An Analysis of U.S. PERM Immigration Data with an Emphasis on Employment Trends

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Abstract

Immigration is a major component of American history and still proves to be a divisive topic today. While some immigration debates revolve around customs and culture, many others focus on jobs and the workplace. Despite these numerous debates, there is a lack of discussion about skilled immigrant workers specifically. The Office of Foreign Labor Certification (OFLC) within the US Department of Labor publishes raw data which provides many details about foreign workers in the country. For example, in 2015 there were approximately 1 million people who obtained lawful permanent resident status. Two of the most useful sets of data provided by the OFLC are PERM and Prevailing Wage. Additionally, there is data available related to the H1B visa which is commonly used by foreign workers. Exploring this data has uncovered insights that shed some light on the current status of immigration. One notable result is that permanent residents earn more on average than the median US income. The analysis in this report is important because the topics it covers are rarely discussed and there is a distinct lack of research in this area. Overall, this project provides an understanding of where skilled immigrants are coming from, where they are settling, and the type of jobs they are doing.

Introduction

Immigration is a heavily scrutinized topic in today's society and considerable attention is given to its effect on the labor force. Despite this, skilled immigrant workers are one aspect of immigration which is given little consideration. It is a topic which receives marginal news coverage and our research was unable to uncover other reports that aimed to analyze skilled worker immigration. The Office of Foreign Labor Certification (OFLC) and the Department of Homeland Security are among several government agencies which make raw immigrant data available for public analysis. While there are countless ways to approach and learn from this information, we have chosen to focus on the data connected to employment and skilled immigrants. This will give some perspective on the current state of foreign workers in the US and characteristics of their employment. Many Americans feel that immigrants are taking "their" jobs. The analysis in this project in part aims to provide some analytical evidence as to whether this sentiment has some truth to it or not. Regardless of the validity of this thought, there are countless immigrants in the United States and a better understanding of them will benefit everyone. Working with the previously under-utilized OFLC data can help achieve this. There are certainly valuable insights to be found in the PERM, H1B, and Prevailing Wage data.

1. PERM Data

One of the main data sets available from the OFLC website is the PERM data file[1]. This data contains information about individual foreign workers who are filing for permanent residency status in the United States which would give them the ability to work and live in the US permanently[2]. An immense amount of information can be found within the PERM data such as employment location, country of origin of the worker, and certification status. Also, additional data can be obtained from the Department of Homeland

Security to provide even more details[3]. In the sections below, analysis of various aspects of the data can be found along with a description of what was done.

1.1 Regional Analysis of PERM Approvals

Information related to a foreign worker's home country or region can be very interesting and insightful. The first plot shown below represents the number of lawful permanent residents (LPR's) come from each region of the world[4]. Melting the data to make a new data product helped make plotting the bar chart simpler.

Persons Obtaining Lawful Permanent Resident Status By Region Fiscal Years 2013 To 2015
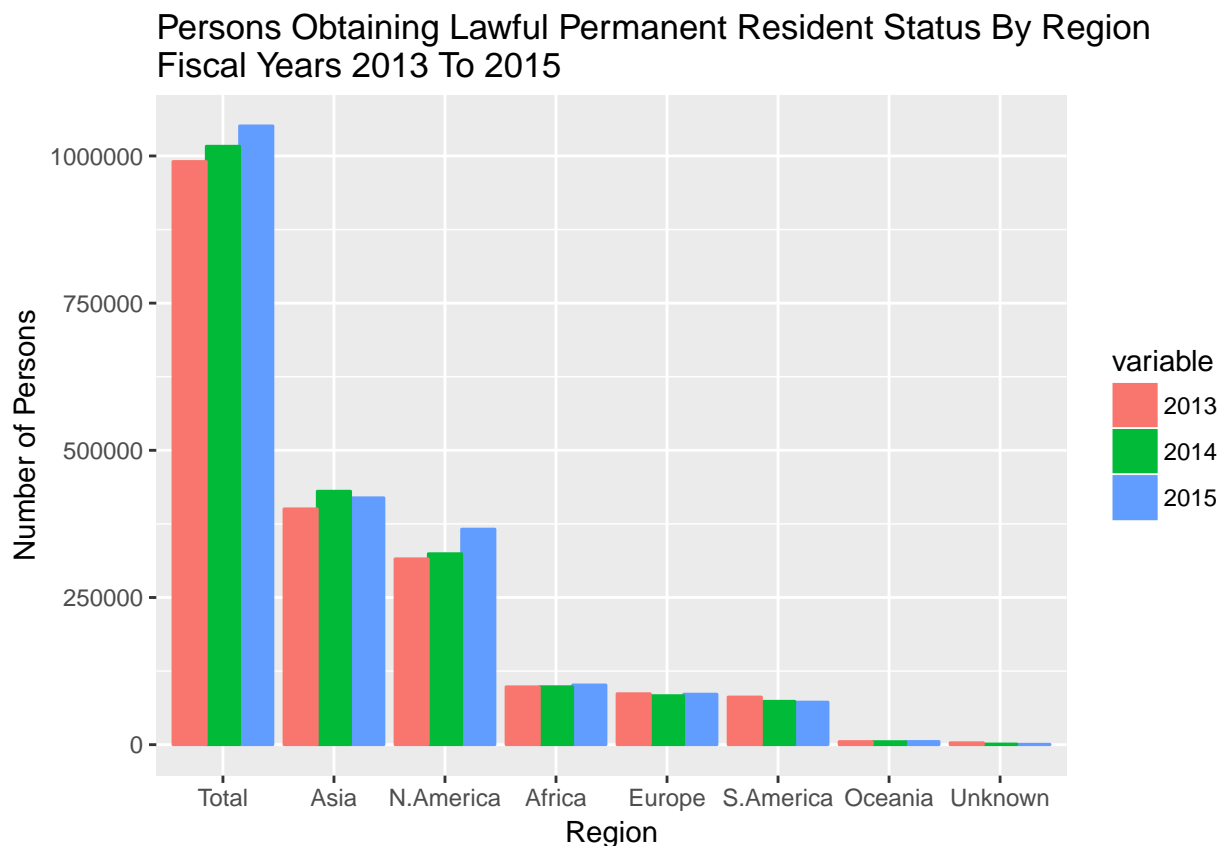
It is intriguing because we can see that the Asian residents and North American residents represent the two highest totals. Additionally, the total number of LPR's is on the rise. The North American numbers are particularly interesting since they are increasing over time while the other regions are comparatively more uniform. It is notable that there are significantly more LPR's from North America than Africa or Europe. While the topic of illegal immigration is often discussed in reference to North America, legal permanent residency is rarely associated with the region. The following plot shows how LPR's are distributed throughout the United States[5]. A darker shading represents a higher number of LPR's.

