the probability of an individual having jobs across different samples.

Table 3 Impact of Treatment on Probability of Family Income less than $25,000

	(1)	(2)	(3)	(4)	(5)
VARIABLES					
Treated	-0.00470				
	(0.0192)				
Treated (All Employer)		0.00443	0.00244	0.0145	0.0119
		(0.0205)	(0.0196)	(0.0298)	(0.0250)
Treated (Public Only)		-0.00668	-0.0117	0.0288	0.0359
		(0.0193)	(0.0183)	(0.0279)	(0.0270)
Senior	0.0968***	0.0968***	0.102***	0.0652***	0.0674***
	(0.00511)	(0.00512)	(0.00498)	(0.00774)	(0.0116)
Children	0.0523***	0.0523***	0.0612***	0.0314***	0.00706
	(0.00402)	(0.00402)	(0.00359)	(0.00628)	(0.00582)
Military	-0.0309***	-0.0309***	-0.0295***	-0.0361***	-0.0344***
	(0.00330)	(0.00330)	(0.00313)	(0.00783)	(0.00937)
College Degree	-0.585***	-0.585***	-0.612***	-0.519***	-0.527***
	(0.00811)	(0.00810)	(0.00671)	(0.00878)	(0.0108)
High School	-0.326***	-0.326***	-0.349***	-0.273***	-0.271***
	(0.00600)	(0.00600)	(0.00486)	(0.00618)	(0.00682)
African American	0.0772***	0.0771***	0.0837***	0.0585***	0.0559***
	(0.00684)	(0.00680)	(0.00741)	(0.00653)	(0.00819)
Hispanic	0.0122*	0.0123*	-0.00424	0.0409***	
	(0.00627)	(0.00627)	(0.00719)	(0.00788)	
Observations	541,528	541,528	427,363	114,165	71,820
Sample	All	All	Citizen	Non-Citizen	Non-Citizen Hispanic

Note: Column (1) shows Probit estimate of equation (1) with "Having family income less than $25,000" indicator variable as dependent variable. Column (2) – (5) shows Probit estimate of equation (2) with "Having family income less than $25,000" indicator variable as dependent variable.
Robust standard errors clustered at state level in parentheses
*** z<0.01, ** z<0.05, * z<0.1

Table 4 The Impact of Treatment on the Probability of Working

	(1)	(2)	(3)	(4)	(5)
VARIABLES					
Treated	0.0135				
	(0.00973)				

Treated (All Employer)		0.00876	0.0100	-0.0108	-0.00744
		(0.0132)	(0.0131)	(0.0248)	(0.0252)
Treated (Public Only)		0.0146	0.0150	0.00194	0.00232
		(0.00938)	(0.00932)	(0.0136)	(0.0153)
Senior	-0.440***	-0.440***	-0.444***	-0.396***	-0.386***
	(0.00611)	(0.00611)	(0.00556)	(0.0119)	(0.0150)
Children	0.265***	0.265***	0.261***	0.284***	0.288***
	(0.00457)	(0.00456)	(0.00468)	(0.00935)	(0.0122)
Military	-0.0234***	-0.0234***	-0.0225***	-0.0239***	-0.0225***
	(0.00327)	(0.00328)	(0.00354)	(0.00753)	(0.00796)
College Degree	0.315***	0.315***	0.361***	0.233***	0.219***
	(0.0113)	(0.0113)	(0.00819)	(0.00967)	(0.00890)
High School	0.214***	0.214***	0.261***	0.133***	0.118***
	(0.00995)	(0.00995)	(0.00599)	(0.00656)	(0.00553)
African American	-0.00842*	-0.00833*	-0.0107**	-0.00525	-0.00672
	(0.00450)	(0.00447)	(0.00458)	(0.00588)	(0.00680)
Hispanic	0.0166***	0.0166***	0.0136***	-0.00755	
	(0.00442)	(0.00442)	(0.00445)	(0.00505)	
Observations	541,528	541,528	427,363	114,165	71,820
Sample	All	All	Citizen	Non-Citizen	Non-Citizen Hispanic

Note: Column (1) shows Probit estimate of equation (1) with Working indicator as dependent variable.
Column (2) – (5) shows Probit estimate of equation (2) with Working indicator as dependent variable.
Robust standard errors clustered at state level in parentheses
*** z<0.01, ** z<0.05, * z<0.1

