

# *Introduction to Human Geography with ArcGIS*

## **Chapter 3 Exercises**

### **Exercise 3.1: Spatial distributions**

#### **Introduction**

The exercises in this section are intended to get you thinking about why people migrate. You will view the maps and develop hypotheses as to why people are moving internationally and nationally. In the next section of the text, you will learn more about why people migrate and can compare your ideas with other migration theories and concepts.

#### **Objectives**

- Examine emigration and immigration flows between countries.
- Calculate the proportion of migrants that emigrated to principal destinations.
- Hypothesize as to the forces driving people to migrate, both domestically within the United States and internationally to the United States.

#### **Where are people migrating around the world? International migration flows**

In this section, you will examine patterns of emigration and immigration between countries. Using the maps provided you will observe not only the number of people who have emigrated, but where they arrived as well. Based on this, you will hypothesize as to what forces are driving people to follow these migration routes.

1. **Open Chapter 3 – Migration 2015 map and sign in to your ArcGIS Online account:**
  - <http://arcg.is/2ecTDWL>
2. **Hover your cursor over the Net Migration Flow 2010 to 2015 per 1000 layer and open the legend  .**
3. **Scroll around the map and select a country with negative net migration. You can click the country to see the net-migration per 1000 value.**

#### Question 3.1.1

Write your selected country name: \_\_\_\_\_

4. **Turn on Migrant Stock 2015 – Emigration (and turn off the other layers).**
5. **Hover over the layer name and click the Change Styles button  .**
6. **Choose an attribute to show. Select the country from the previous step.**
7. **Click Done.**
8. **Click the top countries where they have emigrated to. In the pop-up window, scroll down until you see the name of your selected country.**

#### Question 3.1.2

Note the numbers.

Country 1 Name: \_\_\_\_\_. Number of immigrants from your selected country: \_\_\_\_\_

Country 2 Name: \_\_\_\_\_. Number of immigrants from your selected country: \_\_\_\_\_

Country 3 Name: \_\_\_\_\_. Number of immigrants from your selected country: \_\_\_\_\_

### **Question 3.1.3**

Think about what could cause the patterns you see. Why may they have chosen to migrate to those countries?

**9. Look again at Net Migration Flow 2010 to 2015 per 1000.**

**10. Select a country with positive net migration.**

### **Question 3.1.4**

Write your selected country name: \_\_\_\_\_

**11. Turn on Migrant Stock 2015 – Immigration (and turn off the other layers)**

**12. Hover over the layer name and click the Change Styles button  .**

**13. Choose an attribute to show. Select the country from the previous step.**

**14. Click Done.**

**15. Click some of the countries with the largest number of immigrants to your selected country. Scroll down the pop-up window until you see your selected country. This shows the number of people who left for your selected country.**

### **Question 3.1.5**

Where did most immigrants come from?

### **Question 3.1.6**

Again, think about what could cause the patterns you see. Why may they have chosen to immigrate to your selected country?

## **Where are people coming from and going to in your state? US migration flows**

In this section, you will explore domestic migration patterns for your state. You will see from which states people have moved to your state, and where people are going from your state.

### **1. Open the Chapter 3 – US Migration map and sign in to your ArcGIS Online account:**

- **<http://arcg.is/2e7ZqfB>**

This map shows three layers:

- **US Interstate Migration by State. Year: 2014. State resident lived in 1 year ago.**
- **US Interstate Migration by Region. Year: 2014. Region resident was born in.**

- **US Counties by Country of Birth. Year: 2014. Country resident was born in.**
- 2. Turn on the US Interstate Migration by State, 2014 layer.**
  - 3. Identify the primary place of origin of recent immigrants to your state.**

#### **Question 3.1.7**

Click your state. In the pop-up, which state or states are the largest source of immigrants?

#### **Question 3.1.8**

Hypothesize as to why this may be. What may be driving people to move to your state?

- 4. Identify the primary destination of recent emigrants from your state.**
- 5. Hover over the layer name for US Interstate Migration by State, 2014 and click the Change Styles button  .**
- 6. Choose an attribute to show. Select your state.**
- 7. Click Done.**

#### **Question 3.1.9**

Where have most emigrants from your state gone? Why may this be?

## How international is your county? Patterns of international immigration

In this section, you will see which international immigrants have moved to your county.

