



# Getting Your Students to be Dynamic: Lesson and Web App about Market Dynamics in the Long-Run

Economics instruction is moving away from lecture and “talking at students” toward engaging student activities in which students discover economic concepts through interactive demonstrations. This paper provides a simple, effective demonstration of how profit motivates exit and entry in a perfectly competitive market. The lesson shows how market dynamics work and why in the long-run there is zero (or near zero) economic profit. The paper also shows instructors how to use a web app designed to simplify this lesson in their own class, making the game less about calculating profit and more about understanding the important economic concepts of entry and exit and long-run market dynamics.

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Acknowledgements: Thank you to Price V. Fishback for the initial idea. It was demonstrated to Jamie Wagner at an FTE Economics for Leaders camp by Tom Lampe and has inspired our web app and corresponding lesson for high school and college economics instructors. Thank you to Susan Reilly, Helen Robert, and Amanda Cook for trying it out in their classes, and for providing valuable feedback about the web app and paper.

## 1. Introduction

Economists understand that markets are dynamic. On the other hand, students in high school economics classes or college-level principles of economics classes have a harder time coming to an understanding of what dynamic markets mean. Part of the struggle is due to simplified models of supply and demand (which are useful illustrations, but don't fully demonstrate that markets continually adjust). The goal of this lesson is to demonstrate how markets specifically perfectly competitive or monopolistically competitive markets adjust. This lesson focuses on long-run market dynamics by demonstrating how profit induces firms to enter or exit a market in a given industry.

Classroom experiments are nothing new or groundbreaking in economics; in fact, classroom experiments go back at least as far as Chamberlin (1948). Despite this early experiment, the use of lecture or "chalk and talk" has remained the main method for delivering economic content to students (Becker, 1996; Watts, 2008). Fortunately, over the last 20 years, instructors have gradually abandoned the traditional lecture to adopt more engaging and interactive methods of teaching economics. As more instructors are abandoning traditional lectures, the research and literature is following. Books have been written dedicated to alternative ideas and interactive methods to teach economic concepts to students (Becker, 2006; Hoyt, 2013; Salemi, 2011). Additionally, journals like the *Journal of Economics Teaching* (JET)<sup>1</sup> and the *Journal of Economic Education* (JEE)<sup>2</sup> (as well as other journals) are dedicated to publishing these interactive techniques so that classrooms across the world can use innovative methods to teach students how to think like an economist. Slowly, economic instruction is moving from the dismal science towards being both engaging and thought-provoking.

This article continues the movement towards an engaging and interactive economics classroom using an activity and web app to demonstrate how profit motivates exit and entry in long-run perfectly competitive markets. Rather than sitting through a power point or lecture explaining how markets are dynamic this lesson provides a new way to show students how markets are dynamic by making them get out of their seats and make decisions based upon their own (fictitious) profit.

The exercise illustrates the concepts of free entry and exit in competitive markets, the profit-maximizing behavior of firms in those markets, and the difficulty in knowing whether or not a move into a new industry will lead to profitability. Students will apply these concepts as they learn how firms (motivated by profit) exit and enter markets until a long run equilibrium is reached. Through the exercise, students should develop a conceptual understanding of how economic forces create the markets that we interact with on a daily basis. The paper includes a detailed lesson plan for the activity, as well as a description of the web app and its use in the classroom.

## 2. Lesson Plan

### Lesson Description

In this lesson, students will be making decisions about what to produce as if they were individual firms in a single industry. The firms are part of a perfectly competitive or monopolistically competitive industry, and will serve to demonstrate how firms make decisions to exit or enter markets based on profit motivation. A web app is used

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<sup>1</sup><https://www.journalofeconomicsteaching.org/>

<sup>2</sup> <https://www.tandfonline.com/toc/vece20/current>

to calculate profit for each industry based on the number of students (representing individual firms) choosing to compete in a given industry. Ultimately, the lesson shows how markets will adjust based on profit to a zero (or near zero) economic profit.

