



Pokémon GO: Applications for the Economics Classroom

[Pokémon GO](#) is a free-to-play, location-based, augmented reality game developed by Niantic for iOS and Android devices. The game draws on the familiarity of Nintendo's Pokémon video games, which led to trading card games, animated television shows and movies, comic books, and toys that grew in popularity in the late 1990s and early 2000s. Users in Pokémon GO explore the real world around them in an attempt to *catch 'em all*. The game quickly grew to over 25 million active daily users in 2016, making it the biggest mobile game in U.S. history. Given that many college and high school students have played the game, this provides a unique opportunity for instructors to use this viral sensation in the classroom to enhance economics education.

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1. Overview

Pokémon GO is an app that took over millions of smartphones in the summer of 2016. The app capitalized on the love of the original Pokémon television show from the late 1990s, and became a cultural sensation by drawing on the familiarity of Nintendo's Pokémon video games, trading card games, animated television shows and movies, comic books, and toys that became popular starting in the late 1990s. Many people in their 20s and 30s grew up watching the original animated TV show. The game features the ability to travel in the real world in search of digital Pokémon, like Pikachu, in the game itself. The ability to mix real-life movements with an immersive in-game experience led to the Pokémon GO sensation in 2016.

Pokémon GO provides a fertile platform to explain principles-level content. In our experience, the best examples are those that resonate with an audience through a common shared experience. Pokémon GO (and Pokémon in general) has tremendous name recognition. The game has been downloaded 650 million times. By utilizing Pokémon GO examples in your courses, you will be explaining economics in a way that is tangible to your audience. According to gaming app statistics, 46 percent of Pokémon GO users are in the age group of 18-29.¹ This familiarity helps to make learning economics memorable.

Section II surveys the relevant literature. Section III looks at the in-game economic lessons, while Section IV describes the industry economics surrounding the game. The Appendix provides answers to each of the instructor questions.

2. Literature Review

Historically, economics has been a dry and abstract subject taught through passive methods like "Chalk and Talk" (Becker & Watts, 1996). In an effort to make economics more relevant to today's students, economic educators have incorporated popular culture, media, and current events.

Economic educators have had success using TV shows (Gillis & Hall, 2010; Ghent, Grant, & Lesica, 2011; Al-Bahrani and Patel, 2015), movies (Mateer, O'Roark, & Holder, 2016; Sexton, 2006; Mateer & Stephenson, 2011), music (Van Horn & Van Horn, 2013; Holder Hoffer, Al-Bahrani & Lindahl, 2015; Al-Bahrani, Holder, Patel, & Sheridan, 2017; Hall, Lawson, & Mateer, 2008), social media (Kassens, 2014; Al-Bahrani & Patel, 2015) and literature (Cleveland, Holder, & O'Roark, 2016; Yetter, 2016; Leet & Houser, 2003; Watts, 1998) to teach economics. While economic educators have challenged themselves to provide new and innovative teaching tools, it is difficult to find current events or material that matches student interest. Al-Bahrani, Holder, Patel, and Sheridan (2016), find that there is a mismatch between the media students consume and the teaching resources available to educators. A few exceptions, like www.bazingaonomics.com (Tierney, Mateer, Smith, Wooten, & Geerling, 2016) and the www.economicsoftheoffice.com (Kuester, Mateer, & Youderian, 2014) remain popular with students and instructors. The difference in the speed at which curriculum is developed and the rate of change in students' interests, makes it difficult to develop timely teaching tools. Students' familiarity and experience with the popular culture, media, music, or literature provide instructors with a way to engage students to make economics more relevant to them.

Pokémon GO may be a relatively new phenomenon, but history provides many parallels. The hula-hoop, pet rocks, troll dolls and Beanie Babies are examples from the past that serve as

¹ <https://www.statista.com/statistics/589197/pokemon-go-players-us-age/>

reminders of how quickly a new product can burst onto the scene. Pokémon GO differs from traditional toys, so its popularity is best compared to Candy Crush and other leading gaming apps. Though off from its 2016 peak, Pokémon remains a top ten game app (<http://comicbook.com/gaming/2018/01/31/pokemon-go-2017-revenue/>). Pokémon GO differs from the other popular gaming apps because its in-game mechanics are rich enough to explain economics. Though lacking the complexity of board games, such as Monopoly and Settlers of Catan, Pokémon GO nevertheless is rich enough in its mechanics to help us identify many economic concepts.