Lawful Permanent Residents in US (2015)
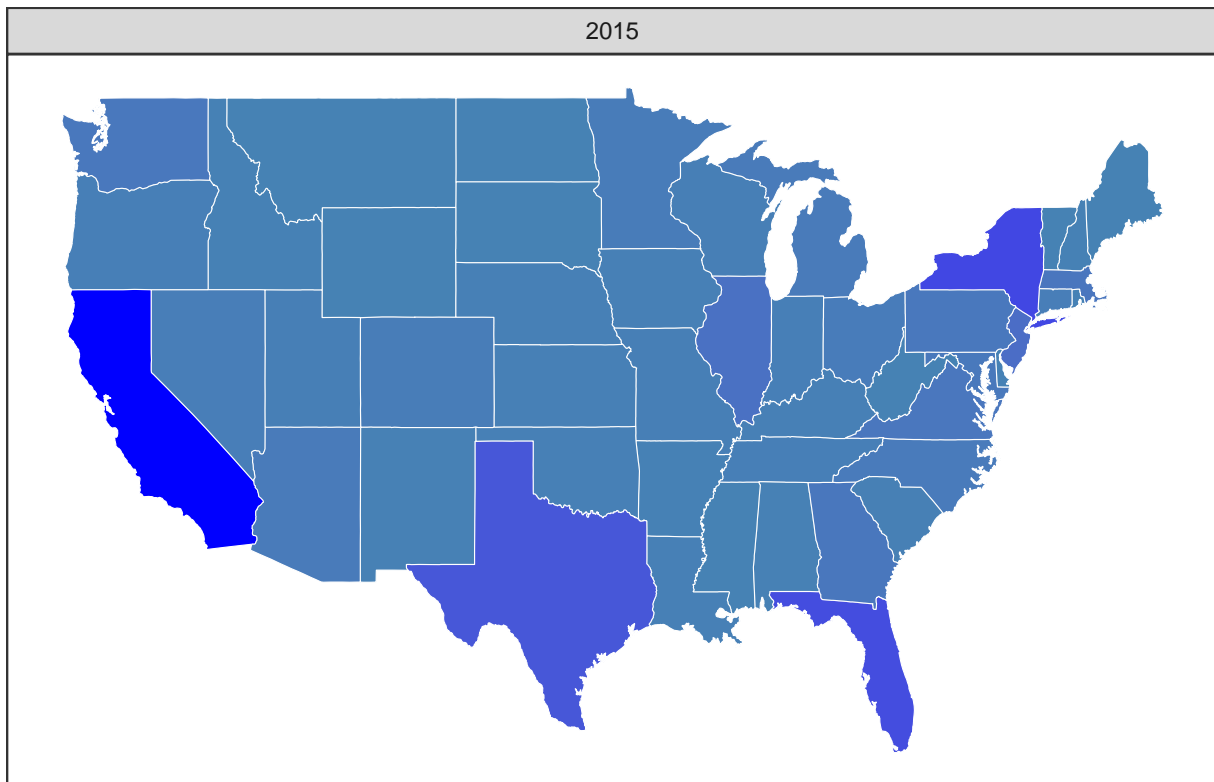
California, Texas, Florida, and New York appear to stand out as destination locations for LPR's. New Jersey also is a darker shade which would make sense based on its proximity to New York City. In general, the states with the highest amount of LPR's are on the coasts.

1.2 Education Level of Foreign Workers

While immigration is certainly a fixture on the news, the education levels of the foreign workers are rarely discussed. This valuable information can be found in the PERM data from the OFLC. As we can see in the following plot, a significant amount of the foreign workers applying for permanent residency possess a bachelor's degree and/or a master's degree. This has ramifications on what types of jobs these workers will seek and hold. The only manipulation of the data that was done was adding levels to the education column. This was done to improve the ordering of the graphic.
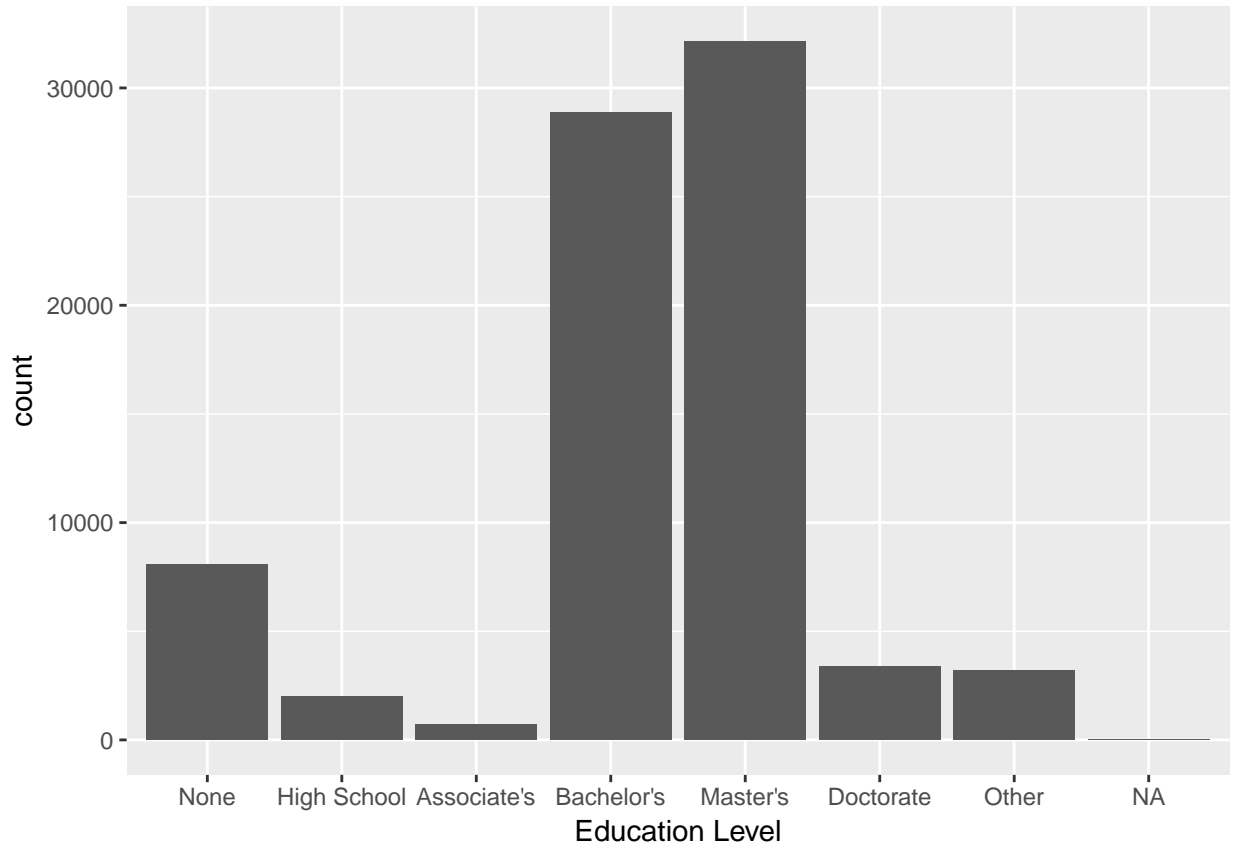
1.3 Origin of Foreign Worker

