Impact of Immigration Laws on Industry Employment: An Analysis of Aliens in the US Workforce

Ellora Bultema[1], Drew Westberg[2], and Jay Chunsuparerk[2*]

[1,2] Coe College, Cedar Rapids, Iowa, United States,
[2]Rangsit University International College, Rangsit University, Pathum Thani, Thailand 12000
*Corresponding, Email: jay.c@rsu.ac.th

Abstract

Immigration has been one of the main focuses of President Donald Trump's campaign, specifically illegal immigration. One of the ways he's focused on solving the undocumented immigrant issue is increasing U.S. Immigration and Customs Enforcement (ICE) detainment rates, coining the term "Buy American, Hire American". In response, this paper conducted a study on the relationship between immigration rates and industry employment rates in the US. Analyze the trends between immigration rate and industry employment and determine what kind of correlation they have with each other to provide insight as to how Trump's new policies may affect the US economy. By gathering information from US Department of Homeland Security and the US Census Bureau and using statistical software, known as R, I was able to construct a Gaussian regression model of how immigration rate and industry employment interact with each other. The regression indicates that employment in agriculture, manufacturing, and construction have a negative relationship with the rate of immigration. In contrast, the information sector has a positive correlation. Furthermore, the t-values and residual plots of each variable indicate how good the models were as predictors. It's important to keep in mind that there are many other variables that have an impact on the immigration rate, for example, geographical location and the culture of each sector. Although the model may not have been a good predictor it illustrated a story of how the two variables interact and gave a good base to continue research into this question.

Keywords: *US Immigration, Employment, Agriculture Industry, Information and Technology Industry, Construction Industry, Manufacturing Industry*

1. Introduction

In January 2018, at the State of the Union address, President Donald Trump's provided an outline his administration would follow to crack down on immigration in the US, known as the Four Pillars for Immigration Reform. These four pillars were redesigning the citizenship process for alien minors, increasing funds for border security, terminating the green card lottery program, and reforming the family-based immigration criteria. One of the driving arguments to take such drastic measures is "they're taking our jobs".

Numerous arguments have been published since then advocating and opposing this claim. Although the administration may be upholding its promise at one end of the bargain, the number of immigrant arrests made within the US by the ICE from January to September 2017 rising by 37% compared to the same period in 2016 (Pierce, Bolter and Selee, 2018), it fails to do so on the other end. "From the Pacific Northwest and Silicon Valley where jobs go unfilled and innovation fails to thrive… (York and Feist, 2018)".

One explanation for this lack of employment could be which industries are hiring. Research indicates that although immigrants don't make up a majority of any industry employment demographic there are specific industries they contribute to more in the workforce. For example, labor-intensive fields like agriculture and manufacturing are one of the top industries for an immigrant to be employed by, about 33% and 23% respectively (Blanco, 2017). Another industry is the information and technology industry which could be attributed to the H-1B visas, a form of visa which grants immigrants with specialty skills to be employed in the US. In order to justify the claim on the impact of immigration reform on each industry employment then many factors are needed to be evaluated.

Supporters of stricter immigration policies argue that unlawful immigrants are guilty of taking job opportunities from qualified and legal residents of the US. On the other hand, adversaries say these new policies negatively affect innocent immigrants who are just looking for opportunities life in America can

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provide and go on to say it may hurt the US economy in the long-run. This paper is intended to provide a narrative of what might happen to the US labor force if stricter immigration laws are implemented.

2. Objectives

- To theorize how President Donald Trump's immigration policies will affect the workforce demographics of specific industries.
- To understand the relationship between immigration and different industries.
- To provide insight as to how Trump's new policies may affect the US economy.

3. Research Methods

To answer the question of whether stricter immigration policies are the solution to the unemployment issue in the US, the research paper took data from the Homeland Security Immigration Statistics Yearbook of 2016 and data from FactFinder.com regarding industry sector employment.