3. In-Game Economic Lessons

In Table 1, we include a list of words that are associated with Pokémon GO. This will help instructors who are unfamiliar with the game learn the language so that they can use it when discussing the topic in class. The examples provided in this section are examples of in-game use of economics.

A. Public Goods

As it relates to public goods, Pokémon GO demonstrates key features of these types of goods in their gameplay. Public goods are products or services provided to all members of a group in a way that is both nonrival, in that all users can share in the resource without negatively impacting others and nonexcludable, in that it is impossible to restrict users from obtaining the resource. These characteristics make these goods ideal candidates to be provided to everyone, irrespective of ability or willingness to pay. One way to provide such goods is through philanthropy. Pokémon GO's Lure Modules can be purchased by a charitable individual player and will attract Pokémon to a Pokéstop location. These Pokémon are visible to all players nearby and, as such, these lures will attract other players seeking to capture Pokémon. Pokéstops are often put in places where the public is allowed general access. Inasmuch as lures are placed in such places, they meet one defining characteristic of public goods in that they are not excludable. The level of rivalry depends on the relative concentrations of users and Pokémon at the lure. Such lures meet the public good condition of nonrivalry whenever the ratio of Pokémon to users are sufficiently high.

Instructor Question: Give an example of a location where a lure will most act like a public good. Explain why your example meets, or closely approximates, the dual necessary conditions of nonrivalry and nonexcludability.

B. Externalities Associated with Game Play

In this section, we provide examples of the negative and positive externalities due to gameplay. We will also explore aspects of gameplay that show how features that are part of the game illustrate public goods and their provision.

Negative externalities occur when costs are borne by parties who did not choose to participate in a transaction. Augmented reality applications such as Pokémon GO require users to engage with the external environment in ways that bring them into contact with many other people and places that have not chosen to participate in gameplay. Examples abound about the costs imposed on third parties. We highlight a few examples here.

Table 1 – Important Pokémon Terms

Game Term	Definition
Avatar	Your character in Pokémon GO! The avatar can be customized by selecting physical features, clothing, and other add-ons.
Candy	Candy is acquired by catching Pokémon, hatching Eggs, and transferring Pokémon to the Professor. Candy is used to evolve and strengthen Pokémon.
Eggs and Egg Incubators	Pokémon Eggs are items that can be found at PokéStops. Once you place an Egg in an incubator and walk a specific distance, the Egg will hatch into a Pokémon.
Evolves (Evolution)	Evolution is the process of using Candy to change a Pokémon into an individual of an evolved species of Pokémon.
Experience Points (XP)	Your advancement is measured in Experience Points (XP). Increase your XP to advance to higher Trainer levels.
Gyms	Gyms are locations where you can battle the Pokémon of rival teams and also earn XP.
Lucky Egg	Players can double the amount of XP they earn in a certain amount of time by using a Lucky Egg.
Lure Module	Players can attract wild Pokémon to a PokéStop for a limited time with a Lure Module.
Pokémon	The monsters that trainers catch in the game.
PokéCoins	PokéCoins are currency that Trainers can exchange for premium items in the Shop.
Pokédex	Your Pokédex is where you'll find information about all of the Pokémon species you've caught or encountered.
PokéStops	PokéStops are locations where you can gather items such as Poké Balls and Eggs.
Pokémon GO Plus	Pokémon GO Plus is an optional Bluetooth accessory to enhance Pokémon GO gameplay. This device allows you to catch Pokémon, hatch Eggs, and spin PokéStops without having to look at your phone.
Source: https://support.pokemongo.nianticlabs.com/hc/en-us/articles/222049307-Glossary	

In Pokémon GO, a gym is where players gather to compete and train against one another. These gyms are overlaid on real environments as is common in augmented reality applications. In one case, a Pokémon Gym was located on the property of an unsuspecting homeowner. This attracted dozens of users throughout the day and stoked fears of what may happen to users or other people in similar situations. Police departments have also reported complaints of users playing the game trespassing on private property. Players are also subject to victimization. In one of the more clear examples, four teenagers are suspected of robbing nearly a dozen victims at gunpoint by adding a beacon to attract users to their location.