You will then hypothesize as to what forces are behind the patterns. You can refine your answers later after reading the section on migration push and pull.

**1. Open the Chapter 3 – US Migration map and sign in to your ArcGIS Online account:**

- <http://arcg.is/2e7ZqfB>

**2. Turn on US Counties by Country of Birth (turn off all other layers).**

**3. Zoom in and click your county.**

### Question 3.1.10

In the pop-up window, which countries are the largest source of immigrants?

### Question 3.1.11

Hypothesize as to why this may be. What drives people from those countries to immigrate to your county?

**4. Hover your mouse over the US Counties by Country of Birth, 2014 layer and click the Change Styles button .**

**5. Choose an attribute to show. Select a country to see which US counties people from your selected country have immigrated to.**

## 6. Click Done.

You can click the counties with the largest number of immigrants from your selected country to see the total number from that country.

### Question 3.1.12

Where have most people from your selected country immigrated to? Why may this be?

### Conclusion

In this exercise, you viewed migration patterns at a global and national scale. Based on observations of these patterns, you hypothesized about why people have moved from some places and to others. As you continue to read this chapter and work on the following exercises, you will learn more about the forces that drive people to migrate, which you can compare with your current hypotheses.

## Exercise 3.2: Push and pull forces

### Introduction

Migration is a complex process that can involve myriad push and pull forces. In these exercises, you will explore the role that economic and political stability forces play in migration at a global scale, as well as the reasons behind Mexico's internal migration at a national scale.

### Objectives

- Evaluate how economic factors impact migration flows.
- Evaluate how political instability and violence impact migration flows.

- Analyze how countries with similar incomes and levels of political stability can have different levels of net migration.
- Explore the role that violence plays on internal migration in Mexico.

### How do income and political stability impact migration flows?

As described in the text, a variety of push and pull factors drives migration patterns. In this section, you will observe how average income and political stability can affect where people immigrate.

#### 1. Open the Chapter 3 – Push and Pull Forces app:

- <https://learngis.maps.arcgis.com/apps/webappviewer/index.html?id=4831a5a2873f4b87b85faf3e206280d0>

#### 2. Turn on the GNI Per Capita PPP layer (and turn off all other layers).

#### 3. Click the layer list to see the layers.

#### 4. Click the Legend button .

This layer shows the gross national income per capita in purchasing power parity (2013–15). This accounts for both the size of a country’s population (per capita) and the cost of living (PPP). Purchasing power is equivalent to a US dollar in the United States.

#### Question 3.2.1

Based on this layer, between which countries would you expect migration flows. Zoom and move the map as needed.

Looking at countries only within Europe, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within South America, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within Africa and the Middle East, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within Asia and the Pacific, where would you expect people to be emigrating from and immigrating to?

**5. Turn on the Political Instability and Violence layer (and turn off the other layers).**

This layer shows the ranking of perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism in 2015. A score of 0 means the most instability, while a score of 100 represents the least instability.

**Question 3.2.2**

Based on this layer, between which countries would you expect migration flows? Zoom and move the map as needed.

Looking at countries only within Europe, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within South America, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within Africa and the Middle East, where would you expect people to be emigrating from and immigrating to?

Looking at countries only within Asia and the Pacific, where would you expect people to be emigrating from and immigrating to?

### **Mexico's drug violence and internal migration**

Many people see news reports of drug-trade violence in Mexico and believe that the entire country is dangerous. However, the violence is spatially concentrated in just a few Mexican states. While it can be very high in those states, it is much lower in others. In fact, some states in some years have lower homicide rates than that of the US, which has fluctuated between 4.5 and 5.0 per 100,000 people between 2009 and 2014.

This violence has contributed to Mexican migration, as people flee the drug wars in search of safer places. However, it is not the only push factor driving people to move. In this exercise, you will examine patterns of violence in Mexico, internal migration, and the forces pushing people to emigrate to new states.

#### **1. Open the Chapter 3 – Mexico Internal Migration app:**

- <https://learngis.maps.arcgis.com/apps/webappviewer/index.html?id=c5aa572764364ec488b20a02e1a18d53>

2. Use the Layer List and Legend buttons to select layers and see legend values



3. Turn on the Mexico Homicide Rate layer if it is not already active.

The symbology is set to show the homicide rate in 2011, one of the years with the highest levels of murder.