#### Grade Level and Classes

High School Economics, AP Microeconomics, Principles of Microeconomics (College-level), Introduction to Economics (College-level)

#### Concepts

- Perfect Competition
- Monopolistic Competition
- Profit
- Incentives
- Long-Run Equilibrium
- Market Dynamics

#### Objectives

After completing this lesson students will

- understand how profit motivates entry and exit into markets;
- participate in a simulation about market dynamics in a perfectly competitive (or monopolistically competitive) industry; and
- be able to explain how market dynamics and economic profit/loss lead to zero (or near zero) profit in the long-run.

#### Time Required

15-20 minutes

#### Materials

- Web app: <https://dustywhite7.github.io/compGameApp/main.html>
- Three sheets of paper with different market or industry labels on each one (i.e. Apples, Oranges, Bananas). The papers should be taped on the wall around the room so students can move around to signal their production choice (see Appendix for large printable signs).
- Student Tally Sheet for each student (optional). If you do not want to print this form, students can easily keep track of production decisions and profit on a regular sheet of paper (see Appendix for sheet.) If you are going to have students keep track themselves, make sure they write the round, their production decision (Apples, Bananas, Oranges), and then the subsequent profit/loss from that round to keep track of how the game progresses.
- Prize of some sort for the most profitable student (extra credit points, candy bar, chips, etc.)

#### Procedure

*Note: These instructions are for the instructor as an aid in lesson preparation. The procedure is not intended to be printed and handed out to the students.*

1. Explain to students that they will be participating in a simulation where they will decide to produce one of three products. For example, the students will be deciding to produce Apples, Bananas, or Oranges. Remind the students of the characteristics of a firm in a perfectly competitive market and that the markets for these products closely resemble perfectly competitive markets. Focus primarily on how firms are price takers and that

the only thing they can change is the amount or type of product that they produce.

2. Ask students why people go into different types of business. (*Possible answers from students: Because they want to create something, they have a passion for the business, to make a profit.*) Tell the students that these are good examples, and that in general profit is the biggest motivator if someone isn't making profit, it doesn't matter how much they care about the environment or giving back to the community; they cannot do so without a profitable idea. Explain how profit motivates people to start businesses—many times a person will see someone else doing well for themselves and think that they can also earn profit by producing that same good or service. Go back to the characteristics of the perfectly competitive firm (or monopolistic competitive firm) and explain that because of free entry/exit people can enter or exit a market whenever they want, and the main incentive for doing so is profit (or loss).
3. Show students the web app. Ask the students if it makes sense that the three industries would have different profit functions. (*Answer: Yes, because firms have different supplies and materials that could change the costs that they must take on.*)
4. Ask the students if it is always clear from the individual's perspective what the profit function looks like for a company or in a given industry. (*Answer: No, for normal people who are looking at companies like Google, grocery stores, or Tesla, it is not easy to determine a company's business model and profit strategies.*) Follow up by asking if people will go into business not fully understanding how current or existing business in that industry make profit. (*Answer: Yes, people will enter industries without having full information or complete details about existing firms' profit and business strategies.*) It is important to note that this is why students are not shown the profit equations for each industry. It is a realistic example of how people decide to enter/exit the market without complete information about existing firms. Instead, they use information about their own personal profits (or losses) to make decisions.
5. Tell the students to make a choice and pick an industry. Explain that each student will represent a firm, and will make one unit of the good produced (for simplicity). Have them walk to the corner (or area of the room) representing a particular industry in order to signal that they are going to produce that good. Let them know that the goal of any firm is to make as much profit as possible and that after each round they will need to keep track of the profit they make. *In general, students will make a choice rather quickly. If students move slowly, the instructor may need to set a 30-second (or more depending on how many students and how large your classroom is) timer to keep the game moving. Authors and others who piloted the activity indicated that the first couple rounds may take a little longer as students are figuring out what to do, but students catch on rather quickly by round three or four and will move around promptly as needed.*
  - If desired, you can mention a default option, in which each student may choose not to engage in business during a given period. If the student chooses this default option, they earn profit of \$0. When including this option, you can discuss with the class how this relates to the choice of starting your own business or working for someone else. When we work for someone else, we typically experience less risk (do not normally lose money), but we also might lose the chance to earn economic profits. *If you choose to include this option, do not count these students in the web application, since they are not representing firms in any industry, but are acting as labor for the firms that other students choose to run.*
6. Calculate the profit using the web app. Have students keep track of their decisions in each round and their corresponding profit either on the Student Tally Sheet in the Appendix or on their own sheet of paper. The web app provides a mechanism for

recording the number of students at each station (and the corresponding profit) during each round, but students should record their own movement and how much profit they