Pokémon GO was blamed for potentially thousands of automobile accidents in the United States. Using data from a county in Indiana, Faccio and McConnell (2018) showed disproportionate increases in crashes, attendant vehicular damage, injuries and fatalities near places where users were allowed to play the game while driving. They estimate that, over the 148 days of gameplay following the game's introduction, the incremental costs of playing Pokémon GO while driving ranged from \$5.2 to \$25.5 million, and they estimate that similar impacts nationwide would range between \$2 and \$7.3 billion. Law enforcement in Japan associated at least one fatality and dozens of injuries to gameplay. Because of this, Niantic has disabled or delayed features such as Pokémon spawning, sightings, and many activities at Pokéstops if the player is moving at too great a speed. This shows that Niantic is trying to be responsive to their potential liability for any negative externalities imposed on third parties.

Examples of positive externalities are not as numerous or clear. Nearly all of the benefits, intended or otherwise, are internalized by the players or participants in the various markets that emerged from the widespread popularity of the game. Lack of the physical activity, like walking, is associated with a "significant percentage of health care expenditures in the U.S." Promotion of the healthy behaviors encouraged by Pokémon GO has the potential to prevent diseases and reduce costs borne by the public in managing those diseases.

Instructor Question: Using a supply and demand framework, illustrate the negative externality of Pokémon GO.

C. Diminishing Marginal Utility

As time passed, many of the game's players started to feel the effects of diminishing marginal utility, also known as "grinding" in the gaming community. Most players started to realize that they might never *catch 'em all*. This is because once you get to level 25 or above, it starts to sink in just how daunting each level is when it comes to the XP required. For example, to get from Level 1 to level 2 it takes 1000 XP, but by the time you hit Level 25, it requires 190,000 XP to get to Level 26. In addition, the typical gamer's frustration grew as many had caught most of the 150 first generation Pokémon and the missing ones were either extremely rare, only available in other continents, or had not been released in the game yet.

Another challenge with the game occurs due to seasonal effects. Given that much of the gameplay associated with Pokémon GO involves walking around to find monsters, hatch Eggs, attack gyms, and collect Pokéstops, areas impacted by seasonal changes in the weather (mostly colder weather) experienced reduced gameplay.

In an effort to keep the game fresh, Niantic introduced rewards in the form of medals for different levels of achievement. The company also partnered with firms like Sprint, Boost, and Starbucks to increase the number of Pokéstops. Additionally, Niantic introduced limited-time events associated with holidays, game anniversaries, and made-up festivals to increase de-

mand. Niantic continues to tweak the game through rewards and special events to stimulate play.

Instructor Question: Graphically illustrate the impact of cold weather on the Pokémon GO market.

D. Conspicuous Consumption

Pokémon GO has a style button where players can purchase upgraded clothing for their avatar to wear. This feature gives avid players a way to differentiate their avatar, making these purchases Veblen goods or a form of conspicuous consumption.

Instructor Question: What are some examples of real-life clothing style choices that people make to signal their dedication to a particular cause or social class?

4. Industry Economics

The examples provided in this section illustrate how Niantic and other firms set prices and offer products related to Pokémon GO.

A. Entrepreneurship

Nintendo's ability to innovate beyond the original web-based application is in itself an example of entrepreneurship and innovation. The firm's ability to identify a market opportunity and introduce new technology like augmented reality, GPS, and mobile experience provides students with a good example of how to create new markets. However, the entrepreneurship landscape created by third-party providers to support the users is even more interesting. In this section, we provide examples of the entrepreneurial spirit that evolved in the Pokémon GO market.

The Pokémon GO app allows business to "lure" customers to their location through strategic marketing that increases demand. Lures help to revive the brick and mortar retail experience by taking advantage of a feature that allows businesses to attract Pokémon GO users. Businesses like L'inizio, a pizza bar in New York, have benefited from the lure feature. After the pizza parlor spent a mere \$10 on lure modules in the location, their sales rose 75 percent the following weekend.