As was mentioned earlier, seeing where foreign workers are primarily coming from can be important and insightful. A column within the PERM data details the applicant's country of citizenship. Several things were done to the data before it was plotted. Initially, the column was read and used to create a frequency table. After that, it was sorted and the 15 most frequently recorded countries were stored in a new object. Then, a data frame was created using the 5 most frequent countries. Lastly, this data frame was used in ggplot to create a bar chart.
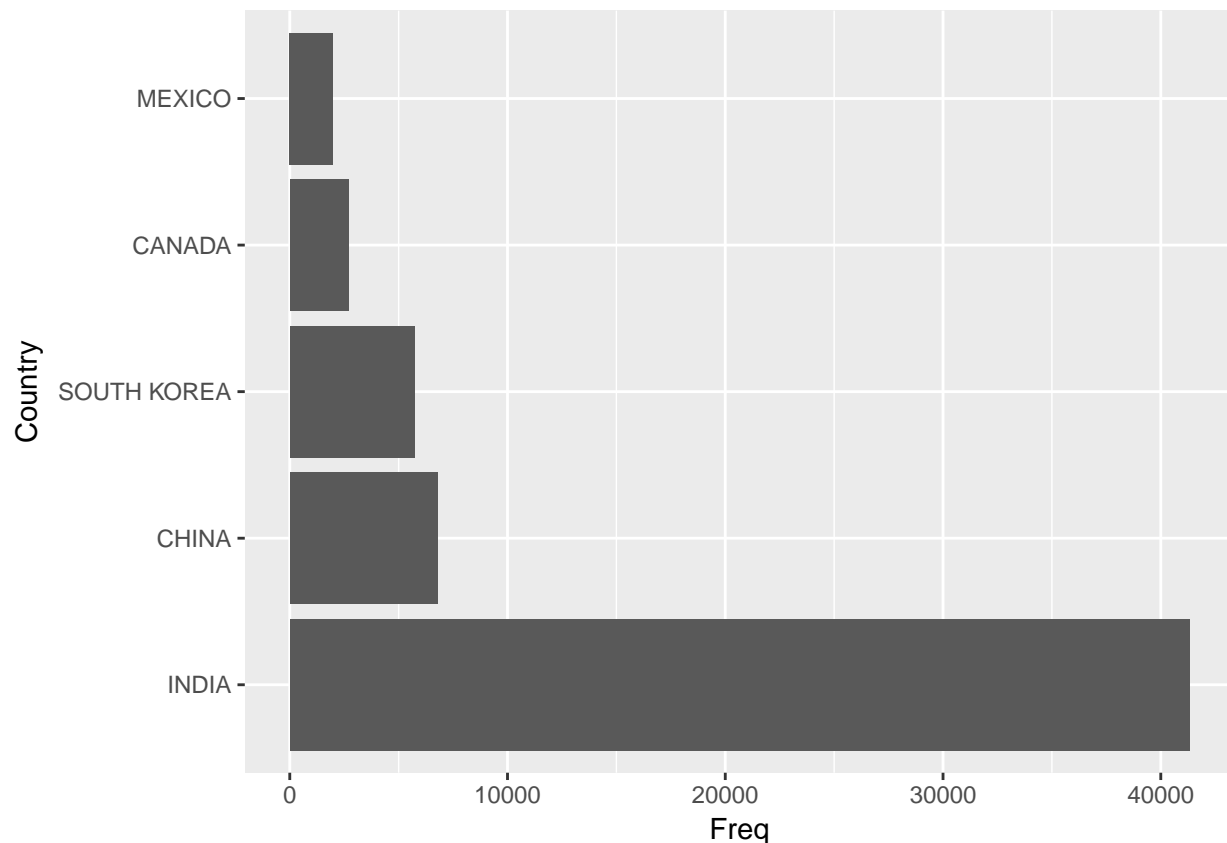
One interesting observations from this plot the fact that India has such a large number of applicants compared to all other countries. It is also of note that three of the top five are Asian nations and the other two are from North America. This coincides with our findings regarding total LPR's by region.

1.4 Path to Application

Many applicants for permanent residency are already within the United States. This is something many people do not realize and is another area of interest which does not receive enough attention. The PERM data records whether the applicant is already within the country or not. There are numerous ways that the applicant may have already been certified to work in the US and the top five are displayed below. Generating this graph required creating a frequency table for the country of citzenship data. After turning this into a data frame and sorting it, a plot was generated with ggplot.
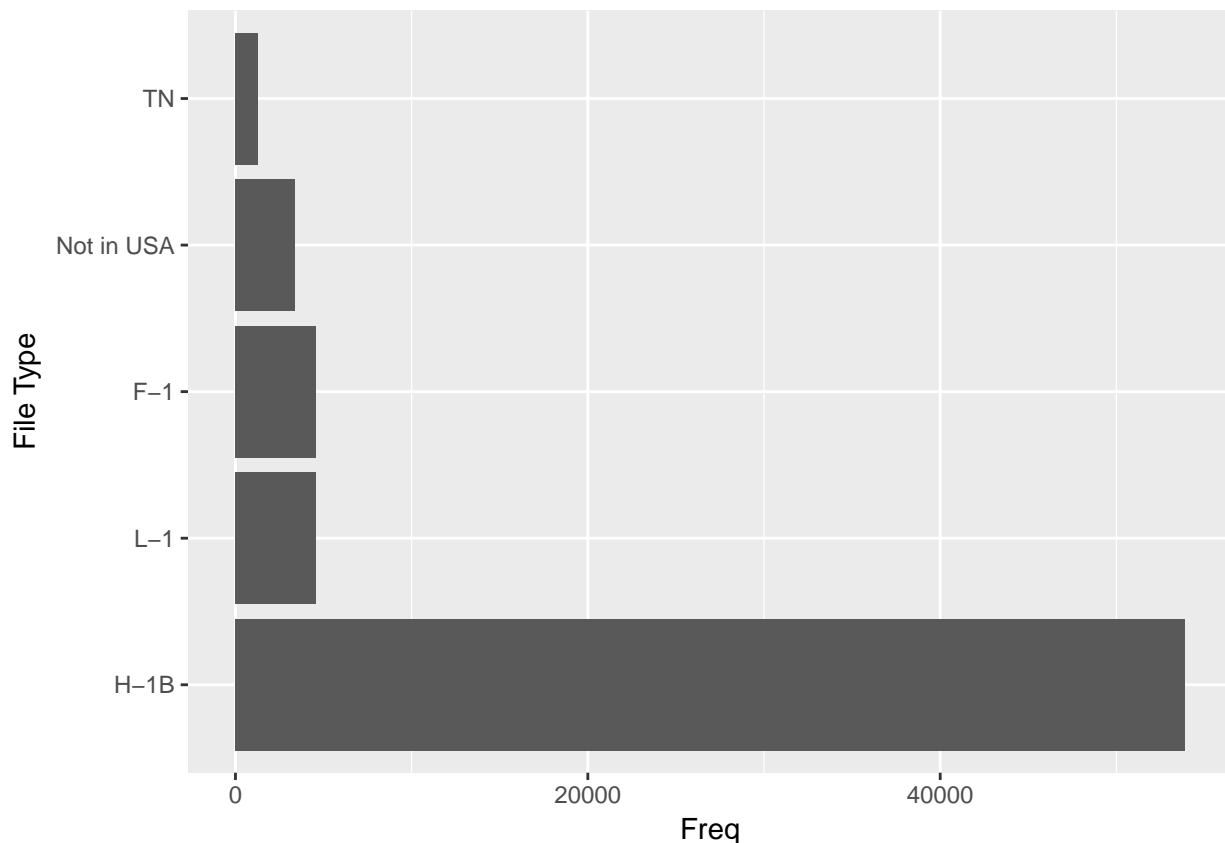
As we can see, there are far more PERM applicants with a previous H1B certification than any other group. While many PERM applicants have obtained some prior certificate and are working in the US, our findings show that there are still many individuals who apply before they are in the United States. The remaining visas in the top five relate to giving skilled workers temporary access to employment and/or education in the US. Since H1B is clearly used by many immigrants as a path to permanent residency, it is discussed in more detail below.