Since food security status is a discrete variable and its three values are ranked in the severity of food insecurity, an Ordered Probit model required in this scenario. Table 5, Table 6 and Table 7 show our primary results, which is the estimated average marginal effects from equation (1) and equation (2) as Ordered Probit model with food security status category as the dependent variable. Table 5 shows result of our baseline specification, which used food security measures with 12-months recall and the full sample. It shows the average marginal effect of E-Verify mandate and other covariate, which is the average impact of those variables on individuals' probability to be in each food security category. Table 6 and Table 7 show estimated treatment effects from other specifications which use more sub-samples. The difference between results in Table 6 and Table 7 is that they use different measures of food security. Table 6, like Table 5, shows the treatment effect on food security status with a 12-month recall, which is calculated based on questions asking interviewees' food situation in the past 12 months. Table 7 shows the treatment effect on food security status with a 30-days recall, which is calculated based on questions asking interviewees' food situation in the past 30 days.

Table 5 Average Treatment Effect of E-Verify Mandate on Overall Food Security Status

	All Treatment Types			Separate Treatment Types		
	FS = 1	FS = 2	FS = 3	FS = 1	FS = 2	FS = 3
Treated	-0.01698***	0.00871***	0.008273***			
	(0.005381)	(0.002752)	(0.002633)			
Treated (All Employer)				-0.01076*	0.005519*	0.005242*
				(0.006503)	(0.003336)	(0.003168)
Treated (Public Only)				-0.01848***	0.009477***	0.009002***
				(0.00529)	(0.002706)	(0.002588)
Senior	0.077526***	-0.03976***	-0.03777***	0.077565***	-0.03978***	-0.03779***
	(0.003607)	(0.001529)	(0.002117)	(0.003605)	(0.001529)	(0.002114)
Children	0.041229***	-0.02114***	-0.02008***	0.041263***	-0.02116***	-0.0201***
	(0.00182)	(0.000882)	(0.000989)	(0.001815)	(0.000879)	(0.000986)
Military	0.011373***	-0.00583***	-0.00554***	0.011385***	-0.00584***	-0.00555***
	(0.001793)	(0.000916)	(0.000881)	(0.001794)	(0.000916)	(0.000882)
College Degree	0.111049***	-0.05695***	-0.0541***	0.111067***	-0.05696***	-0.05411***
	(0.002521)	(0.00136)	(0.001445)	(0.002528)	(0.001364)	(0.001446)
High School	0.025222***	-0.01294***	-0.01229***	0.025244***	-0.01295***	-0.0123***
	(0.001877)	(0.000988)	(0.000909)	(0.001885)	(0.000992)	(0.000913)
African American	-0.04063***	0.020838***	0.019794***	-0.04078***	0.020913***	0.019865***
	(0.002278)	(0.001175)	(0.001147)	(0.002329)	(0.0012)	(0.001173)
Hispanic	-0.02739***	0.014047***	0.013343***	-0.02736***	0.014031***	0.013328***
	(0.002173)	(0.001183)	(0.001008)	(0.002182)	(0.001187)	(0.001013)
Family Income	0.013282***	-0.00681***	-0.00647***	0.013284***	-0.00681***	-0.00647***
	(0.00038)	(0.000192)	(0.000214)	(0.00038)	(0.000192)	(0.000214)
Observations	539,850	539,850	539,850	539,850	539,850	539,850
Sample	All	All	All	All	All	All

Note: Estimated average marginal effect represent each variable' impact on the households' probability to be in each FS category.
FS = 1: Food Secure; FS = 2: Food Insecure without Hunger; FS = 3: Food Insecure with Hunger;
Estimation uses food security measures calculated by food security questions with 12-months recall

Estimation used full sample and Ordered Probit Model. Robust standard errors clustered at state level in parentheses
*** z<0.01, ** z<0.05, * z<0.1

Table 6 Detailed Average Treatment Effect of E-Verify Mandate on Food Security Status, with a 12-Month Recall

