

Lesson 15

“What if ...?” Scenarios

The stories are not over. Kristin is moving, Abbey is working, Adeline is learning, and the Baby Boomer parents are retiring. But whatever the present situation, the future is still a question for all of them.

The models developed and analyzed in this module are mathematical designs to think about the future. Will the countries grow or decline as indicated by these models? What are the possible ways these countries may change as a result of shifting demographics? What if you could examine these changes before they happened or did not happen? You know events happened in the past that resulted in population histograms or population pyramid graphs looking “ragged” with certain age groups dominating the profile of a country for decades (for example, the Baby Boom generation). Several of these ragged features were the result of wars or economic challenges or storms or draught.

Up to this point, your connection with the models has been **static** – you observed the models through graphs and tables, you examined the assumptions that were made to build the models, and you analyzed the projected results based on the anchor years. For the recursive model, you specifically analyzed the changes in age groups that had a major impact on a country.

For this lesson, you are provided an opportunity to be more involved with the details of the recursive model. Rather than just analyzing a country’s population based on the population or foundation factors, you are now able to alter these factors. What if you could examine more closely the impact of death or birth or immigration or the combinations of these factors in the future based on changes not reflected in the 2010 and 2015 counts? This lesson uses the recursive models to examine these “What if ...?” possibilities.

The tools for this lesson are several Excel spreadsheet files of the recursive model. The files will allow you to apply the recursive model with altered population factors and altered foundation factors. If you have limited access to Excel, other spreadsheet applications may work with these files, however, the histograms may not display the data as designed in the Excel files.

Lesson 15 – Project

Handouts needed to complete the projects in this lesson:

Handout 6: The United States 2010 – 2050

Handout 7: Kenya 2010 – 2050

Handout 8: Japan 2010 – 2050

Spreadsheet files needed to complete the projects in this lesson:

USA Recursive Model.xlsx

Kenya Recursive Model.xlsx

Japan Recursive Model.xlsx

Starting the task ...

Read through the scenarios provided for the United States, Kenya, and Japan. Each scenario describes an event that could affect a country's population at the start of the year 2020 or later. The scenarios are not always comfortable. Sometimes, as previous lessons indicated, wars, floods, earthquakes, or economic conditions can visibly alter the shape of a country for years after these events. And, as these previous lessons also pointed out, altering the shape can result in new challenges and a new lifestyle within in the country. What if the scenario you selected happened? In what way do you think the population distribution looking beyond this event will change? Will the scenario alter the shape of the country? If yes, how will the altered shape affect the way people make a living, go to school, take care of each other, or use the resources of their country?

The following steps outline the expectations of a task that gives you a chance to alter the future of the countries studied in this module.

Step 1: Read through the scenarios. Select one scenario to complete for this lesson. If time promotes, you may be asked to select another scenario and repeat the process.

Step 2: Review your country's current population distribution using **Handout 6** for the United States, **Handout 7** for Kenya, or **Handout 8** for Japan. Carefully examine the **Scenario Planning Template** for the country you selected that is included at the end of this lesson. Indicate on this template the population factors (if any) you would change, the new values you would assign to these factors, and a brief statement why you would change these factors based on the scenario you selected.

Step 3: In addition to possibly changing the population factors, decide if you would also change the foundation factors for your country and why. Identify your changes and your explanations

on the **Scenario Planning Template**. Unlike the proposed changes to the population factors, you may recommend changing the foundation factor for certain periods. For example, you may decide to increase the foundation factor from its current value for the years 2020 to 2040, and then you may decide to decrease it for the years 2045 to 2050.

Step 4: Load the Excel file that matches your country (***USA Recursive Model, Kenya Recursive Model, and Japan Recursive Model***). Make sure you save the revised file to your account or computer by a new name. Directions to save files will be provided by your teachers as computer networks have different procedures regarding saving files. This process will allow you to return to the original values of the recursive model in case of errors or revisions while completing this lesson.

Step 5: Enter the proposed revisions from the **Scenario Planning Template** on the Excel file. Note the outcomes for the age group and for the population totals as a result of your changes to the model. Also note the revised shape of the final histogram.

Step 6: Continue to either revise or alter population and foundation factors on the Excel file if you think your plan needs revisions. Make sure you also record the changes on the **Scenario Planning Template**.