In order to obtain information on immigration activity, this research collected data from the Homeland Security Immigration Statistics Yearbook of 2016. Although immigration rate commonly encompasses both individuals with lawful permanent residence (LPR) and unlawful residence, such as refugees and asylum seekers, for the purposes of ease of communication in this project, the immigration rate will only be referencing LPR. The immigration data defined LPR as "...persons who have been granted lawful permanent residence in the United States" (United States Department of Homeland Security, 2017, p. 1). The author used Table 5 which provided information on the immigration rates in 2016 and divided the US into 49 metropolitan-statistical areas (MSA's).

When analyzing information from FactFinder.com, rather than analyze every sector in the US workforce, this paper selected four industries: agriculture, construction, manufacturing, and information, since these four industries had high levels of immigrant workers in their employee demographics.

All the data was taken from 2016. The first step was to visualize the datasets. The data was presented in counts for a better visualization, then the percentages were calculated. After that, the author created a table of descriptive statistics for each industry sector and MSA to better visualize the data. Next, the author constructed histograms to illustrate the distribution of the data. From these graphs, the results show some variables skewed-right, and from there, calculated the log value of each variable to get a more accurate representation. The next step was creating scatter plots and a correlation matrix of each variable to determine what kind of relationship each sector had with the immigration rates (e.g. strong or weak, negative or positive).

Next, the author ran the data through a Gaussian regression model. The reason to use this model was because there are two variables, the immigration rate and industry employment, that were continuous, and in order to see how they impacted one another. Still using the log values, the author then found out that the model confirmed what the scatterplots illustrated, a negative relationship for three of the sectors, the information sector being the exception. With this model the author also calculated the t-value, a good indicator if the model was a reliable resource for predicting the relationship. Unfortunately, all but the information sector had low t-values, so they couldn't be trusted as reliable sources.

A final way to evaluate the accuracy of the model is plotting the residuals to the fitted values, which suggests how dependent the two variables are on each other. There didn't seem to be a pattern in the plot but there was a faint outline of heteroskedasticity. It indicates that the model was inconsistent with predicting certain values and therefore is not a reliable source. Although the plot points don't make an obvious cone shape, in conjunction with the poor t-values showing that the model was a poor predictor.

4. Results & Discussion

A table of descriptive statistics was created to help visualize the data (see Figure 1). Wide ranging means and medians indicate outliers in the dataset in the agriculture industry. The information of Mean, Standard Deviation, Max, Min, and Median are should in the table separated by selected industry including Agriculture Industry (AG PER), Information and Technology Industry (INFO PER), Construction Industry (CON PER), and the Manufacturing Industry (MAN PER). Statistics in Agriculture Industry (AG PER) result in the Mean of 1.42, Standard Deviation of 2.75, Max of 16.86, Min of 0.21, and Median of 0.64. For Construction Industry (CON PER) result in a Mean of 6.24, Standard Deviation of 1.13, Max of 9.81, Min

of 4.5, and a Median of 6.05. Manufacturing Industry (MAN PER) result in the Mean of 9.03, Standard Deviation of 3.64, Max of 18.64, Min of 2.91, and Median of 9.22. For Information and Technology Industry (INFO PER) result in a Mean of 2.25, Standard Deviation of 3.39, Max of 4.6, Min of 1.0, and a Median of 2.09 as shown in figure 1.

Statistic	N	Mean	St. Dev.	Min	Median	Max
TOTAL	49	1,631,222.00	1,665,873.00	274,224	1,037,154	9,628,179
AG.PER	49	1.42	2.75	0.21	0.64	16.86
CON.PER	49	6.24	1.13	4.50	6.05	9.81
MAN.PER	49	9.03	3.64	2.91	9.22	18.64
INFO.PER	49	2.25	0.73	1.00	2.09	4.60
prs16.PER	49	2.04	3.39	0.34	0.90	20.89

Figure1 Descriptive Statistics

From this table, histograms were also constructed. It was clear from the histograms that the agriculture sector (Figure 2A) had outliers within the dataset. Outliers reveal themselves as skews or clusters in graphs. Upon closer inspection of the actual datasets, it was noted that one MSA accounted for 16% of the employment in that industry.