Other business benefited indirectly from Pokéstops. A Pokéstop is an in-app feature that allows users to gain more resources to help capture Pokémon. Players are attracted to these locations. For example, Utah clothier, iconoCLAD, became a Pokéstop and took advantage of this by marketing to Pokémon GO players. Huge, a New York based advertising agency, used its local Atlanta café to experiment with Pokémon users. The café is located between two Pokéstops. Since the app typically drains phone batteries, the coffee shop advertised 25 free phone-charging stations and offered a free pastry with a qualifying purchase if the user catches a Pokémon at the business.

The owner of Mad Hatter, an ice cream store, reopened his shop after a Pokéstop was discovered nearby. The increase in demand resulting from the app helped the business get back

on its feet, and also caused the firm to extend its hours. This example is especially relevant when teaching the shutdown rule, costs, revenue, and profits.

The growth of Pokémon GO also created new firms like Pokémon GO Driver. The firm is a by-product of a negative externality that players were causing. The introduction of the mobile game increased the number of players playing the game while driving which led to an increase in car accidents. Pokémon GO Driver specialized in driving players around to Pokémon Stops, enabling players to travel farther, faster and more safely. Pokémon GO Driver costs players \$25 an hour.

If driving is too slow, consumers in Lancaster, PA could hire a helicopter. Traveling by helicopter allows players to travel to places that are not accessible by walking. The helicopter ride starts at \$20 per person. In Tennessee, Joyride Nashville takes Pokémon players on a tour through the city that allows them to tour the city and catch Pokémon. The tour costs \$45 per person.

The Pokémon craze created a new market for “account flipping.” Players who want to compete at the highest levels, but do not want to invest their time reaching high levels, can purchase accounts in the secondary market. Account flipping allows for these mutually beneficial trades to occur.

Instructor Question: Explain how the shutdown rule applies to the Mad Hatter business operations, and how the Pokémon craze changed the firm’s decision.

B. The Pokémon GO Plus

Niantic has also created complementary products for Pokémon GO players. The Pokémon GO Plus is a small device that lets players enjoy features of Pokémon GO while on the move and not looking at their smartphone. The device was released at a price of \$34.99 and immediately sold out in the primary market. Secondary markets like eBay experienced skyrocketing prices for the device. Nintendo President Tatsumi Kimishima explained that “Demand far exceeded our expectations and production has not caught up, leading to product shortages.” Other developers also capitalized on this craze by selling accessories such as extended battery packs and team merchandise from t-shirts to ball caps.

Instructor Question: Draw the supply and demand curves for the GO Plus and illustrate the market conditions at \$34.99.

C. Total Revenue

Pokémon GO is free to download but makes most of its revenue through in-game purchases. Players can purchase PokéCoins in order to buy beneficial items that increase the game play experience. These items include Lucky Eggs that earn extra experience points (XP) for a period of time, Egg incubators that can be used to hatch Eggs with Pokémon inside, and lure modules that attract Pokémon to Pokéstops.

Many people still play Pokémon GO regularly but that number is down 80 percent from July 2016. Is the Pokémon phenomenon over? Yes and no. Daily usage has declined dramatically, but that is only part of the story. As with any fad, most players were going to quit eventually. Therefore, the revenue that Pokémon GO generates, as opposed to the number of players, is

Figure 1 – Top Grossing Games

Top Grossing iPhone - Games

UNITED STATES

DEVICE: iPhone | COUNTRY: United States | DATE: May 7 | GROUP BY: Day

#	FREE	PAID	GAME	PUBLISHER	PRICE	REVENUE	NEW INSTALLS
1	4	-	 Fortnite	Epic Games	Free	\$1,940,315	182,682
2	36	-	 Candy Crush Saga	King	Free	\$1,271,162	35,661
3	5	-	 Harry Potter: Hogwarts Mystery	Jam City, Inc.	Free	\$1,005,004	167,451
4	30	-	 Toon Blast	Peak Games	Free	\$666,741	36,406
5	80	-	 Pokémon GO	Niantic, Inc.	Free	\$589,637	30,138

Accessed May 7, 2018. <https://thinkgaming.com/app-sales-data/>.

a better measure of Niantic's success. According to SuperDataResearch, Pokémon GO was the ninth biggest game in 2017, generating more than \$890 million in revenue.²

Moreover, as seen in Figure 1, Pokémon is not dying—it is simply not the fad it once was.³ It is thriving among its user base.