	Overall FS		Adults FS		Children FS	
	Treated (All Employer)	Treated (Public Only)	Treated (All Employer)	Treated (Public Only)	Treated (All Employer)	Treated (Public Only)
All Sample						
FS = 1	-0.0107606*	-0.0184795***	-0. 0079491	-0.0172285***	-0.011309*	-0.018581***
	(0.0065026)	(0.0052904)	(0.0061232)	(0.0054117)	(0.0066697)	(0.0042677)
FS = 2	0.0055186*	0.0094773***	0.0037458	0.0081186***	0.0095695*	0.015723***
	(0.0033359)	(0.0027064)	(0.0028858)	(0.0025389)	(0.0056382)	(0.0036149)
FS = 3	0.005242*	0.0090023***	0.0042032	0.0091099***	0.0017395*	0.0028581***
	(0.0031678)	(0.002588)	(0.0032382)	(0.0028769)	(0.0010323)	(0.0006566)
Observation	539,850	539,850	492,007	492,007	156,652	156,652
Citizen						
FS = 1	-0.0076402	-0.0162974***	-0.004805	-0.0150199***	-0.0076093	-0.0169618***
	(0.0060601)	(0.0056914)	(0.0060185)	(0.0058569)	(0.0072311)	(0.0044783)
FS = 2	0.0038651	0.0082447***	0.0022209	0.0069423***	0.0065547	0.0146111***
	(0.0030643)	(0.0028714)	(0.00278)	(0.0026947)	(0.0062269)	(0.003858)
FS = 3	0.0037751	0.0080527***	0.0025841	0.0080776***	0.0010546	0.0023508***
	(0.0029962)	(0.002822)	(0.0032387)	(0.0031644)	(0.001005)	(0.0006265)
Observation	426,167	426,167	387,650	387,650	115,263	115,263
NonCitizen						
FS = 1	-0.0161723	-0.0235672**	-0.0163373	-0.00235264**	-0.0209517*	-0.0207565**
	(0.0171013)	(0.0148)	(0.0164539)	(0.0103691)	(0.0126541)	(0.01014)
FS = 2	0.0085827	0.0125073**	0.008108	0.0116759**	0.0170877*	0.0169285**
	(0.0090672)	(0.0078)	(0.0081527)	(0.0051393)	(0.0103365)	(0.0082832)
FS = 3	0.0075895	0.01106**	0.0082293	0.0118505**	0.003864*	0.003828**
	(0.0080353)	(0.0059)	(0.0083028)	(0.0052351)	(0.0023206)	(0.0018605)
Observation	113,683	113,683	104,357	104,357	41,389	41,389

Note: Estimated average marginal effect represent treatment effect on the households' probability to be in each FS category.
FS = 1: Food Secure; FS = 2: Food Insecure without Hunger; FS = 3: Food Insecure with Hunger
Estimation uses food security measures calculated by food security questions with 12-months recall
Estimation used Ordered Probit Model. Robust standard errors clustered at state level in parentheses
*** z<0.01, ** z<0.05, * z<0.1

Table 7 Detailed Average Treatment Effect of E-Verify Mandate on Food Security Status, with a 30-Days Recall

	Overall FS		Adults FS		Children FS	
	Treated (All Employer)	Treated (Public Only)	Treated (All Employer)	Treated (Public Only)	Treated (All Employer)	Treated (Public Only)
All Sample						
FS = 1	-0.0033833	-0.0107341***	-0.0026995	-0.0101852***	-0.0022346	-0.0073575***
	(0.0038485)	(0.0032313)	(0.0037072)	(0.0031246)	(0.0059774)	(0.0027887)
FS = 2	0.0017301	0.0054892***	0.001273	0.0048029***	0.0018733	0.0061678***
	(0.0019693)	(0.0016516)	(0.0017489)	(0.0014711)	(0.0050092)	(0.0023399)
FS = 3	0.0016531	0.0052449***	0.0014266	0.0053824***	0.0003613	0.0011897***
	(0.0018794)	(0.001582)	(0.0019584)	(0.0016557)	(0.0009683)	(0.0004509)
Observation	491,996	491,996	491,993	491,993	156,611	156,611
Citizen						
FS = 1	-0.001314	-0.0097378***	-0.000453	-0.0091163***	-0.0019031	-0.005814**
	(0.0039819)	(0.0038433)	(0.0039196)	(0.0037486)	(0.0053935)	(0.0030346)
FS = 2	0.0006551	0.0048545***	0.0002079	0.0041849***	0.0016285	0.0049751**
	(0.001985)	(0.0019157)	(0.0017992)	(0.0037486)	(0.0046153)	(0.0025997)
FS = 3	0.000659	0.0048833***	0.000245	0.0049314***	0.0002746	0.0008389**
	(0.0019969)	(0.0019285)	(0.0021204)	(0.0020324)	(0.0007783)	(0.0004368)
Observation	387,641	387,641	387,639	387,639	115,241	115,241
NonCitizen						
FS = 1	-0.0091439	-0.0120476*	-0.010389	-0.0121817**	-0.0146626	-0.0096701
	(0.0113352)	(0.0071391)	(0.0103419)	(0.0067034)	(0.0124412	(0.0084372)
FS = 2	0.0049916	0.0065767*	0.0052646	0.0061731**	0.0117957	0.0077794
	(0.0061813)	(0.003893)	(0.0052365)	(0.0033956)	(0.0100009)	(0.0067837)
FS = 3	0.0041523	0.0054709*	0.0051243	0.0060086**	0.0028669	0.0018908
	(0.0051545)	(0.0032478)	(0.0051064)	(0.0033099)	(0.0024433)	(0.0016554)
Observation	104,355	104,355	104,354	104,354	41,370	41,370