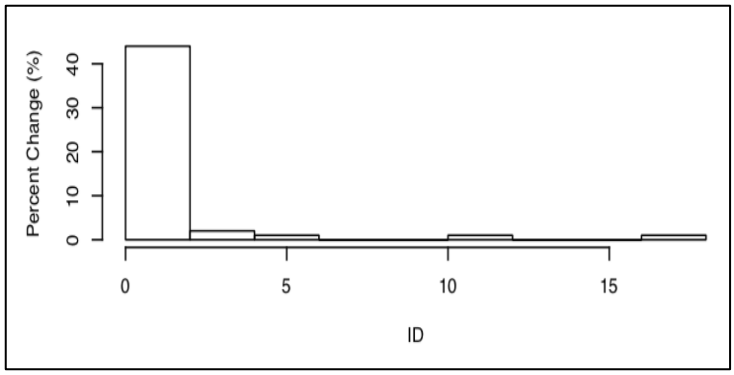

Figure 2A Agriculture Histogram

For other industry including Construction Industry Histogram (Figure 2B), Manufacturing Industry Histogram (Figure 2C), and Information Technology Industry Histogram (Figure 2D) the information shown normal distribution without obvious outliers within the dataset like in Agriculture Industry.

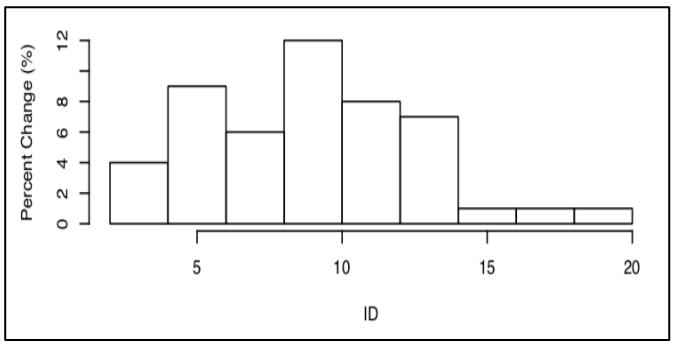

Figure 2B Construction Histogram

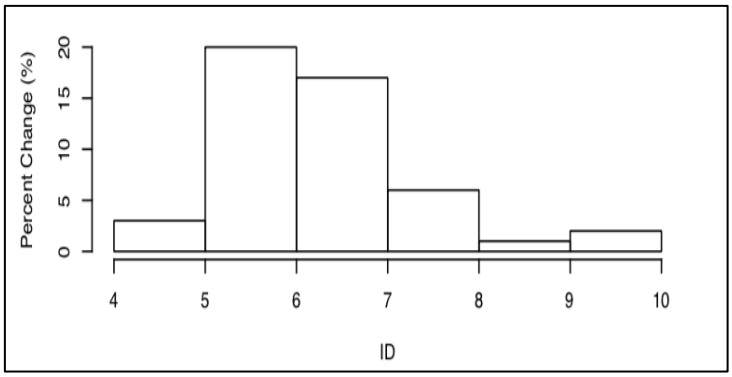

Figure 2C Manufacturing Histogram

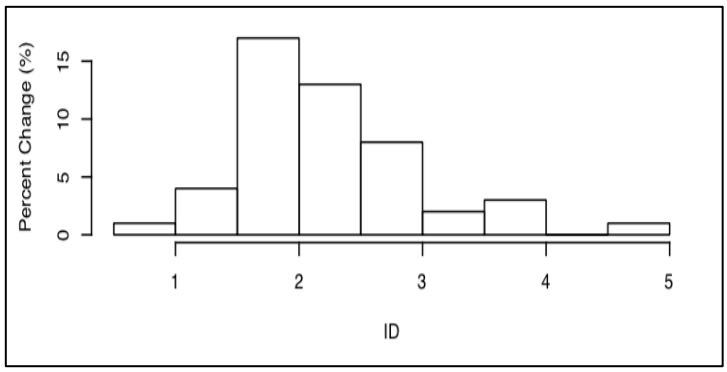

Figure 1D Information Histogram

Immigration rate (Figure 2E) had some outliers shown in the histogram, with the New York-Newark-Jersey City MSA representing a rate of 20%. The immigration rate histogram is significantly skewed right.