Instructor Question: There are a lot fewer Pokémon GO players in 2018 than 2016. Given that total revenue is calculated by multiplying the price paid \times the quantity purchased, how has Pokémon GO's total revenue remained so high?

D. Inelastic Demand

From Niantic's perspective, there are two types of users, those who play for free and those who spend money to improve their game experience. The users who play for free do not produce any in-game revenue but the hardcore players, who are highly invested in playing, demonstrate much more inelastic demand. It is this group—what you might think of as the base of users—who are much more apt to spend money playing the game. Niantic's challenge is to keep their core using the app while also trying to build the base of users.

When a player encounters a new Pokémon, it is registered to the Pokédex, a digital catalog of all of the Pokémon a player has captured in the game. The process of collecting Pokémon is quite similar to collecting coins or stamps. Since many players are trying to *catch 'em all*, Pokémon collectors receive a great deal of utility from completing their collections and sharing their most recent acquisition with others. Niantic knows that collectors have relatively inelastic demand, so it can add new Pokémon to the game or make it easier to find rare Pokémon during special events, in order to encourage more game play.

Niantic has two more ways of generating revenue, sponsored Pokéstops and special codes. Sponsored Pokéstops are in-game advertising. When a player goes to a sponsored Pokéstop, they see the corporate image of the sponsor. Special codes help players unlock certain features

² <http://comicbook.com/gaming/2018/01/31/pokemon-go-2017-revenue/>

³ <https://thinkgaming.com/app-sales-data/>

and are only available through corporate sponsorship.

Instructor Question: Which type of player, casual user or heavy user, spends the most money buying upgrades and coins? Explain why.

E. Price Discrimination

Niantic used PokéCoins to attract users and used price discrimination when pricing them. PokéCoins can be purchased in differing amounts in a block pricing system used to extract more consumer surplus. One hundred PokéCoins cost \$0.99, 550 PokéCoins cost \$4.99, 1200 PokéCoins cost \$9.99, 2500 PokéCoins cost \$19.99, 5200 PokéCoins cost \$39.99, and 14,500 PokéCoins cost \$99.99. This allows customers to select the price per coin they are willing to pay and allows Niantic, the game's developer, to earn more than in a single price system. Similarly, the items themselves are priced in different blocks. Incense, which attracts Pokémon to the trainer's location, can be purchased at varying prices: 1 for 80 PokéCoins, 8 for 500 PokéCoins, or 25 for 1250 PokéCoins.

Instructor Question: How does a block pricing system price discriminate in an effort to increase total revenues as compared to a single-price model?

5. Conclusion

Given the widespread familiarity with Pokémon GO, we hope that instructors will use Pokémon GO as a vehicle for connecting important concepts in economics with an example that almost all students will be familiar.

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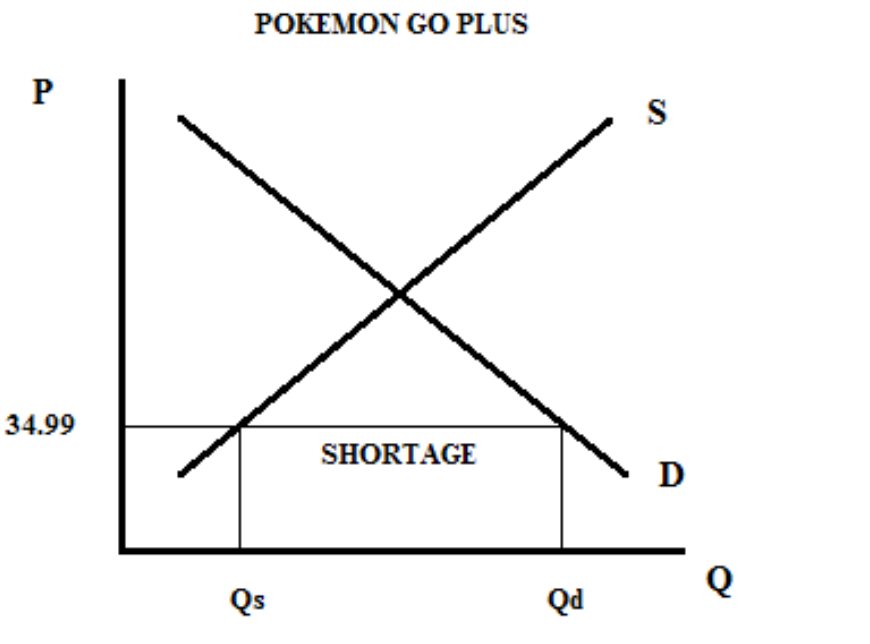
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Appendix: Answers to the Instructor Questions

