

## The Relationship between Unemployment Change and Manufacturing Employment

### **Introduction**

In this report, data of unemployment change and manufacturing employment in Virginia and North Carolina from 2007 through 2010 was evaluated to determine if counties where high percentages of the workforce were employed in manufacturing in 2007 should have experienced a greater increase in unemployment between 2007 and 2010 could be supported. The predicted relationship between unemployment and manufacturing employment is due to the 2008 recession that cause an increase in unemployment from 4.8% to 9.1% between 2007 and 2010. As for manufacturing employment, during the 2001 recession manufacturing dependent businesses suffered, which caused an increase unemployment for people within that job sector. Therefore, since there was a correlation between manufacturing employment and unemployment in 2001, the same might have occurred during the 2008 recession. This study uses percentage data from the 2011 Virginia Employment Commission and the North Carolina Division of Employment Security to determine the geographic variations of the data, the methods used to analyze it, and the results of the analysis.

### **Geographic Variations**

Between Virginia and North Carolina, the percentage of change in unemployment was most concentrated in the western part of North Carolina and near the southern border of Virginia. There is also a concentration of unemployment to the southern border of North Carolina. The areas that experienced the least about of unemployment change was a majority of Virginia aside from the area near the southern border. As for the percentage of manufacturing employment, it was moderately high in the western part of North Carolina and at the southern border of Virginia. Manufacturing employment was also relatively concentrated along Virginia's western border.

The areas that had the lowest percentages of manufacturing employment was in northern Virginia.