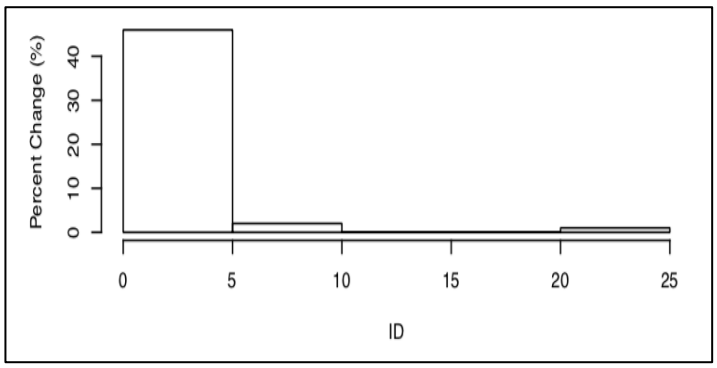

Figure 2E Immigration Rate Histogram

From the median and the mean, as well as the histograms, it is shown that agriculture and immigration were significantly skewed right. Because of these result, calculating the log value of each variable would get a more accurate representation of the situation. From there, then using the same data set to recreate histograms and identified that all the sectors except for information have negative correlations with immigration rate.

This research also constructed a correlation matrix from which the assumption about the information sector and immigration rate was confirmed (see Figure 3). It had a value of 0.39, which is a moderate positive relationship.

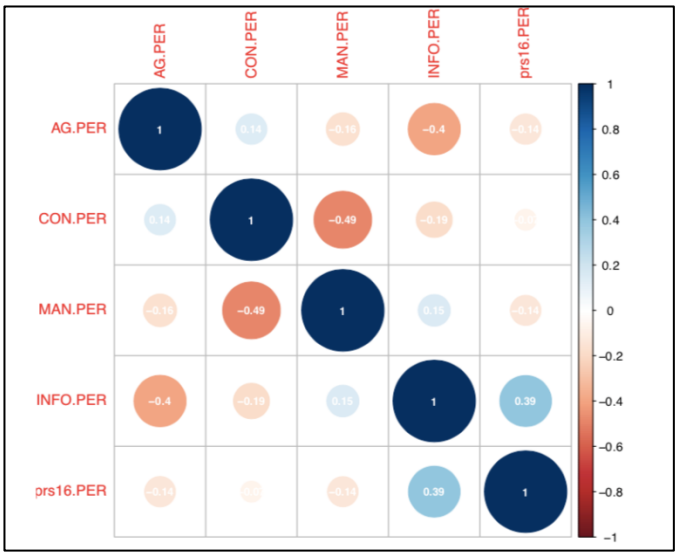

Figure 2 Correlation Matrix

From these findings, the regression indicates that employment in agriculture, manufacturing, and construction have a negative relationship with the rate of immigration. In contrast, the information sector has a positive correlation.

The Gaussian Regression

After running a Gaussian regression on the dataset (see Figure 4), the model described that, for every 1% increase in agricultural employment, the rate of immigration would decrease by 0.081%. Just as the scatterplots illustrated, there was a negative relationship between the two factors. Similarly, for construction and manufacturing, the model predicted that the immigration rate would fall by 0.175% and 0.333%, respectively. For the information sector, a rise in the employment influenced the immigration to rise by 1.499%.

	Dependent variable:
	prs16.PER2
AG.PER2	-0.081
	t = -0.416
CON.PER2	-0.175
	t = -0.179
MAN.PER2	-0.333
	t = -0.963
INFO.PER2	1.499
	t = 2.935***
Constant	-0.049
	t = -0.022

Figure 3: Gaussian Regression

It should also be noted the information sector was the only variable that had a t-value that exceeded 2, the significance of this will be further explored in the discussion portion of the paper.

Residuals

To evaluate the accuracy of the model then plotted the residuals to the fitted values (see Figure 5), which provided me with a visual of how dependent they were on each other. There didn't seem to be a pattern in the plot but there was a faint outline of heteroskedasticity. It indicates that the model was inconsistent with predicting certain values and therefore is not a reliable source. Although the plot points don't make an obvious cone shape, in conjunction with the poor t-values, so would conclude that the model was a poor predictor of the situation.