2. H1B Workers

H1B is a type of visa in the United States. This visa can be used by companies to employ foreign workers in certain occupations. In order to be considered a valid occupation for the H1B, it must require highly specialized knowledge in the field. The H1B is notable because it applies to a situation when a foreign student graduates from a university and then wants to continue being able to work in the US for an extended period. Additionally, there are only a limited number of H1B visas that are approved each year. Like PERM data, there are interesting aspects that can be explored and many details available in H1B data[6]. The following sections look at where H1B applicants are coming from and what type of work they are doing.

2.1 Origin of H1B Workers

The plot below shows the number of petitions for an H1B visa by employers over several fiscals years for workers from certain countries. It details the top five. Some reshaping of the data aided in graphing after the file was read.

## Number of H1B Visa Petitions Approved by Employers FY2013 – FY2017
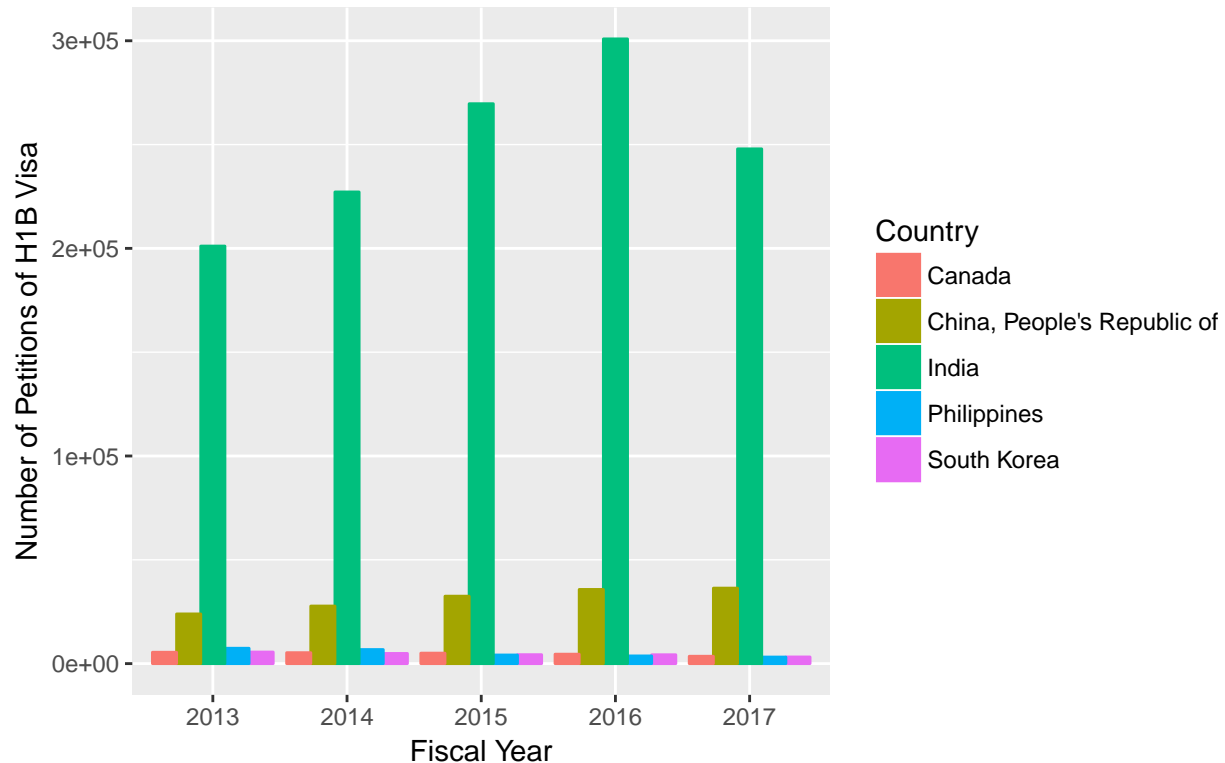
The most notable observation is that there are far more petitions for Indian workers than the other groups. It is worth noting thought that these petitions do not guarantee the individual received an H1B. The employer has approved the petition but the government has not made a decision. This is important for understanding the data but the sheer quantity of Indian H1B applicants is still significant. This graphic is very similar to the one above related to PERM data and countries of origin. It can be useful to compare the two. While quite similar, the Philippines replaced Mexico in the top five. This might suggest something about the age groups of the foreign workers. It also continues the trend of Asian and North American nations being well represented.

2.2 H1B Prevalence in Various Industries

What types of jobs foreign workers are doing is certainly worth analyzing. It is important to understand when considering whether immigrants are taking "American" jobs. A component of the H1B data details the type of industry that the employer belongs to. The following plot represents the top five industries that employers petitioning for H1B visas belong to. Reshaping the data product proved to be quite useful again for this plot.