Table 1: Profit Functions For Each Market

Market	Profit Function
<b>Apples</b>	$(0.3 \times n)/q_1 - 1$
<b>Oranges</b>	$0.5 \times n - q_2$
<b>Bananas</b>	$(1/25) \times n^2 - q_3^2$

Note:  $q_1$ ,  $q_2$ , and  $q_3$  represent the number of students engaging in the Apples, Oranges, and Bananas markets, respectively.  $n$  is  $q_1 + q_2 + q_3$ .

make each round. The profit functions for each market are provided in Table 1. Note that you should not show these profit functions to the students.

- Repeat steps 5-6 until the students are no longer able to move around to improve their profit. For the remainder of the game students can stay at their production decision spot—there is no need to return to their seats before they make a decision for the next round. There may be one or two students moving in the end, but you'll notice that profit doesn't really change much from one round to the next. The authors typically find that the appropriate end of the game occurs after about six to nine rounds have been completed. (The number of students who should be at each station in equilibrium will depend on the number of students in the class, and approximate equilibrium points are presented in Table 2).

### Closure and Discussion

Once you get to a point where the markets are at equilibrium, debrief the activity. Questions you'll want to ask the students include:

Table 2: Equilibrium Points For Typical Class Sizes

Number of Students	Equilibrium Apple Firms	Equilibrium Orange Firms	Equilibrium Banana Firms
15	5	7	3
20	7	9	4
25	8	12	5
30	9	15	6
50	15	25	10
100	30	50	20
200	60	100	40

- What is the difference between the long-run and short-run? (Answer: In the long-run, all inputs are variable. In the short-run, at least one input is fixed.)
- Did anyone move between rounds? Why did you move? (Answer: They chose to move to an industry that was making more profit.)
- What happened to the profit in that industry after you moved there? (Answer: Typically, the profit decreased because other students had that same idea. The profit could increase if there were more people who left than entered that firm.)
- For the last round, why did you stay put? (Answer: They could not move somewhere else to improve their firm's profit.) Explain that this is the long-run equilibrium.
- What perfectly competitive characteristic leads to this outcome? (Answer: The perfectly competitive (or monopolistically competitive) market allows for free exit/entry into the industry.)
- (Optional Extension) Ask students to do some research and present their findings about companies that are perfectly competitive or monopolistically competitive and who have entered a market because of profit and exited because of firm losses.

### 3. Using the Web Application

The web application can be accessed at <https://dustywhite7.github.io/compGameApp/main.html>, or by going to <https://dustywhite7.github.io/>, then choosing the "Competition Game" link in the page menu. At this point, you will arrive at the competition game web application.

The web app is simple and easy to use. As seen in Figure 1, there are only three boxes that will be completed by the instructor during the game.

At the start of the game, the web application will state that there are 0 participants, and have three blank text boxes, into which the instructor will enter numbers as the game progresses. When those boxes are filled in, the number of participants and the profit for each industry will update automatically.

With the web application open to this point, the instructor should continue with the lesson plan until reaching step (5) listed in the "Procedure" of the lesson. When students have chosen which industry they will move to, the instructor should count the number of students in each industry. First, enter the number of students in the Apple Market. The form will then look similar to Figure 2.

The instructor will then enter the number of students who have entered the Orange Market. At this point, the form will look similar to Figure 3.

Finally, the instructor will enter the number of students in the Banana Market, so that all cells are completed, and the form looks similar to Figure 4.