Completing the task ...

When you think your scenario has been accomplished with the revisions you entered, complete a **Final Summary Report**. Submit your **Scenario Planning Template** and your **Final Summary Report** to your teacher. Be prepared to summarize the results of your proposed changes to the whole class.

United States

Scenario 1:

It is 2018. The economy in the United States is doing well. The labor market is expanding at a rate that will require more workers than there are currently available in the country. Major companies are focusing on bringing in people from other countries to fill these jobs.

*Scenario 2:

It is 2017. People from most countries are not immigrating into the United States.

Scenario 3:

It is 2025. There is a major recession in the United States. The result is high unemployment and major financial constraints for families across the economic spectrum.

***Scenario 4:**

It is 2018. There is an epidemic that will affect the country for many years. In particular, people 50 and older are dying at higher rate.

Scenario 5:

It is 2018. A major medical breakthrough has been reached in which almost every person will live well into their 100's.

Scenario 6:

It is 2018. The economies in Africa and Europe are doing much better than in the United States. A major effort to recruit workers from the United States to move to countries in Europe and Africa has been launched.

Scenario 7:

It is 2018. Young people indicated that they are not likely to have children.

Scenario 8:

It is 2018. Young people who are 20 – 29 years old have decided to wait and have their families until they are 30 or older.

Kenya

***Scenario 9:**

It is 2018. The Kenyan government has been working with groups across the country to reduce its birthrate.

Scenario 10:

It is 2018. Improvement in health care resulted in a higher life expectancy for people who are 40 years old or older. In addition, people indicated they do not want large families.

***Scenario 11:**

It is 2018. The people of Kenya have problems finding work and are moving to other countries for employment. 25% of the people who are 20 years or older are moving out of the country.

Japan

Scenario 12:

It is 2018. There is a major concern of how to care for older people. The government made an effort to encourage people 25 years or older in other countries to move to Japan to help care for older people.

Scenario 13:

It is 2020. More young people indicate they are planning to have children. Many of them indicate that they would like to have a family of at least 2 children.

Scenario 14:

It is 2018. The government initiated incentives to encourage people from other countries to move and live in Japan. The appeal has attracted many people who are 30 years old or older.

Scenario Planning Template for the United States:

Scenario number: _____

Identify the population factors you would change and why you selected these factors in the following planning template. It is not necessary to change factors if you think the scenario would not require a change to the population factors for an age group:

Age Group	Current Population Factors	Proposed change of Population Factor:	Explanation for changes:
0 – 4	1.014		
4 - 9	1.014		
10 - 14	1.020		
15 - 19	1.032		
20 - 24	1.032		
25 - 29	1.022		
30 - 34	1.012		
35 - 39	1.004		
40 - 44	0.995		
45 - 49	0.985		
50 - 54	0.974		
55 - 59	0.962		
60 - 64	0.945		
65 - 69	0.917		
70 - 74	0.869		
75 - 79	0.792		
80 - 84	0.670		
85 - 89	0.508		
90 - 94	0.340		
95 – 99	0.205		
100 +			

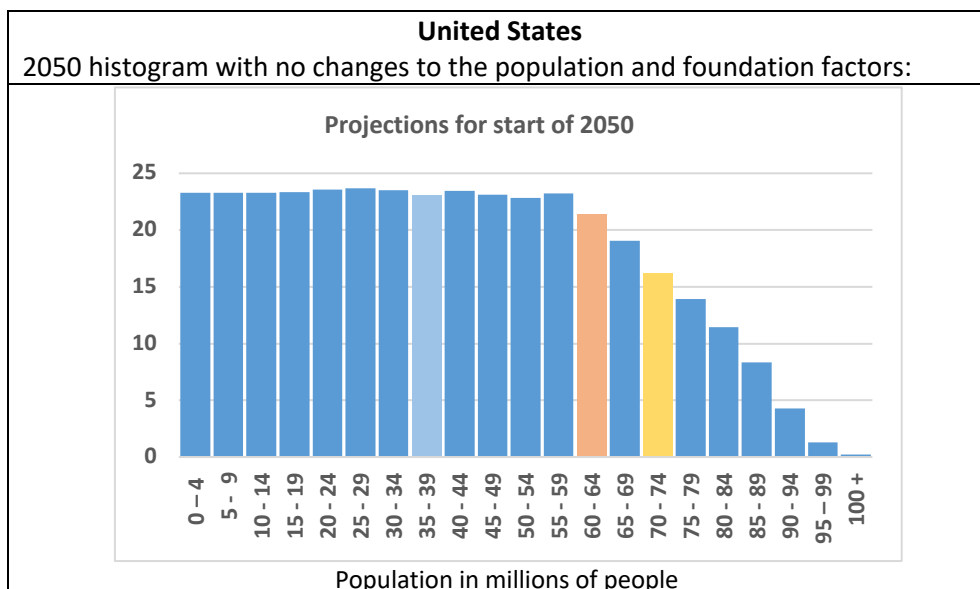
In the following table, indicate any changes to the Foundation Factors and when you would propose making those change. It is not necessary to change factors if you think the scenario would not require a change:

Year	Current Foundation Factors	Proposed changes to Foundation Factors:	Explanation for changes:
2010	0.065	Fixed – cannot change.	
2015	0.062	Fixed – cannot change.	
2020	0.062		
2025	0.062		
2030	0.062		
2035	0.062		
2040	0.062		
2045	0.062		
2050	0.062		

Final Summary Report (USA)

Scenario number: _____

Note the colors used to track Adeline, Abbey, Kristin, and her parents are included in the histograms. Include in your summary of the 2050 histogram what is different about the counts for their age groups.



Description of the 2050 histogram with proposed changes (if possible, provide a copy or sketch of the histogram):	
Population in millions of people	<p style="text-align: center;">United States 2050</p>

Describe why the proposed changes were made to address the scenario:

Scenario Planning Template for Kenya:

Scenario number: _____

Identify the population factors you would change and why you selected these factors in the following planning template. It is not necessary to change factors if you think the scenario would not require a change to the population factors for an age group:

Age Group	Current Population Factors	Proposed change of Population Factor:	Explanation for changes:
0 – 4	0.984		
4 - 9	0.990		
10 - 14	0.987		
15 - 19	0.988		
20 - 24	0.982		
25 - 29	0.973		
30 - 34	0.963		
35 - 39	0.957		
40 - 44	0.951		
45 - 49	0.947		
50 - 54	0.942		
55 - 59	0.926		
60 - 64	0.898		
65 - 69	0.837		
70 - 74	0.742		
75 - 79	0.600		
80 - 84	0.500		
85 - 89	0.250		
90 - 94	1.000		
95 – 99	0.205		
100 +			

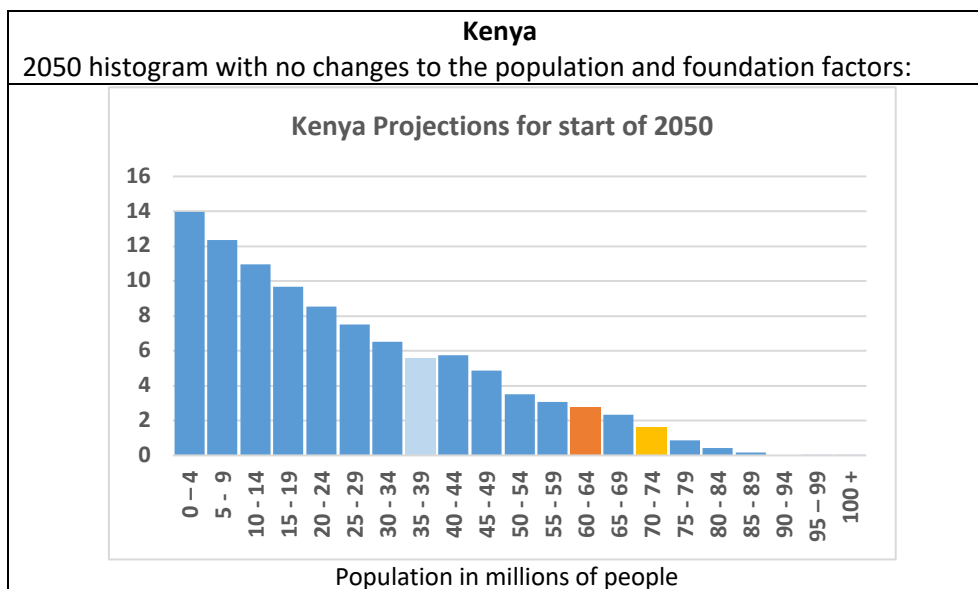
In the following table, indicate any changes to the Foundation Factors and when you would propose making those change. It is not necessary to change factors if you think the scenario would not require a change:

Year	Current Foundation Factors	Proposed changes to Foundation Factors:	Explanation for changes:
2010	0.168	Fixed – cannot change.	
2015	0.139	Fixed – cannot change.	
2020	0.139		
2025	0.139		
2030	0.139		
2035	0.139		
2040	0.139		
2045	0.139		
2050	0.139		

Final Summary Report (Kenya)

Scenario number: _____

Note that the colors used to track Adeline, Abbey, Kristin, and her parents have been included in the histograms. Although they are not counted in Kenya, they represent important age groups to monitor. Include in your summary of the 2050 histogram a description of what is different about the counts for their age groups.



Description of the 2050 histogram with proposed changes (if possible, provide a copy or sketch of the histogram):	
Population in millions of people	Kenya 2050

Describe why the proposed changes were made to address the scenario:

Scenario Planning Template for Japan:

Scenario number: _____

Identify the population factors you would change and why you selected these factors in the following planning template. It is not necessary to change factors if you think the scenario would not require a change to the population factors for an age group:

Age Group	Current Population Factors	Proposed change of Population Factor:	Explanation for changes:
0 – 4	0.996		
4 - 9	0.998		
10 - 14	0.998		
15 - 19	1.000		
20 - 24	0.998		
25 - 29	0.996		
30 - 34	0.996		
35 - 39	0.995		
40 - 44	0.993		
45 - 49	0.989		
50 - 54	0.984		
55 - 59	0.975		
60 - 64	0.965		
65 - 69	0.946		
70 - 74	0.909		
75 - 79	0.845		
80 - 84	0.742		
85 - 89	0.604		
90 - 94	0.427		
95 – 99	0.205		
100 +			

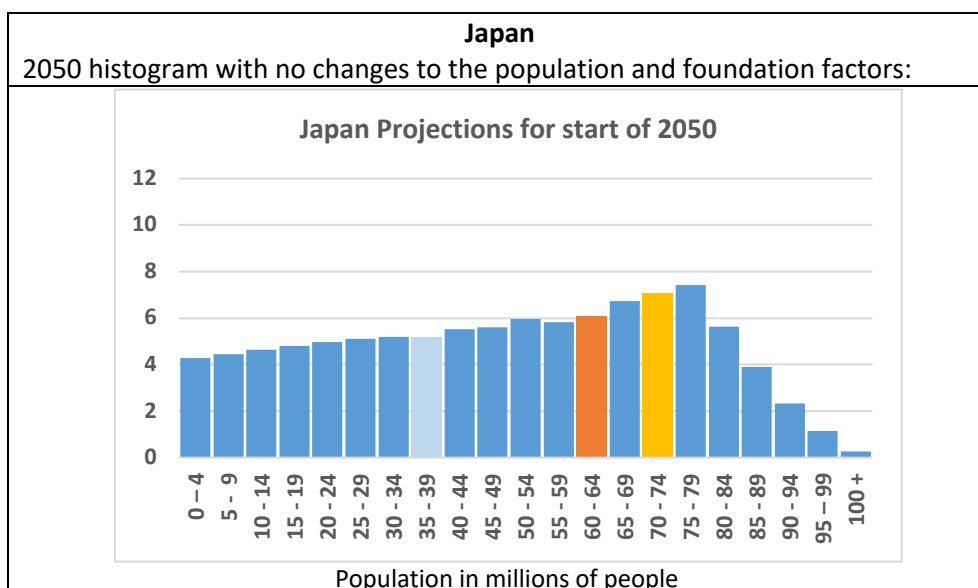
In the following table, indicate any changes to the Foundation Factors and when you would propose making those change. It is not necessary to change factors if you think the scenario would not require a change:

Year	Current Foundation Factors	Proposed changes to Foundation Factors:	Explanation for changes:
2010	0.044	Fixed – cannot change.	
2015	0.042	Fixed – cannot change.	
2020	0.042		
2025	0.042		
2030	0.042		
2035	0.042		
2040	0.042		
2045	0.042		
2050	0.042		

Final Summary Report (Japan)

Scenario number: _____

Note that the colors used to track Adeline, Abbey, Kristin, and her parents have been included in the histograms. Although they are not counted in Japan, they represent important age groups to monitor. Include in your summary of the 2050 histogram what is different about the counts for their age groups.