Top 5 Beneficiary Industries
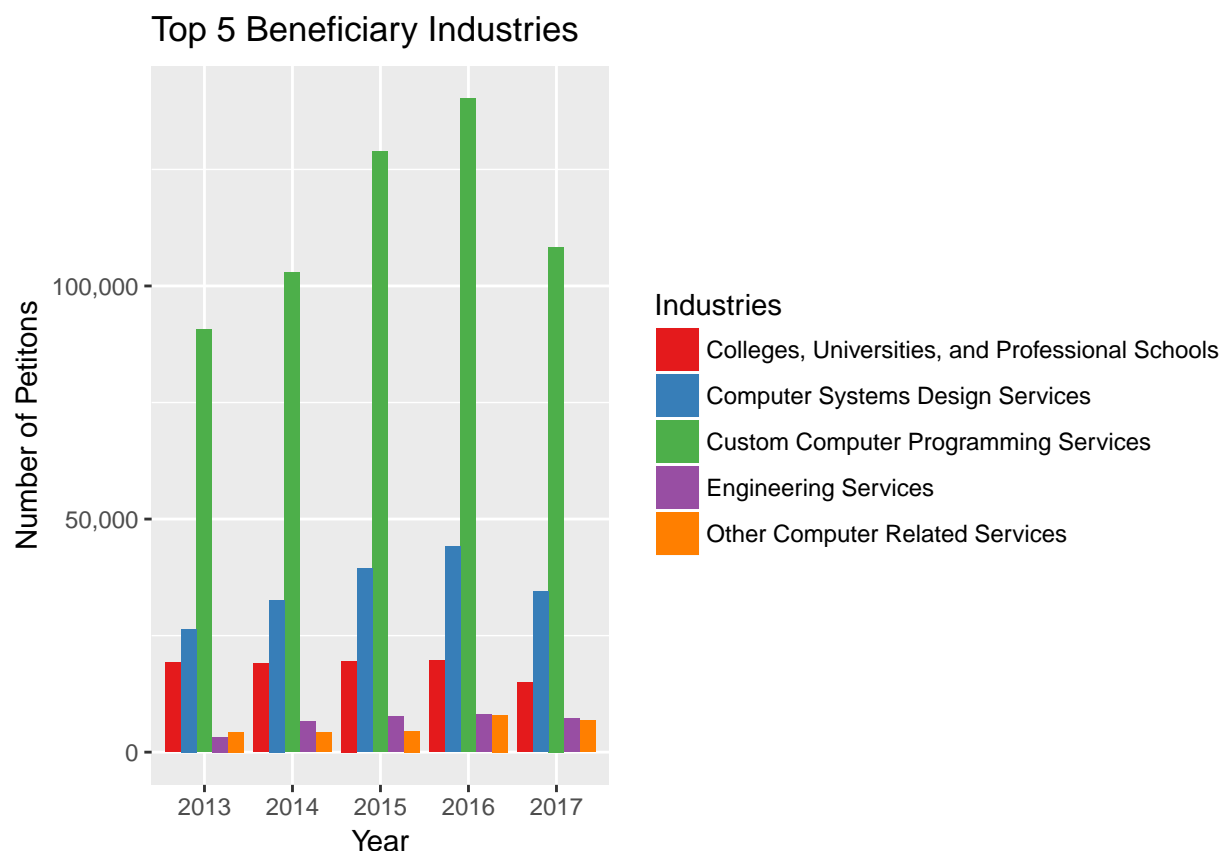
We can see that STEM areas, specifically computer-related fields, represent a large percentage of the H1B applications. This is an important insight because it reveals what industries many foreign workers are employed in. It also may suggest characteristics about the US labor force or identify industries that are facing a shortage of workers. Colleges and universities also are heavily involved with H1B petitions which has implications for students and the teaching labor force.

2.3 Compensation for H1B Workers

Understanding the income levels of H1B workers is just as important as analyzing the industries they operate in. Another sentiment sometimes held by individuals in the United States is that immigrants don't make much money or contribute to taxes enough. A segment of the H1B data reports on the income of the workers. Analysis of this is useful when evaluating the validity of the sentiment. Melting the data and using ggplot to graph were important for plotting the data.