Question	Answer
<p>Give an example of a location where a lure will most act like a public good. Explain why your example meets, or closely approximates, the dual necessary conditions of nonrivalry and nonexcludability.</p>	<p>Placing a lure in a public place like a public park would satisfy the condition that public goods must be nonexcludable. Having a large number of Pokémon relative to the number of users at the lure would satisfy the condition that public goods be nonrival.</p>
<p>Using a supply and demand framework, illustrate the negative externality of Pokémon GO.</p>	<p>The graph illustrates the negative externality of Pokémon GO. The vertical axis represents the Price of Gameplay, and the horizontal axis represents the Hours of Gameplay. Three curves are shown: Marginal Private Benefit (MPB), Marginal Social Cost (MSC), and Marginal Private Cost (MPC). The MPB curve is downward-sloping, while the MSC and MPC curves are upward-sloping. The MSC curve is positioned above the MPC curve, indicating that the social cost of gameplay exceeds the private cost. The intersection of the MPB and MSC curves is marked as the 'Social Optimum', while the intersection of the MPB and MPC curves is marked as the 'Equilibrium'.</p>

<p>Graphically illustrate the impact of cold weather on the Pokémon GO market.</p>	<p style="text-align: center;">Decrease in Demand in Cold Weather</p>
<p>What are some examples of real life clothing style choices that people make to signal their dedication to a particular cause or social class?</p>	<p>Sports fanatics buy team jerseys to express their devotion. There are also many luxury clothing brands with very well-known labels (Louis Vuitton, Dior, Polo, Burberry, Fjallraven, etc.) to help clients signal that they are wealthy.</p>
<p>Explain how the shutdown rule applies to the Mad Hatter business operations, and how the Pokémon craze changed the firm's decision.</p>	<p>The shutdown rule applies when a firm is not able to cover its variable costs. Before the Pokémon GO craze the Mad Hatter's revenues did not cover the variable cost of operating, and therefore the best economic decision was to shutdown. The increase in demand accompanying the Pokémon GO craze helped the firm increase its revenues and therefor cover its variable cost of operation. Any revenue above variable cost could pay for the firms fixed costs.</p>

<p>Draw the supply and demand curves for the GO Plus and illustrate the market conditions at \$34.99.</p>	 <p>The graph is titled "POKEMON GO PLUS". The vertical axis is labeled "P" and the horizontal axis is labeled "Q". An upward-sloping supply curve "S" and a downward-sloping demand curve "D" intersect. A horizontal line is drawn at a price of 34.99. This line intersects the supply curve at quantity Q_s and the demand curve at quantity Q_d. The region between Q_s and Q_d at this price level is labeled "SHORTAGE".</p>
<p>There are a lot fewer Pokémon GO players in 2018 than 2016. Given that total revenue is calculated by multiplying the price paid \times the quantity purchased, how has Pokémon GO's total revenue remained so high?</p>	<p>The huge loss in the number of players has not affected Pokémon GO's total revenue because those losses have been mostly the "free-to-play" gamers. Those who have been paying to play the game are still there.</p>
<p>Which type of player, casual user or heavy user, spends the most money buying upgrades and coins? Explain why.</p>	<p>Heavy users spend more money buying upgrades and coins as they value the game more. They have a much more inelastic demand with regards to upgrades and coins when compared to the casual user.</p>
<p>How does a block pricing system price discriminate in an effort to increase total revenues as compared to a single-price model?</p>	<p>Customers are able to select the price per coin they are willing to pay. Gamers who are not willing to buy many units at a time are forced to pay a higher price, while those who are willing to buy more units receive a discount. This increases the revenue gained from both when compared to a single-price model.</p>