As the instructor enters the number of students at each station, the total number of participants will be updated, as will the profit levels for each station. Students should only record the profit levels once the number of students at *all* stations have been counted and entered into the web application. At this point, the instructor can click the "Record Scores" button, and the profit levels and number of students at each station will be recorded in the table within the web app.<sup>3</sup> The form will now look similar to Figure 5.

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<sup>3</sup>At any point, the instructor may use the "Clear Scores" button to revert to the initial state of the web app. This may be handy if the game needs to be restarted for any reason.



Figure 1: Web App Opening Screen

## Market Equilibrium Game

Number of Participants:

0

Producers in Apple Market:

Students in Apple Market

Apple Profit: -\$NaN

Producers in Orange Market:

Students in Orange Market

Orange Profit: -\$0

Producers in Banana Market:

Students in Banana Market

Banana Profit: -\$0

Record Scores

Clear Scores

Round Number	Profit Apples	Profit Oranges	Profit Bananas	Apple Firms	Orange Firms	Banana Firms
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Figure 2: Entering Data for the Apple Market

## Market Equilibrium Game

Number of Participants:

10

Producers in Apple Market:

10

Apple Profit: -\$1

Producers in Orange Market:

Students in Orange Market

Orange Profit: \$5

Producers in Banana Market:

Students in Banana Market

Banana Profit: \$4

Record Scores

Clear Scores

Round Number	Profit Apples	Profit Oranges	Profit Bananas	Apple Firms	Orange Firms	Banana Firms
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Figure 3: Entering Data for the Orange Market

## Market Equilibrium Game

Number of Participants:

20

Producers in Apple Market:

10

Apple Profit: -\$0

Producers in Orange Market:

10

Orange Profit: -\$0

Producers in Banana Market:

Students in Banana Market

Banana Profit: \$16

Record Scores

Clear Scores

Round Number	Profit Apples	Profit Oranges	Profit Bananas	Apple Firms	Orange Firms	Banana Firms
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Figure 4: Entering Data for the Banana Market

## Market Equilibrium Game

Number of Participants:

30

Producers in Apple Market:

10

Apple Profit: -\$0

Producers in Orange Market:

10

Orange Profit: \$5

Producers in Banana Market:

10

Banana Profit: -\$64

Round Number	Profit Apples	Profit Oranges	Profit Bananas	Apple Firms	Orange Firms	Banana Firms
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Record Scores

Clear Scores

Figure 5: Web App with Recorded Profit Levels After Three Completed Rounds

## Market Equilibrium Game

Number of Participants:

30

Producers in Apple Market:

10

Apple Profit: -\$0

Producers in Orange Market:

14

Orange Profit: \$1

Producers in Banana Market:

6

Banana Profit: -\$0

Round Number	Profit Apples	Profit Oranges	Profit Bananas	Apple Firms	Orange Firms	Banana Firms
1	-\$0	\$5	-\$64	10	10	10
2	-\$0	-\$1	\$20	10	16	4
3	-\$0	\$1	-\$0	10	14	6

Record Scores

Clear Scores

At this point, the instructor should ask students to record their profit for the period, before repeating the process of allowing students to move, and completing the form for the next period.

### 4. Common Experiences Encountered in the Lesson

The authors and other pilot instructors have implemented this activity in their classes with the number of students involved ranging from just over a dozen to about 100. In each of those classes, they have experienced very similar outcomes. Below are some of the difficulties the authors and reviewers found as students were playing the game and when explaining the process in economic terms to the students during the debriefing.

- Students may want to know how profit is calculated. While you can show them profit functions of each market, a simpler way to handle this is to explain to students that in general we don't really know the profit function of a business we generally only see if they are making money or not (and even



then it can be deceptive). In the early 2000s, frozen yogurt was all the rage and shops popped up all over. People saw that one franchise/shop seemed to be making money and they decided to enter the market. Shortly thereafter, a large number of frozen yogurt shops exited the market because of a lack of profit.