Beneficiary Compensation
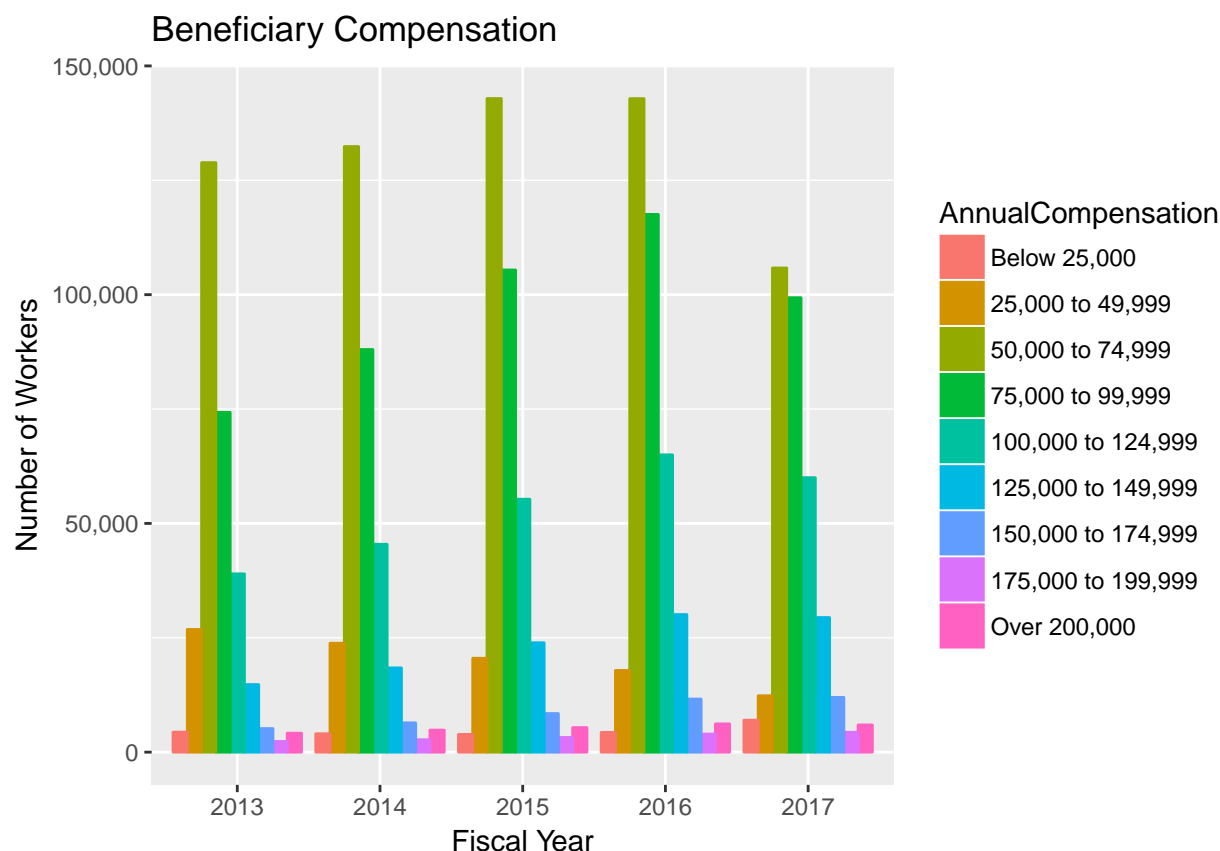
There are numerous insights provided by this plot. First, the majority of H1B workers are members of the middle or upper middle class. Also, the number of H1B workers that do not receive incomes consistent with the middle class is decreasing over time. Overall, as the number of low income H1B has decreased, the number of H1B workers making six figures has increased. These are notable points because they provide a firm start to dispelling the sentiment that immigrants do not contribue to taxes or make money. More information and discussion about income is provided below in the next section about prevailing wage data.
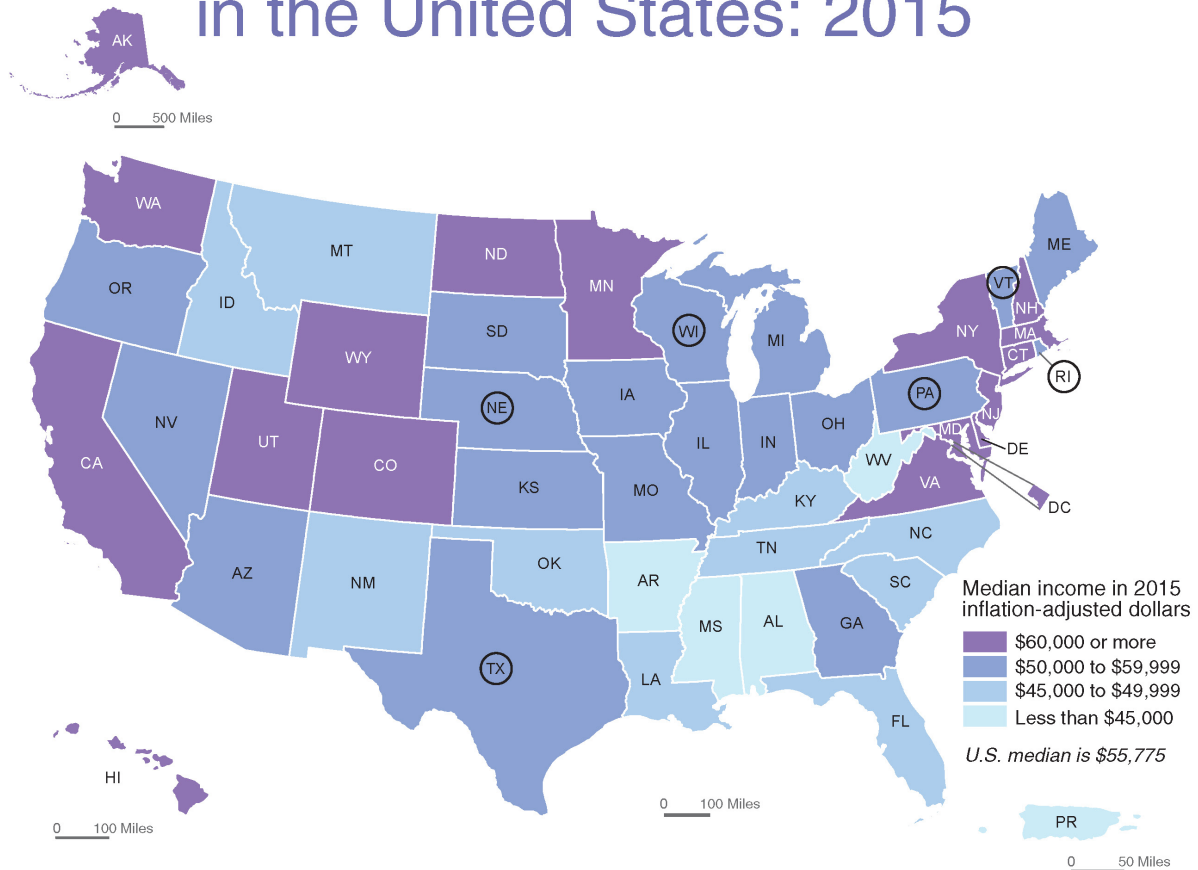
3. Prevailing Wage Data

A final area of interest is wage information for foreign workers. The OFLC also provides prevailing wage data which can be analyzed. A graphic comparing wage data across the US as well as a discussion of what was done to the data to create the data product can be found below. In the data set there is a prevailing wage designated for each case number which includes all of the information regarding the employee/employer. The prevailing wage may not be what the laborer is paid, but for their industry and region it is the average, thus the laborer will be paid based on that figure. We primarily are focused on disecting the average income in various facets for interpolation and to compare with United States average incomes.

3.1 Comparison of PW to U.S. Median Income
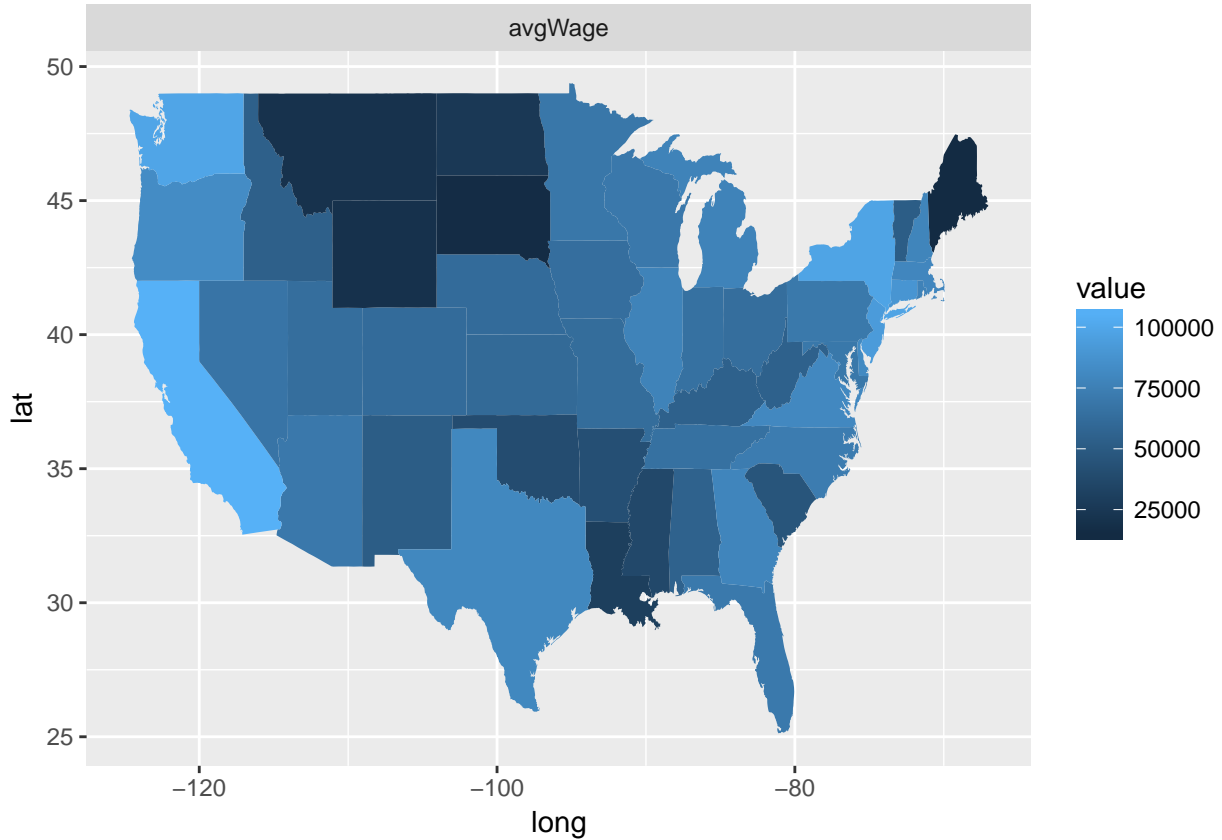
Above, we took the data set collected from the US Department of Foreign Labor, on prevailing wages for the fiscal year 2015. Initially, many columns were filled with NA's and therefore useless. So, through piping, we subsetted the data by the columns we wanted and, with the goal of mapping avg wages by state, we grouped the set by the worksite state names. For this set, we wanted to particularly compare the aggregate wages amongst states. Since all the columns and text were capitalized, we converted everything 'tolower' to compare to the map data later. Then before merging with the map we summarized the prevailing wages by state name. We then collected the map data and merged it with our new PV subset by state names. Lastly before plotting, we melted our map/PV data so we just have our state variables and avg wage values. The plotting is done using the long, lat map data and each state variable is filled to a certain degree by the avgWage value. From interpolating out map, we gathered that for 2015 the prevailing wages were the highest in California, Minnesota, Virgina, Indiana, Oregon and the northern east coast; while the lowest is an exception to the east coast being Maine, some of the other lowest averages are in Arkansas, Mississippi, Lousianna, Montana, and the Dakotas. This data gathered is pretty consistent with the average wage for all Americans by state, which is shown below. The maps both show the highest/lowest values in the east coast with the lowest in Maine and also the highest in California, Virginia and Oregon. More consistent lows are in Oklahoma, Mississippi, and Montana. The key differences to extract from the comparison of the graphs are the inconsistencies in Wyoming and North Dakota; for US citizens they are among the top ten highest incomes while immigrants in those states are ranked in bottom 5 for lowest average incomes in the US amongst immigrants. Lastly, a key difference to note is the gap between immigrants income vs citizens. Immigrants' is close to 20 thousand higher in states where the national trend is seen. Our prediction for this gap is the amount of samples in the citizen set compared to immigrant per state, more citizens income is represented and since immigrants are generally coming in to do some skilled labor, they are paid what a general skilled laborer would be paid according to the restrictions on prevailing wage. To answer shortly, we are getting the best of the skilled immigrants income as their average and the US population as a whole.