### Question 3.2.3

Fill in this table based on the instructions in the steps:

Highest 2011 Homicide Rate (state name)	Lowest 2011 Homicide Rate (state name)	Highest Negative Net Migration (state name)	Highest Insecurity or Violence (state name)

4. Open the attribute table by clicking the icon near the bottom of the screen



5. In the attribute table, click Filter by map extent and make sure it is not highlighted. At the bottom of the attribute table, it should say “32 features 0 selected.” This shows that all 32 Mexican states will be used in your calculations.

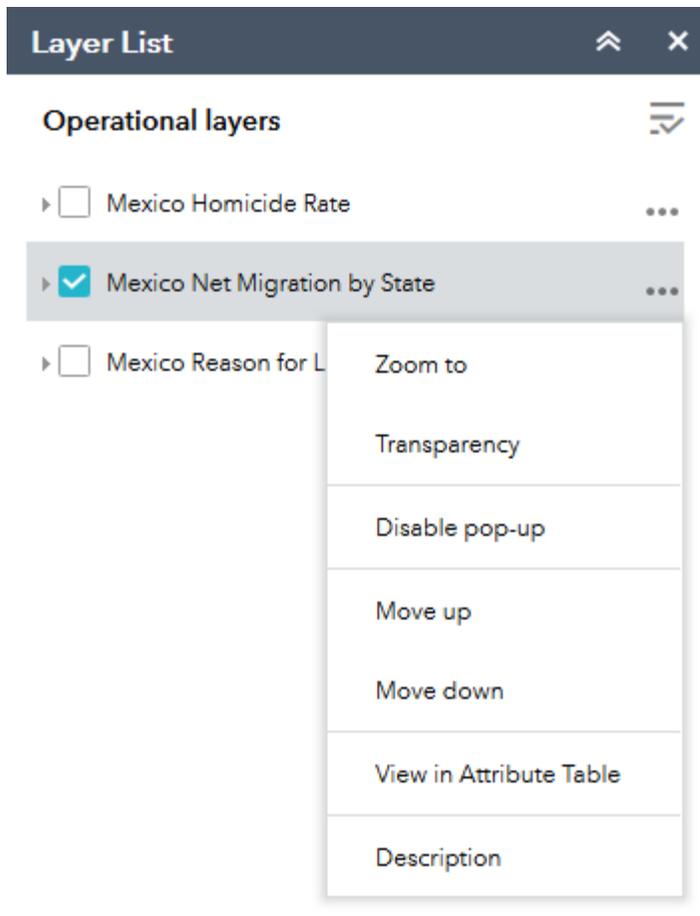
Mexico Homicide Rate	
Options Filter by map extent	
STNAME	
BAJA CALIFORNIA	
SONORA	
CHIHUAHUA	
COAHUILA	
BAJA CALIFORNIA SUR	
NUEVO LEON	
TAMAULIPAS	

32 features 0 selected

6. In the attribute table, click the Rate 2011 field and choose Sort Descending.
7. Write the five states with the highest homicide rates in the table.
8. Write the five states with the lowest rates in the table.
9. Turn on the Mexico Net Migration by State layer (and turn off other layers).

States with the darkest shades have the highest levels of negative net migration. That means that more people left for other states in Mexico than moved in. This data does not include numbers on those who left the country.

10. Open the attribute table by clicking More Options (...) by the layer name and then choosing View in Attribute Table.



**11. In the attribute table, click the Net Migration field and choose Sort Ascending.**

**12. Write the five states with the highest negative net migration in the table.**

**13. Turn on the Mexico Reason for Leaving State layer (and turn off the other layers).**

This layer has information on why people left each state between 2009 and 2014. The symbology shows the proportion that reported violence and insecurity as the reason for leaving.

**14. As you did previously, open the attribute table by clicking More Options by the layer name and then choosing View in Attribute Table.**

**15. In the attribute table, click the Insecurity or Violence field and choose Sort Descending.**

**16. Write the five states where more people emigrated due to violence and insecurity in the table.**

#### **Question 3.2.4**

Of the five states with the highest negative net migration, which ones also were in the top five for homicides? Does homicide seem to be the main force pushing people to leave?

#### **Question 3.2.5**

Of the five states with the highest reported reason for emigrating being insecurity or violence, which were also in the top five for homicide and the top five for negative net migration?