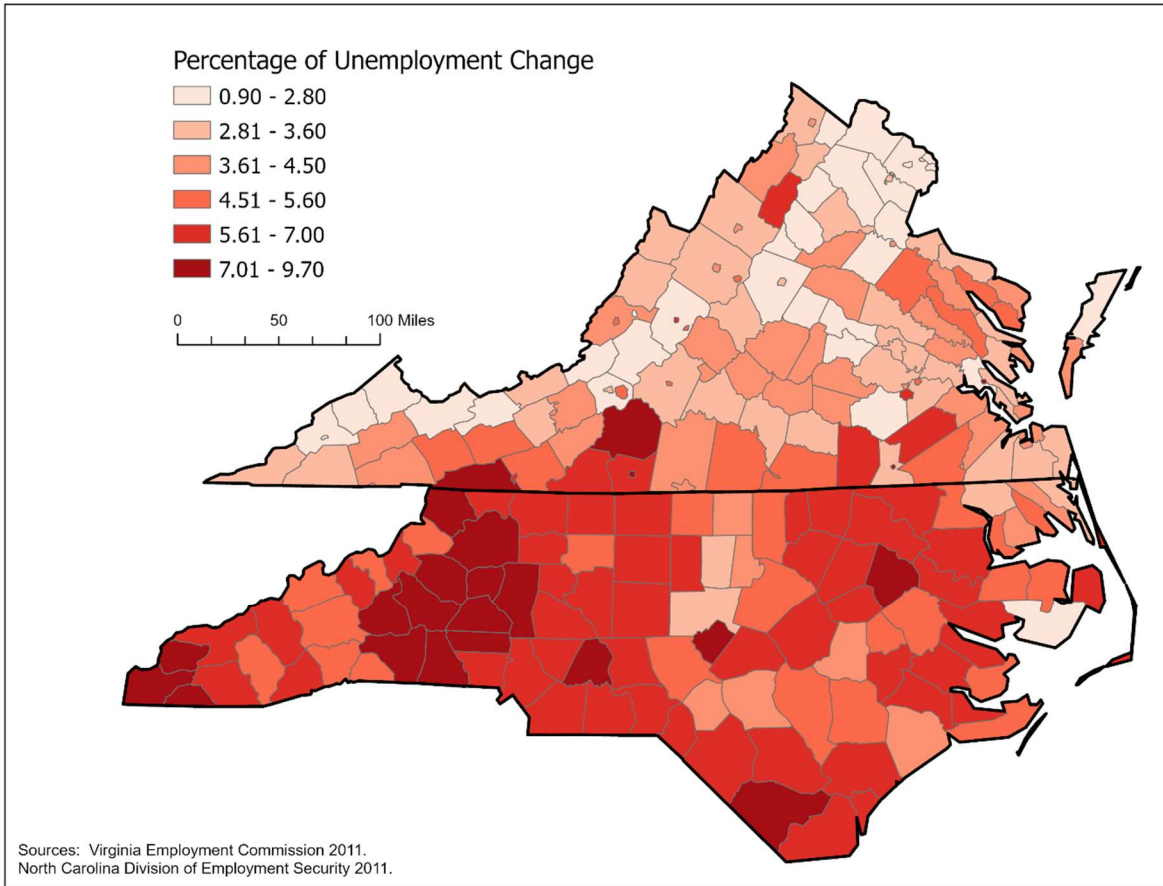


Figure 1: Unemployment Change in Virginia and North Carolina.

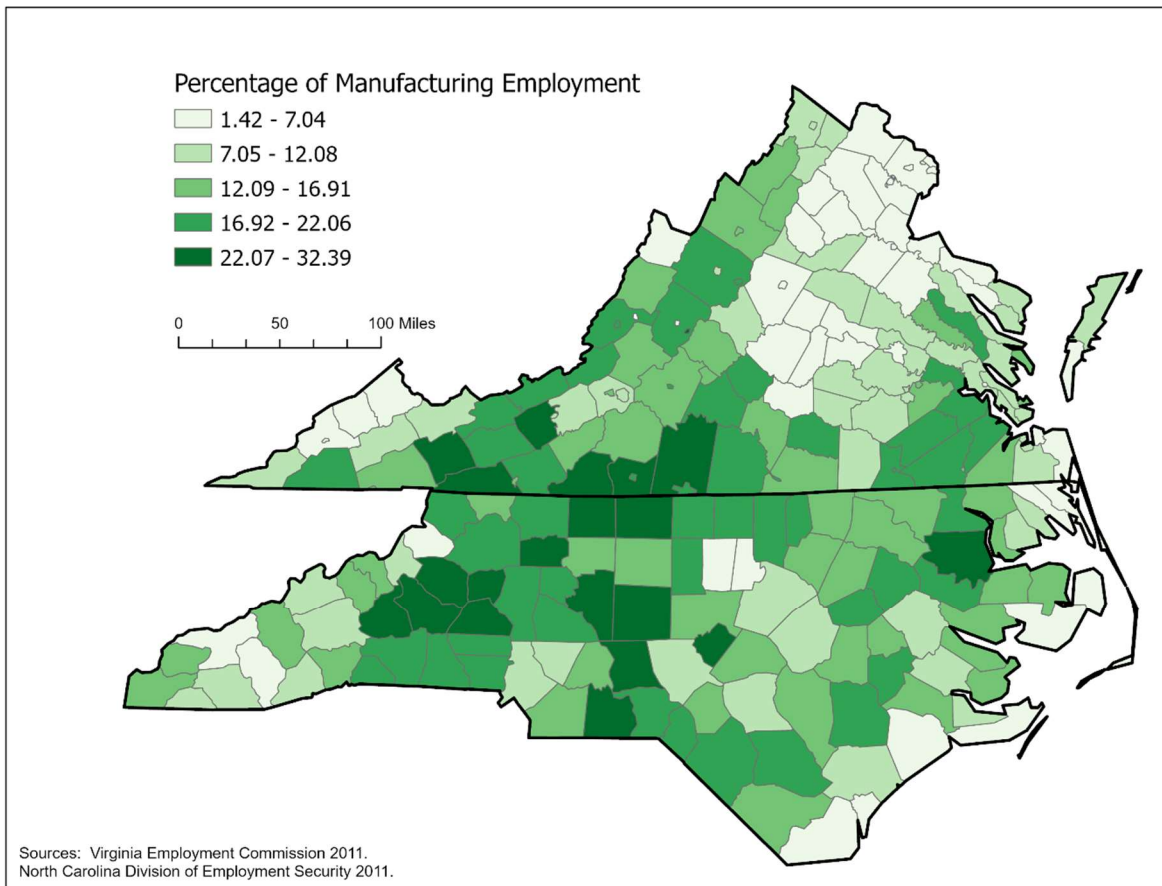


Figure 2: Manufacturing Employment in Virginia and North Carolina.