Median Household Income in the United States: 2015

Median income in 2015 inflation-adjusted dollars

- $60,000 or more
- $50,000 to $59,999
- $45,000 to $49,999
- Less than $45,000

U.S. median is $55,775

Note: A state abbreviation surrounded by the "O" symbol denotes the value for the state is not statistically different from the U.S. median.

Figure 1: US Citizen Comparison[7]
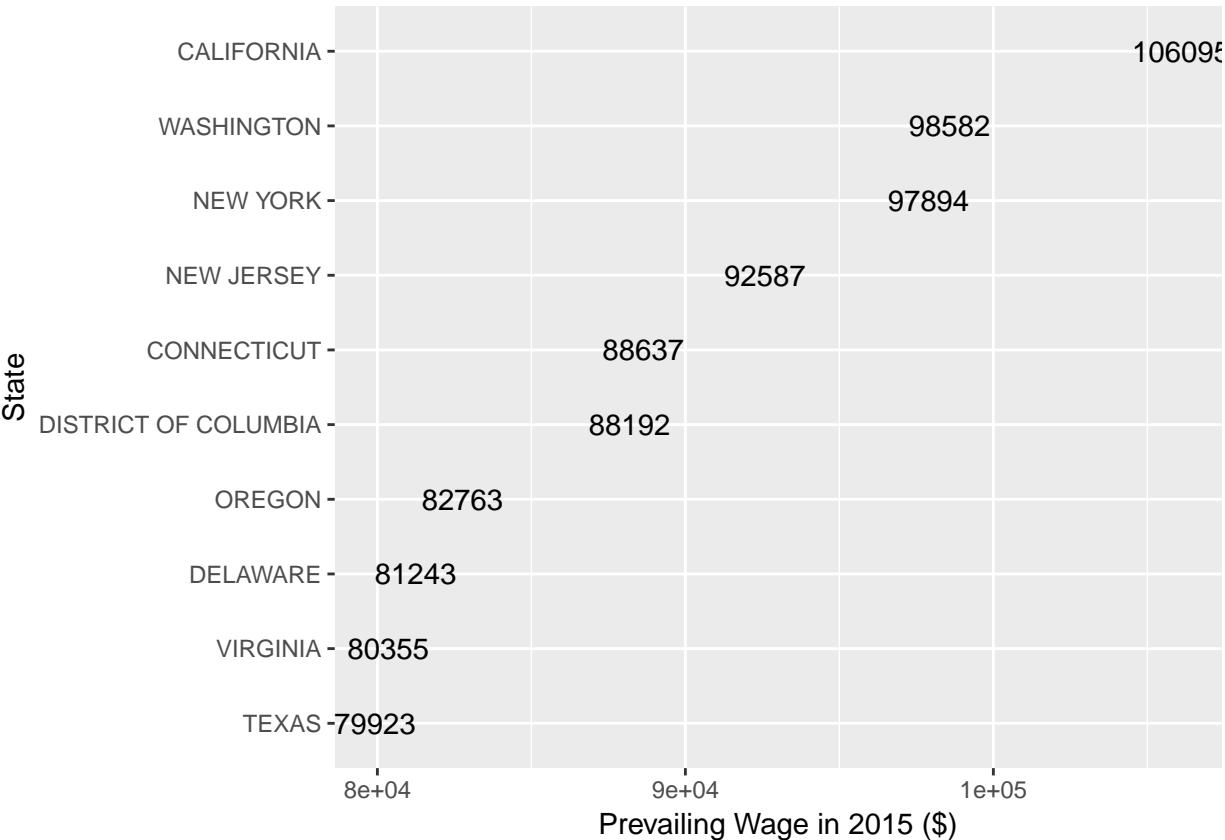
Below the median income map is a quick look at the top/bottom 10 average immigrant incomes by state.

## 3.2 Top 10 Highest Incomes by State

The immigrant prevailing wages and the United States average income followed a direct relationship in the District of Columbia, California, New Jersey, New York, Delaware, Connecticut, and Virginia; as these states are among the highest incomes for immigrants and citizens[8]. An indirect relationship can be seen in North Dakota, Alaska, and Wyoming since these states are in the top 20 highest incomes for citizens while they are in the lower range for immigrants. We believe the reason for this is because these states have far more open land than coastal states thus a much higher demand for outdoor/physical laborers at near minimum wages while the landowners and average middle class are benefitting from the output causing an indirect wage gap.