#### **Question 3.2.6**

Does there appear to be a strong, moderate, or weak relationship between homicide rates, net migration, and the perceived push forces of violence and insecurity?

**17. Click the top five negative net migration states from your table.**

#### **Question 3.2.7**

For each state, write down the top two reasons for emigrating.

State	#1 Reason for Emigrating	#2 Reason for Emigrating

### Question 3.2.8

Which push factors seem to be most important in driving people to migrate to another state in Mexico?

### Conclusion

In this exercise, you saw how economic and political stability forces influence migration and considered additional forces that can influence where people move. You also examined the forces driving internal migration within Mexico, seeing that violence plays a role, but other forces can be more powerful in many states.

## Exercise 3.3: Refugees

### Introduction

In this exercise, you will apply migration concepts to understand the forces that drive refugees to flee their homes.

### Objectives

- Explore spatial patterns of refugees.
- Apply concepts of distance decay and intervening obstacles to refugee flows.
- Describe the location of migrant and refugee flows into Europe.

## The Mediterranean refugee crisis

During the mid-2010s, massive numbers of migrants attempted to enter Europe from Africa, Asia, and the Middle East via routes in the Mediterranean Sea. The push factors varied, from war to a lack of economic opportunity and political instability. As you now know, migrants don't move randomly to new locations, but rather spatial interaction tends to flow in streams or channels. You will explore these migration flows in this section.

**1. Open the Chapter 3 – Refugees app:**

- <https://learngis.maps.arcgis.com/apps/webappviewer/index.html?id=ca2a7ec70f9641f5ae2d67e88b6b71ae>

**2. Turn on the Refugees 2015 – Refugees in Country layer. Click the Layer List**

**button**  **to see the layers.**

This layer shows the total number of United Nations registered refugees in each country as of mid-2015.

**3. View the map and open the attribute table.**

**4. Click the Open Attribute Table icon**  **near the bottom of the screen.**

**5. Click the Refugee field in the table and choose Sort Descending.**

### Question 3.3.1

Write down the six countries with the most refugees in mid-2015:

Country	Number of Refugees

### Question 3.3.2

Where do you think most of the refugees in each of the six countries came from? Why? Think about events that may have driven people to flee to those countries.

6. **Turn on the Refugees 2015 – Refugees per 1000 Population (and turn off the other layers).**

This layer shows the proportion of a country's population with refugee status.

7. **View the map and open the attribute table.**
8. **Click the Open Attribute Table icon , and click the Refugees 2015 – Refugees per 1000 Population tab.**
9. **Click the Refugees per 1000 Residents field in the table and choose Sort Descending.**

### Question 3.3.3

Of the six countries, which three also have the highest proportion of refugees?

<b>Countries with large refugee count and large refugee proportions:</b>

**Question 3.3.4**

In what ways do you think these three countries may struggle with such a large number of refugees?

**10. Turn on the Syrian refugees Mid-2015 layer (and turn off the other layers).**

This layer shows where Syrian refugees lived as of mid-2015.

**Question 3.3.5**

Where did most Syrian refugees live? Explain how distance decay and intervening obstacles play a role in these patterns.

**11. Turn on the Afghan Refugees Mid-2015 layer (and turn off the other layers).**

This layer shows where Afghan refugees lived as of mid-2015.

**Question 3.3.6**

Where did most Afghan refugees live? Explain how distance decay and intervening obstacles play a role in these patterns.

From about mid-2014 through 2016, massive numbers of refugees began flowing in to Europe as information spread about migration and human smuggling routes there.

**12. Turn on the Refugee Arrivals June 2014 to June 2016 layer (and turn off the other layers).**

This layer shows the destination of new refugees in Europe during that time.

**13. View the map.**

**14. Open the attribute table and click the tab for the Refugee Arrivals June 2014 to June 2016 layer.**

**15. Click the Refugees 6/2014-6/2016 field in the table and choose Sort Descending.**

### Question 3.3.7

Which five countries received the most refugees?

Country	Refugee Arrivals 6/14-6/16

Refugees fleeing to Europe face intense intervening obstacles in the form of violence and the risk of death.

**16. Turn on the Dead and Missing Migrants – Graduated Symbol layer.**

This layer shows the location of known dead and missing migrants in North Africa, the Middle East, the Mediterranean region, and Europe. The location of the dead and missing give

clues as to the routes migrants take in their attempt to get to Europe and ask for asylum. The larger the circle, the greater number of dead or missing in a single event.