Note: Estimated average marginal effect represent treatment effect on the households' probability to be in each FS category.
FS = 1: Food Secure; FS = 2: Food Insecure without Hunger; FS = 3: Food Insecure with Hunger

Estimation uses food security measures calculated by food security questions with 30-days recall
Estimation used Ordered Probit Model. Robust standard errors clustered at state level in parentheses
*** z<0.01, ** z<0.05, * z<0.1

As shown in Table 5, states' implementation of E-Verify mandates had significant adverse effects on the overall food security of households in our full sample, which included both citizens and non-citizens. Based on food security measures with a 12-months recall, states implementation of E-Verify mandates decreased the likelihood of households being in the "Food Secure" category by 1.7 percentage point. Compare to the baseline "Food Secure" probability of 87.66%, which is shown in Table 2, this is a significant reduction. Meanwhile, states implementation of E-Verify mandates increased the likelihood of households being in the "Food Insecure without Hunger" category by 0.87 percentage point and increased the likelihood of households being in the "Food Insecure with Hunger" category by 0.83 percentage point. Those changes are also large when compared to the baseline probability shown in Table 2. We will further discuss the scale of the impact in the discussion section of this paper. If we break E-Verify mandates by their types, the implementation of E-Verify mandates on public sectors and contractors decreased households' likelihood of being in the "Food Secure" category by 1.85 percentage point. It also increased the likelihood of households being in the "Food Insecure without Hunger" category by 0.95 percentage point and increased the likelihood of households being in the "Food Insecure with Hunger" category by 0.90 percentage point. The implementation E-Verify mandates on all employer decreased households' likelihood of being in the "Food Secure" category and increased the likelihood of households being in the "Food Insecure without Hunger" category and "Food Insecure with Hunger" category. However, the impact is smaller, and the significance level is only at the 0.10 level.

Table 6 and Table 7 provide estimates for more specifications with separated E-Verify mandate types, different food security measures and different sub-samples. As one can see in Table 6, the results with the full sample and overall food security level are what we have shown in Table 5. Other rows and columns show results with different measures of food security and different subsamples. With adults-only food security measure, the impact of the public sector and contractor E-Verify mandates is very similar to results from the full sample, and the effect of all-employer E-Verify mandate becomes insignificant. For the children food security measure, results shows that the implementation E-Verify mandates on public sectors and contractors have decreased children's probability of being in the "Food Secure" category by 1.86 percentage point, increased children's probability of being in the "Food Insecure without Hunger" category by 1.56 percentage point and increased children's probability of being in the "Food Insecure with Hunger" category by 0.29 percentage point. The difference in the impact again suggests that when facing the shock of the E-Verify mandates, households prioritized the food supply of children, which is consistent with what we observed in the summary statistics.

The implementation of the E-Verify mandates on the public sector and contractors also caused a similar decrease in food security level among citizens, which is surprising considering that the E-Verify mandates are designed to protect those people who are undoubtedly authorized to work. The estimated treatment effect for non-citizens is larger and more significant than the estimated treatment effect from the full sample and the citizen sample as shown in the "non-citizen" section of Table 6.