- Students may try to “stick it out” even if they are making little profit while another good is making large amounts of profit. Explain to the student that he or she might have a monopoly in a certain good, but if consumers do not demand that good then they will never generate profits. One author used the example of VCR repair shops. You may be the only VCR repairman (and have the monopoly), but that does not mean that it is a good business venture!
- Keep students’ decisions on making profit rather than guessing how many firms each market can handle. For example, the author had a class where the banana market had large amounts of profit so several students moved there and wanted to produce bananas in the next round. A couple students who were already producing bananas left because they anticipated that their profits would go down (this loss never materialized because the banana market can handle a large number of firms). You can debrief about this in a couple different ways to get them thinking about the game and how this relates to the “real world”:
  - Explain that some goods/services can accommodate a large number of firms. The students do not know what the capacity is for that good/service. Firms typically do not exit the market just because of a feeling. For example, there are many coffee shops in any given city and adding an additional coffee shop will probably not take away too much profit. On the other hand, there may be a limited number of restaurants that serve African cuisine (due to low demand), so adding one more restaurant to that market could significantly lower profit levels for all restaurants serving African cuisine.
  - In addition to the previous discussion, explain or discuss what it really means to exit a market. The exercise is a stylized game, but it may be helpful for the students to actually lay out a plan to exit the banana market. They would have to destroy the trees, tear them up, replace the soil, and replant orange trees (for example), and then wait several years for the trees to produce fruit. This would be a lot of effort and work for someone to do based solely on a hunch that they *may* lose some profit.
- When allowing students to decide whether or not to move, it has been the authors’ experience that prompting students to consider the changes from one round to the next is helpful. Questions like “Which group gained the most new firms? Which lost the most?” and “How did the rapid expansion of the Apple market affect profits?” keep students focused on the outcomes, rather than clustering and refusing to move.
- As students move, they may move in masse, in which case profits may change rapidly, or they may move very slowly, in which case profits may change gradually from one round to another. Keep encouraging them to be observant of the changes in market conditions across all three markets, and to think about whether their profitability (or opportunity to do better) has changed since the last round.

## Conclusion

Instructors help students to think like an economist using interactive techniques to engage with the material. This simple, quick, and effective lesson and web app improves

the ability of economists to demonstrate in class how firms' profits motivate entry into and exit from markets.

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## **Appendix**

# Apples

# Bananas

# Oranges



Student Tally Sheet

Round	Production Choice	Profit/Loss	Net Profit
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
Total Profit			

**Assessment**

1. What is the difference between the shortrun and the longrun?
2. How did profit affect your production decision from round to round? Explain your strategy.
3. Why might a firm exit the market? Why might a firm enter the market?
4. Explain what it means for a firm to make 0 economic profit in the long-run.

**Assessment (With possible answers for instructors)**

1. What is the difference between the short-run and the long-run?

Answer: In the short-run a firm has at least 1 fixed cost which is usually rent or location related. In the long-run all of the firm's costs are variable.

2. How did profit affect your production decision from round to round? Explain your strategy.

Possible student answers (Note that none of these are right or wrong, trying to get their thought process for why they moved or didn't move—try to get the students to think and communicate use economic terms like profit): I was making the most profit so I decided to stay in the market I was in. I saw that another market was making more profit so I left the market I was in and moved to another to make more profit. I thought too many people moved to a certain market so I left to make sure I could still make profit.

3. Why might a firm exit the market? Why might a firm enter the market?

Answer: Entering and exiting a market is a long-run decision that is determined based upon the profits or losses that a market experiences. If a market appears to be making large profits someone may decide to start a firm and enter that market; if a market is losing profits and individual firms with their individual cost/profit functions are not profitable, they may choose to exit the market in the long-run.

4. Explain what it means for a firm to make zero economic profit in the long-run.

Answer: A firm making zero economic profit means that taking into account explicit (opportunity costs) and implicit costs the firm cannot better themselves by doing something else. This does NOT mean that a firm is necessarily losing money or not profitable thinking about their accounting profits it means that they are doing exactly what they should be doing and cannot improve their situation by any changes.