Look at the map and think about the routes that migrants are using to get to Europe.

**17. Turn on the Dead and Missing Migrants – Heat Map (and turn off the other layers).**

This heat map makes it easier to visualize the danger points in migrants' journeys. Based on this map, answer the following questions (you can zoom in and out to see better).

**Question 3.3.8**

Based on the heat map, which area has had the greatest number of dead and missing (describe based on nearby land and water place names)?

**Question 3.3.9**

In the area you just identified, which country does it appear people are leaving from and which country are they trying to get to? You can zoom in if necessary.

**18. Turn on the World Boundaries and Places layer (and leave on the Dead and Missing Migrants – Heat Map layer).**

The goal of many migrants is to set foot on the closest territory in the European Union, from which they hope to move to European countries with the best economic opportunities and most open refugee policies.

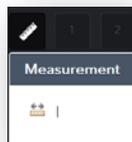
**19. Zoom in to heat map cluster on the west coast of Turkey. Zoom in until you can see the Greek islands of Lesvos, Chios, and Samos (they may not all fit on the screen at the same time).**

By crossing from Turkey into Greece, people can enter the European Union and seek refugee status.

**20. Use the Measure tool to measure the distance from Turkey to each island.**

**Many migrants see this route as among the shortest into Europe.**

- **Click the Measure tool, then click the Distance button.**



### Question 3.3.10

<b>Greek Island</b>	<b>Distance from Turkish coastline</b>
Lesvos	
Chios	
Samos	

Zoom in to the heat map cluster off the west coast of Morocco. What are the islands located there that migrants try to reach, and which European country do they belong to? Search the Internet to find the answer.

### **Question 3.3.11**

Zoom in to the northern tip of Morocco. A small number have died at Ceuta. What is Ceuta and which country does it belong to (search the Internet for the answer)?

### **Question 3.3.12**

Search the Internet for “Channel Tunnel.” What is the Channel Tunnel and which European city shows dead and missing migrants at one of its ends?

## **Conclusion**

In this exercise, you explored where and why refugees are migrating to Europe. Spatial variations in poverty and political instability continue to drive migration, as people seek places with greater opportunity and safety.

## **Exercise 3.4: Does immigration increase unemployment?**

### **Introduction**

The causes of unemployment are complex, but some argue that immigration can exacerbate it as foreign workers compete with the native workforce. If this is true, places with an increase in foreign immigrants would be expected to have higher rates of unemployment.

In this exercise, you will analyze the relationship between the unemployment rate and the proportion of the population that is foreign born at the county scale of analysis. You will look at two periods—2000 to 2010 and 2010 to 2014. The period of 2000 to 2010 begins with low unemployment just prior to the impacts of the dot-com bust and ends when

unemployment was at a peak after the recession of 2008–09. The period from 2010 to 2014 covers a time of economic recovery, as the unemployment rate slowly declined from its recessionary peak.

## Objectives

- Analyze statistics and explore the relationship between immigration and unemployment.
- Apply knowledge to explain who may benefit and who may be harmed by immigration.

### 1. Open Chapter 3 – Immigration and Unemployment and sign in to your ArcGIS

#### Online account:

- <http://arcg.is/2dMoZ9R>

The map shows US counties.

### 2. Hover over the layer name and click Show Table .

The table has the following fields. Three fields show the percentage of the population that is foreign born by year.

- **% Foreign 2000**
- **% Foreign 2010**
- **% Foreign 2014**

Three fields show the unemployment rate by year.

- **% Unemployed 2000**
- **% Unemployed 2010**
- **% Unemployed 2014**

There are four fields with the percent change in unemployment and the proportion of foreign born.

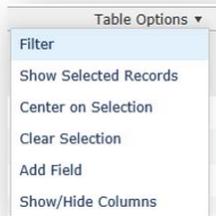
- **Change Unemp 2000-10**
- **Change Unemp 2010-14**
- **Change Foreign 2000-10**
- **Change Foreign 2010-14**

You want to see if the counties that had the largest growth in the foreign-born population (immigrants) differ in terms of unemployment rate, and change in the unemployment rate, relative to all US counties.