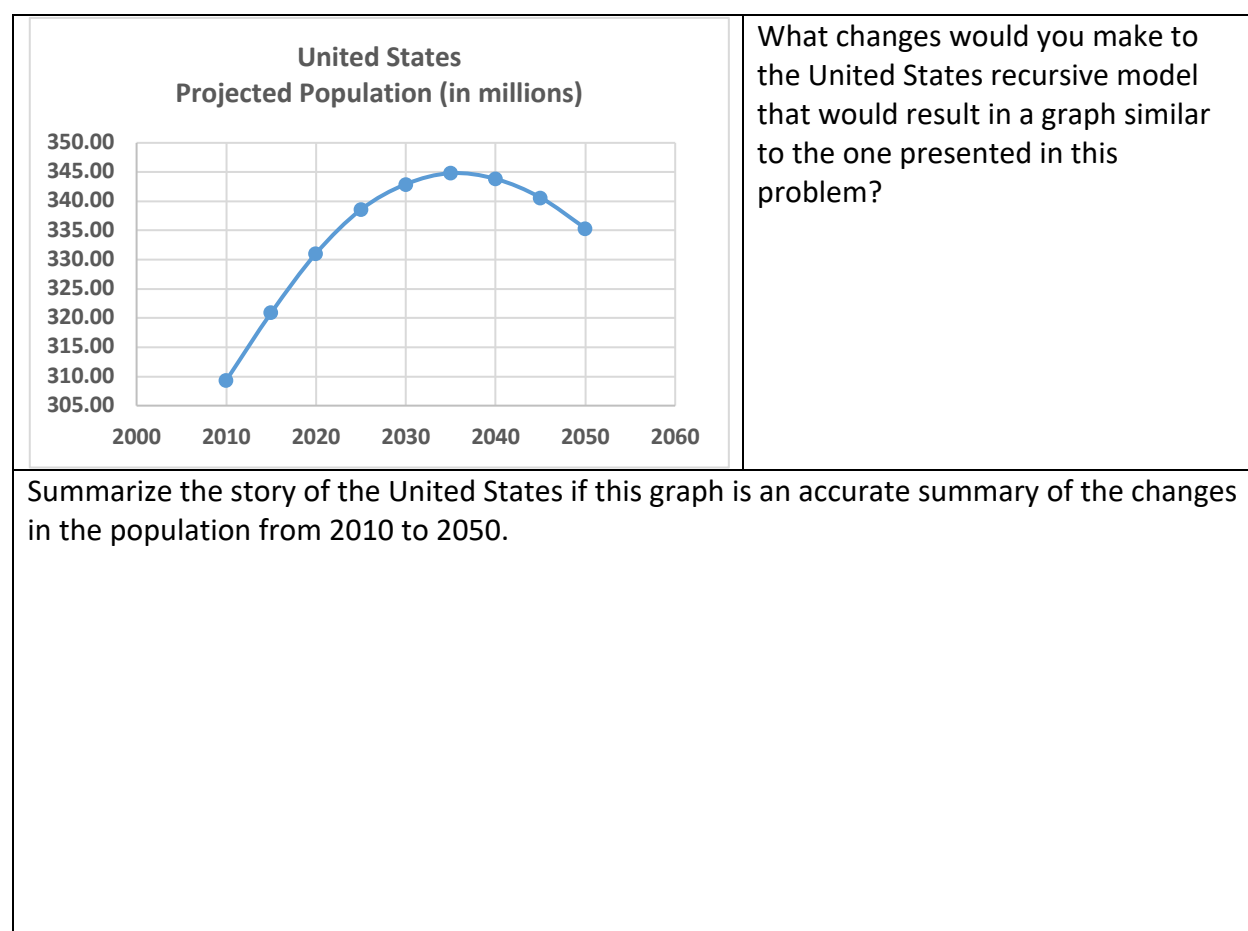
Description of the 2050 histogram with proposed changes (if possible, provide a copy or sketch of the histogram):	
Population in millions of people	<p>Japan 2050</p>