Results in Table 6 also suggest that the implementation of E-Verify mandate on all employers has negative effect on the overall food security status. However, the significance level is at 0.10 level, and the effect becomes nonsignificant once we divide the full sample into citizen sample and non-citizen sample. E-Verify mandate on all employers also seems to have a larger impact on children's food security than adults' food security.

Table 7 shows results with food security measure with a 30-days recall. In the full sample, the E-Verify mandates on the public sector and contractor caused households to be 1.07 percentage point less likely to be in the "Food Secure" category. It caused households to be 0.55 percent percentage point more likely to be in the "Food Insecure without Hunger" category and 0.52 percentage point more likely to be in the "Food Secure with Hunger" category. Also, with a 30-days food security recall, some estimates in the non-citizen sample drop in significance level. Overall, the estimated treatment effect is smaller but still significant and consistent with results with 12-month recall food security measure considering the difference in the original food security level.

6 DISCUSSION AND CONCLUSION

Implementation of E-Verify mandates was hypothesized to impact employment, income, and household food insecurity. We found no statistically significant effects on household employment and income. The results are not surprising since some previous studies have found that the E-Verify mandates only have impacts on real wages and the probability of switching jobs for some specific subgroups (Orrenius and Zavodny, 2015). Other studies (Amuedo-Dorantes and Bansak, 2012) have found that the implementation of the E-Verify mandates has no impact at all on the labor market. No previous studies have found a significant effect on the labor market outcome for the full sample. However, we did find that implementation of E-Verify mandates had substantial adverse impacts on both U.S. citizens and non-citizens' food security level. This effect was consistent over different subsamples and measures of food security status. We also found that the mechanism of this effect is unlikely to be related to family income or employment status. In addition, the adverse effect of the E-Verify mandates on food security was consistent for both non-citizens and U.S. citizens. The latter was not supposed to be negatively impacted by the E-Verify mandates on the labor market. Thus, it is unlikely that E-Verify affects food security by adversely affecting household's income. Based on previous findings, it is likely that the negative

impact comes from other sources including the negative shock to the food, transportation, and retail sectors as well as potential shocks to the demand for social safety-net services.

We also found that the E-Verify mandates on all employers only had a marginally significant adverse effect on the food security status for any sub-sample. This is surprising since the all-employor E-Verify mandate was expected to have a more substantial impact. One possible explanation is that, included in the all employer mandate treatment group, were both the four states that implemented the E-Verify mandates on all employers at the beginning and the five states that switched from public sector only mandate to the all employer mandate. Pooling these two groups together may have caused the estimated treatment effect to be smaller and the estimated variance in the treatment effect to be larger. Another possible explanation is that states that were able to pass laws that require the implementation of all-employer E-Verify mandates were states where the mandate was least likely to have substantial consequences for food insecurity.

The negative impact of the E-Verify mandate on food security is substantial in scale. One comparison we can draw is with the recession beginning in 2007. From 2006 to 2011, food insecurity level in the United States increased from 10.94 percent to 14.94 percent. Our estimate shows that overall, the E-Verify mandate increased the food insecurity level by 1.7 percentage points. This indicates that the impact of the E-Verify mandate was around 40 percent as large as the impact of the great recession in 2007.

Our empirical study is not without limitations. First, while the CPS includes both citizen and non-citizen respondents, the representativeness of CPS data with regards to undocumented immigrants who are the primary target of E-Verify mandates is unknown. To the extent that this population is not represented in our sample, our results likely provide a lower bound estimate of the impact of E-Verify mandates on food insecurity. Additionally, we have no data on enforcement of E-Verify mandates and the severity of penalties for violating E-Verify mandates and/or the existence of informal labor markets that allow individuals to circumvent the mandates. There may be significant heterogeneity related to this across states, which we are unable to measure. Finally, more work is needed to understand the underlying mechanism of the impact of the E-Verify mandate on food security. While its effects on the food, transportation and retail sectors and demand for social safety-net services are possible candidates, we are not able to test hypotheses related to these potential mechanisms due to data limitations.

Nevertheless, the present study provides strong evidence for a significant unintended consequence of mandatory working eligibility verification that negatively impacts both U.S. citizens and non-citizens. This effect is robust to multiple measures of food insecurity and across different sub-populations.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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