To do this, you will use the Filter tool in ArcGIS to select the top 10 percent of counties that had the fastest growing foreign populations. You will do the same for the top 20 percent of counties with the fastest growing foreign populations. If unemployment is higher in the counties with faster growing immigrant populations, it could be an indication that a relationship exists between the two. If unemployment is not higher, it could indicate that no relationship exists between the two.

**3. Click the field heading for % Unemployed 2010 and choose Statistics.**

4. In the table (question 3.4.1), write down the average value in the middle column of the first row. This is the average unemployment rate for all US counties in 2010.
5. Repeat the process with Change Unemp 2000–10 and write the average value in the last column of the first row.
6. Filter for the top decile (top 10 percent) of counties in terms of growth of the foreign population. You will then be able to evaluate if counties with rapid growth in the foreign population suffered higher rates of unemployment or not.
7. Click Table Options and choose Filter.



If you map Change Foreign 2000–10 by 10 quantile classes, you will find that the top decile begins at 116 percent growth.

8. In the Filter window, set the filter so that Change Foreign 2000–10 is at least 116.

This selects the top 10 percent of counties with the fastest growing foreign-born populations between 2000 and 2010.



**9. Click Apply Filter.**

**10. As you did previously, click the field heading for % Unemployed 2010 and choose Statistics.**

**11. In the table, write down the average value in the middle column of the first row.**

This is now the average unemployment rate by county for the 10 percent fastest growing foreign populations in 2010.

**12. Repeat the process with Change Unemp 2000–10 and write the value in the last column of the first row.**

Again, this will show change in the unemployment rate for the 10 percent of counties with the fastest growing foreign populations.

You should now have values in all cells in the table.

### Question 3.4.1

2000 to 2010

	Unemployment Rate 2010	Percent Change in Unemployment 2000 to 2010
Total (all counties)		
Top 10% of counties. Growth in foreign born (116% + growth )		

**13. Repeat the process using the % Unemployed 2014 and Change Unemp 2010–14 fields. This will show the relationship between growth in the foreign population and unemployment between 2010 and 2014.**

**14. Open the Filter window and click Remove Filter if necessary.**

**15. In the attribute table, click the % Unemployed 2014 field and choose Statistics.**

**16. Write the Average value for Total (all counties) in the table (question 3.4.2).**

**17. Click the Change in Unemp 2010–14 field, choose Statistics, and write the Average value in the table.**

**18. Filter for the top 10 percent of counties in terms of growth in the foreign population.**

**19. Open the Filter window and set the expression so that Change Foreign 2010–14 is at least 70. Then click Apply Filter.**

**20. In the attribute table, click the field headings for % Unemployed 2014 and Change in Unemp 2010–14, and then write the average value for Top 10% of counties.**

### Question 3.4.2

2010 to 2014

	<b>Unemployment Rate 2014</b>	<b>Percent Change in Unemployment 2010 to 2014</b>
Total (all counties)		
Top 10% of counties. Growth in foreign born (70% + growth )		

### Question 3.4.3

In the table from question 3.4.1, look at the Percent Change in Unemployment 2000 to 2010. As unemployment rates increased between 2000 and 2010, did counties with higher levels of immigration see a greater increase in unemployment or less of an increase as compared with the average for all counties?

### Question 3.4.4

In the Unemployment Rate 2010 column, did counties with larger increases in immigration have more or less unemployment?

### Question 3.4.5

In the table from question 2.4.2, look at the Percent Change in Unemployment 2010 to 2014. As unemployment rates decreased between 2010 and 2014, did counties with higher levels of immigration see a greater decrease in unemployment or less of a decrease as compared with the average for all counties?

**Question 3.4.6**

In the Unemployment Rate 2014 column, did counties with larger increases in immigration have more or less unemployment?

**Question 3.4.7**

Regardless of the overall unemployment rates, based on the textbook, are some groups more likely to be negatively harmed by immigration than others? Explain.

**Question 3.4.8**

Who may benefit economically from an increase in foreigners? Why?

**Question 3.4.9**

What factors other than immigration could influence the unemployment rate and changes in the rate over time?

**Conclusion**

Immigration and employment are hotly debated issues in many countries around the world. In this exercise, you examined how immigration affects unemployment at a county level of analysis. As seen in the results, the relationship is not as clear as some would assume, given that unemployment is the function of many variables.