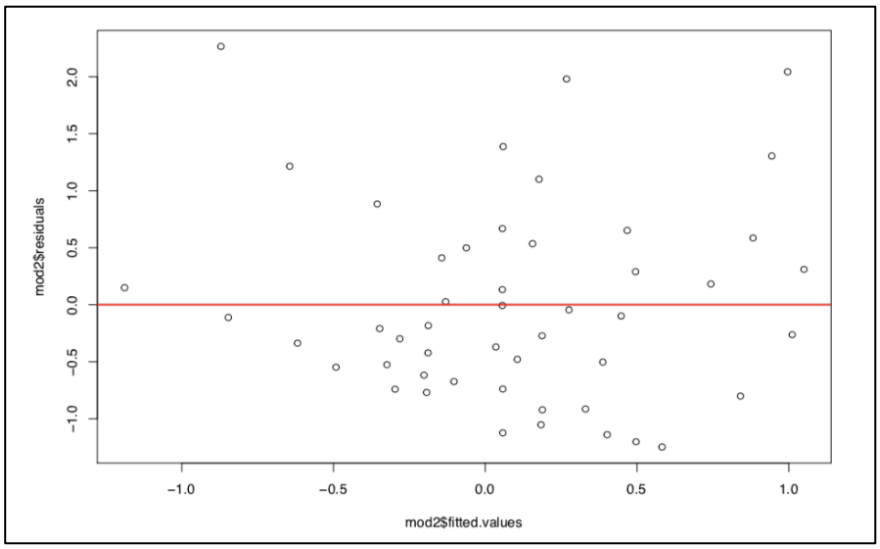

Figure 4: *Residual Plot*

As mentioned before, from the Gaussian Regression analysis, the only variable that had a significant t-value was the information sector variable. The t-value is used to measure the difference in units of standard error. When this value exceeds 2, either positive or negative, it suggests there is greater evidence of a significant difference. From this high value, I can extrapolate that there are other factors at play here, that a variable, or variables, other than immigration rate are affecting the information sector employment. One possible answer to this "unknown" variable is residency status. It may be that firms in the information sector hire immigrants with more human capital rather than just physical labor skills, therefore there are more variables to consider than simply increased immigration rates. Like mentioned earlier, this is just a single possible story to the narrative that is information sector employment in relation to immigration policy. But what can be said is that immigration rates have not been the only thing to cause fluctuation in the information employment industry.

5. Conclusion

Although the results of these computations might suggest that a decrease in immigrants granted residency in the US will lead to a decrease in employment in the information industry it's important to keep in mind that many other variables affect immigration rate as well. For example, geographical location, it is more likely that an area located near a border or body of water is more accessible for immigrants to reach such as Texas or New York. Another factor to consider is the nature of each sector, the demographic that makes up its workforce. The percentage of lawful immigrants and undocumented immigrants in the sector also could be the important factors for consideration as in IT industry the proportion of legal or documented workforce account for more than 80% of the total workforce. Comparing to other industry chosen for the research in this paper including Agriculture, Manufacturing, and Construction are all labor-intensive fields and often the projects they hire for are short-term. The percentages of the undocumented workforce are higher in other industry comparing to IT industry which needs continuity and specific skill set.

Jobs in the information sector tend to require more human capital and proficiency in nature. Therefore, certain sectors attract immigrants differently. Firms in IT industry tend to be ongoing and might require more time and effort from their employees so it's easier for immigrants to obtain permanent residency status with support from their employers. For example, the HB-1 visa allows employers in the US to hire foreign workers temporarily for special occupations. This could explain why the information sector has such high rates of immigrant employees. To put it simply, the information sector hires more talented immigrants to construct their workforce.

Considering the evaluation of accuracy for these models, although the model may not have been a good predictor it illustrated a story of how the two variables interact and gave a good base to continue research into this question. Further investigation on other variables should be included to validate the impact of more intense immigration policies on the productivity of different industry including the proportion of lawful and undocumented workforce and the ongoing trend of those statistics.

As the Trump Administration continues to implement harsher immigration policies and the immigrant population fluctuates there's no doubt that the job market will be influenced by these changes. There will be an impact on business in each industry differently depending on the nature of the operation and culture of each industry. Businesses will need to carefully evaluate the impact and prepare themselves for changes that might occur from the changing policies.

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