## Methodology

In order to see if counties where high percentages of the workforce were employed in manufacturing in 2007 should have experienced a greater increase in unemployment between 2007 and 2010, the change in unemployment was compared between two sets of counties. The first set of counties included ones with a high manufacturing employment percentage and the other set was counties with a low to average manufacturing employment percentage.

To determine what constituted a high manufacturing employment percentage and a low to average percentage, the critical value of 20.1 was defined for the dataset. The critical value was determined based on the single best descriptor and measure of variation for the data. The data was measured using a ratio measurement scale since it measures quantitative attributes and has a

true zero value. The true zero value is important because the percentage of both unemployment and manufacturing employment have true zeros. The ratio measurement scale's single best descriptor is the mean, and the measure of variation is the standard deviation. Therefore, the standard deviation was added to the mean to define the critical value.

This value was used in the "select by attributes" tool to filter which counties had a value equal to or greater than 20.1, or high manufacturing employment. Then changing the input of the histogram statistics to the unemployment change feature class, the minimum, maximum, mean, and standard deviation of unemployment change was recorded for the selected counties. Using the "invert selection" tool on the histogram, the minimum, maximum, mean, and standard deviation of unemployment change was recorded for low to average manufacturing counties.

## **Results**

The mean of unemployment change for high manufacturing counties was 6.2% while the mean of unemployment change for low to average manufacturing counties was 4.5% (Table 1). Other statistics between high manufacturing counties and low and average manufacturing counties varied as well, such as number, standard deviation, range, minimum, and maximum. The number of counties with high manufacturing was 34, whereas for low and average it was 200 (Table 1). The standard deviation for high manufacturing counties was 1.55 and 1.6 for low and average (Table 1). The range for high manufacturing counties was 7.0% and 7.3% for low and average (Table 1). As for the minimum and maximum values between both categories, the minimum for high manufacturing counties was 2.7% and 0.9% for low and average and the maximum for high manufacturing counties was 9.7% and 8.2% for low and average (Table 1).

<b>Table 1: Comparing Unemployment Change between High and Low to Average Manufacturing Counties</b>		
<u>Statistics</u>	<u>Unemployment Change in High Mfg Counties</u>	<u>Unemployment Change in Low and Avg. Mfg Counties</u>
Number (N)	34	200
Minimum	2.7	0.9
Maximum	9.7	8.2
Range	7	7.3
Mean	6.2	4.5
Standard Deviation	1.55	1.6

### **Conclusion:**

When using the standard deviation of unemployment change in low and average manufacturing counties, the maximum value within one standard deviation is 6.1%. Comparing this to the 6.2% mean for unemployment change in high manufacturing counties shows that there is not a strong correlation between unemployment change increasing in areas with more manufacturing employment. While 6.2% is more than one standard deviation above the mean for the low and average counties, it is not significantly higher which does not support the hypothesis. However, there is data that supports the hypothesis such as the unemployment change in high manufacturing counties range is higher than the change in low and average counties. While the range being higher in high manufacturing counties is expected due to outliers, this does suggest a relationship between high manufacturing employment counties experiencing an increase in unemployment as opposed to low and average counties. Furthermore, the frequency histograms also support the hypothesis because an increase in unemployment values are more common in high manufacturing counties and above the mean value. For low and average manufacturing counties, the histogram shows a concentration of unemployment change below the mean. More tests will need to be conducted to conclusively determine if there is a relationship between high

manufacturing counties experiencing greater increases of unemployment, however, the parts of the data do support this hypothesis.