3.3 Top 10 Lowest Incomes by State

On the lower end of the spectrum, both for citizens and immigrants, the lowest earning states are Mississippi, Arkansas, Alabama, Kentucky, Louisianna, Oklahoma, and Montana. One side note here is the direct trend specific to the south where average income is distinctively low for both groups. We attribute the cause of this to be related to the growth in the computer industry and these states lack of employment in the field, the alternative jobs pay less. An indirect relationship can be seen in Maine, South Dakota, Alaska, Wyoming, and North Dakota since these states have the 10 worst incomes for immigrants while they are in the upper half of incomes for citizens. Note again the indirect relationship in the north/east compared to the opposite in the south. We attribute this to an overall lower wage level of immigrants being hired in these states, as they primarily hire for seasonal work in the agriculture/farming industry which pays far less than the dense computer industry on the other end of the spectrum. The states average income isn't affected by this because the citizens aren't occupying these jobs which can be implied from visa criteria.

3.4 Implicit Definition of Foreign Wage Groups
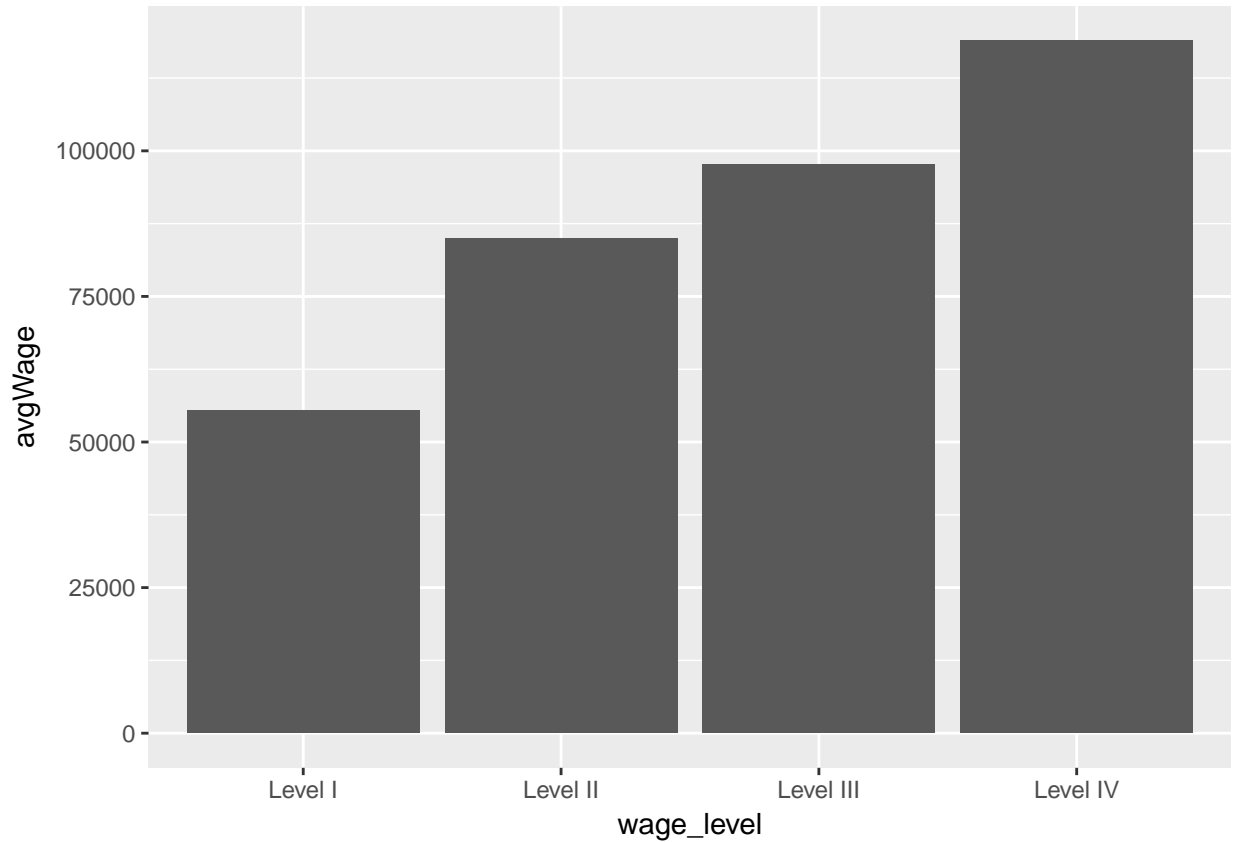
There was no standard table on the FLC website that defined what level each wage fell into so through our data we built a nice table that shows the wage level along with their corresponding amount. This is very interesting because the average wage for US citizens, excluding unemployed, is approximately $50,000 which is lower than the lowest foreign wage level. On average, taking count into consideration, we estimate that foreign workers as a whole make $20,00 more than US citizens.

Conclusion

Immigration continues to be a contentious topic in the United States with much of the debate focued on employment. In this project, we were able to examine PERM, H1B, and prevailing wage data and use this analysis to provide insights for the skilled worker aspect of immigration. This area receives far less attention and it is important that we understand PERM recipients and all skilled immigrant workers in the United States. Our findings suggest that common US sentiments towards immigrants should not be applied towards those with permanent residency status. The vast majority of PERM applicants have a bachelor's or even a master's degree. They are clearly very skilled workers and this fact has major ramifications towards the type of work that they do. We found that many PERM residents come from North America and Asia, specifically India. The analysis showed that H1B is a very common route for individuals to travel before applying for PERM status. This agrees with our findings that PERM applicants are very skilled workers since an H1B recipient must have an expertise in their field of study. These skilled workers often belong to STEM industries, specifically those dealing with computers. Additionally, colleges and universities are helped greatly by the skilled immigrant workers. The finding that the computer industries have so many foreign workers might suggest that there are not enough American workers trained in those fields but further

research would be necessary to definitively conclude that. In deeper research we would like to dig further into the amount of specfic immigrant industry change and their growth rates per state. From this we would be able to see what industries are emerging where Americans are unable to satisfy the needs in an effort to focus more educational resources to these segments. Our analysis of prevailing wage data found that most states display similar characteristics when it comes to PERM prevailing wage and median income for citizens. A future area of research which could expand on our findings would be to investigate the effect of cost of living in different states and then reevaluate the best states for immigrant income. A very noteworthy finding in the prevailing wage data is that the skilled immigrant workers have an average income higher than the U.S. median income. This firmly counters the idea that immigrant workers do not earn much money or pay enough in taxes. In general, our analysis shows that PERM recipients should not be subjected to the common sentiments imposed on immigrants. They are not taking "American" jobs and are certainly paying their fair share. Without these workers, industries such as computer systems or higher education would not be as successful and face labor shortages. Finally, since the total PERM numbers are increasing, it is apparent that skilled immigrant workers will continue to be a present in American society. They may not receive enough attention in the immigration debate but our analysis has showed skilled immigrant workers are positive members of society and the United States is lucky to have them.

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