Describe why the proposed changes were made to address the scenario:

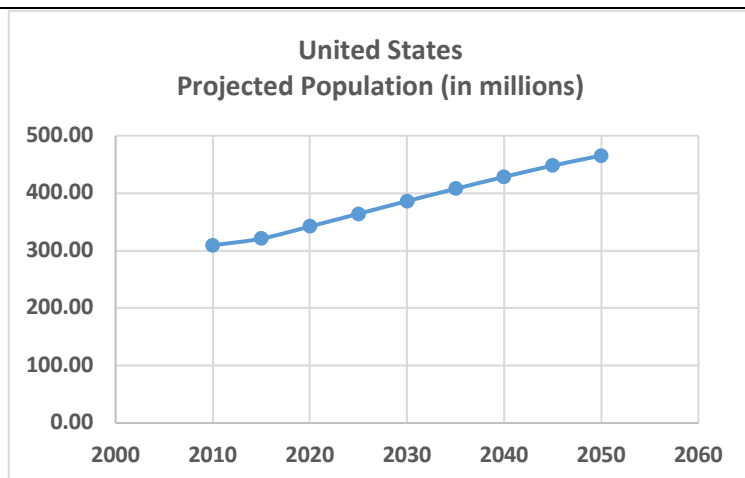
Extension Problems

Each of the following problems contain graphs of the USA population from 2010 to 2050 as a result of changing the Population Factors for certain age groups, or changing the Foundation Factor for various years, or changing both. What if the following graphs summarize stories of the United States population from 2010 to 2050? What would you change in the recursive model and why you would make those changes to the recursive model to obtain each graph? If you have access to the recursive model for the United States (**USA Recursive Model**), make the changes you identified. Did your changes result in a graph similar to the graph in the problem? If your graph is not the same, what other changes might be considered?

Extension Problem A:



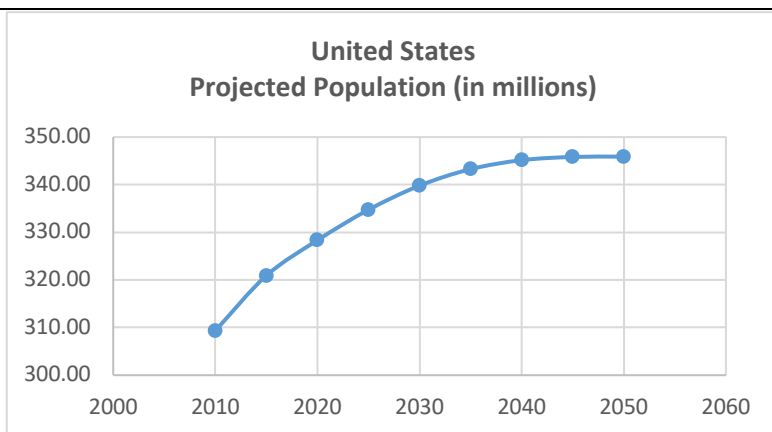
Extension Problem B:



What changes would you make to the United States recursive model that would result in a graph similar to the one presented in this problem?

Summarize the story of the United States if this graph is an accurate summary of the changes in the population from 2010 to 2050.

Extension Problem C:



What changes would you make to the United States recursive model that would result in a graph similar to the one presented in this problem?

Summarize the story of the United States if this graph is an accurate summary of the changes in the population from 2010 to 2050.

Extension Problem D:

For this extension problem, you are in control. Make changes to the recursive model that tells a story of the population changes of the United States from 2010 to 2050. What if your changes were an accurate summary of what might happen in the United States? (If you do not have access the recursive mode spreadsheet file, sketch your graph and tell your story.)

	<p>What changes would you make to the United States recursive model that would result in a graph similar to the one you produced?</p>
<p>Summarize the story of the United States if the graph you produced is an accurate summary of the changes in the population from 2010 to 2050.</p>	