



Choice:

ECONOMICS MATERIALS FOR
SUCCESS

STEFANI MILOVANSKA-FARRINGTON

Worksheet – Oligopoly

Related news article: [UPS and FedEx are no longer the largest delivery companies in the US](#) (New York Post, November 27, 2023)

Summary: This worksheet could be used for in-class or homework practice. Students will be asked to read the excerpts from a short article about the market for parcel deliveries in the U.S. UPS and FedEx used to deliver more packages than Amazon, but more recently, Amazon began to control a larger share of the market. One reason could be a “high-tech upgrade” and the adoption of a “robotics system, named Sequoia” that has helped Amazon fulfill orders and identify inventory faster. Students will be asked to discuss the level of competition and tech innovations in the parcel delivery market. Game theory questions will also be asked. **Answers are provided at the end of this document.**

Learning objectives:

At the end of this worksheet, students will be able to:

- o Identify the market structure the parcel delivery market in the U.S. provides an example of;
- o Discuss the effect of technological advancements on Amazon’s performance;
- o Determine the dominant strategy of a player (if any) in a simultaneous-move game of complete information given a payoff matrix;
- o Determine the Nash equilibrium/equilibria (NE) of a simultaneous-move game of complete information (if any);

In Collaboration With:

FOUNDATION *for*
ECONOMIC EDUCATION
— EST. 1946 —



- o Understand the association between the level of competition and prices.

Economics concepts: Oligopoly, Competition, Technological advancement, Dominant strategy, Nash equilibrium

Suggested excerpts:

“Both UPS and FedEx have been eclipsed as the largest courier companies in the US by Amazon, which delivered more packages to US homes in recent years than both delivery giants. Amazon surpassed UPS in parcel volume in 2022 and FedEx in 2020 — and the gap is only set to widen throughout 2023...”

“The biggest parcel service, however, is a title that’s still held by the US Postal Service, which handles packages for Amazon, UPS and FedEx.”

“Internal forecasts reportedly said the Seattle-based e-commerce giant [Amazon] is expecting to make some 5.9 billion deliveries by the end of 2023.”

“The figure would mark a roughly 13.5% increase from last year, when Amazon shipped a total of 5.2 billion packages, per The Journal.”

“FedEx parted ways with Amazon in 2019, but Amazon still has a delivery partnership with UPS, and the e-commerce behemoth accounts for 11% of UPS’s revenue. A UPS spokesperson told The Post: “Amazon is an important customer and our relationship is mutually beneficial, including agreement about the number of packages we will deliver for them and the number of packages they deliver in support of their retail business.”

“... [Amazon] has been preparing for the day it overthrows UPS and FedEx as No. 1, revamping its delivery efforts as recently as last month with new robots and artificial intelligence-backed technologies.”

“The robotics system, named Sequoia, reportedly allows Amazon to list items for sale on its website faster, and is able to more easily predict delivery estimates. Sequoia is expected to reduce the time it takes to fulfill an order by up to 25%, and can identify and store inventory as much as 75% faster...”



Questions

1. Which of the following statements about the market for package deliveries is correct?

- a. Amazon has always dominated this market.
- b. Amazon started to deliver more packages than FedEx before it started to deliver more packages than UPS.
- c. The gap between the number of packages delivered by Amazon, FedEx and UPS was expected to become smaller in 2023.
- d. US Postal Services does not handle packages for UPS, FedEx and Amazon.

2. Four companies dominate the parcel delivery market: UPS, USPS, FedEx, and Amazon. Given that a few suppliers control the shipping industry, it is considered to be a(n):

- a. Monopoly.
- b. Oligopoly.
- c. Monopolistic competition.
- d. Perfect competition.

3. According to the article, compared to 2022, UPS expected a decline in their domestic deliveries while Amazon had a clear increase in the parcels they delivered in 2023. Is the reported difference between the number of packages delivered by Amazon and UPS underestimated or overestimated provided that “UPS and FedEx’s figures include packages they hand off to the US Postal Service for final delivery” whereas Amazon’s figures “only include packages that Amazon shipped from beginning to end”?

4. True or false? Amazon is one of UPS’s customers, that is, UPS delivers a certain number of packages for Amazon.

5. One reason for Amazon’s success in the shipping industry could be the adoption of “new robots and artificial intelligence-backed technologies,” including the robotics system Sequoia. How have these technological advancements affected Amazon’s performance, the time it takes Amazon to fulfill orders and identify inventory?



When UPS and Amazon make decisions, it is likely that they consider the potential reactions of their competitors in the shipping industry. Suppose that Amazon is deciding whether to make a high-tech upgrade or not, and UPS is choosing whether to focus on delivering parcels only to customers who gain the most value or all customers. The following is the payoff matrix that presents the expected net profit margin (i.e., generated net profit as a percentage of revenue) of Amazon and UPS given that Amazon and UPS choose a certain combination of strategies.

Consider a simultaneous-move game of complete information. Use the payoff matrix to answer Questions 6 to 8.

| | | UPS | |
|--------|--------------------------|--|---------------------|
| | | Focus on customers who gain the most value | Serve all customers |
| Amazon | Make a high-tech upgrade | 6.9%, 7.5% | 6.3%, 6.2% |
| | Not upgrade | 4.7%, 7.4% | 4.3%, 7.4% |

6. What is Amazon's dominant strategy (if any)?

- a. Make a high-tech upgrade.
- b. Not make a high-tech upgrade.
- c. Amazon does not have a dominant strategy.
- d. It cannot be determined.

7. What is UPS's dominant strategy (if any)?

- a. Focus on customers who gain the most value.
- b. Serve all customers.
- c. UPS does not have a dominant strategy.
- d. It cannot be determined.

8. What is/are the Nash equilibrium/equilibria (NE) of the game (if any)?



9. If Amazon manages to eliminate some of its competitors in the package delivery market, do you expect the price of shipping services to increase or decrease?



Answer Key

1. Which of the following statements about the market for package deliveries is correct?

- a. Amazon has always dominated this market.
- b. Amazon started to deliver more packages than FedEx before it started to deliver more packages than UPS.
- c. The gap between the number of packages delivered by Amazon, FedEx and UPS was expected to become smaller in 2023.
- d. US Postal Services does not handle packages for UPS, FedEx and Amazon.

Answer: B. The article states that “Both UPS and FedEx have been eclipsed as the largest courier companies in the US by Amazon, which delivered more packages to US homes in recent years than both delivery giants. Amazon surpassed UPS in parcel volume in 2022 and FedEx in 2020 — and the gap is only set to widen throughout 2023...” According to the article, US Postal Service “handles packages for Amazon, UPS and FedEx.”

2. Four companies dominate the parcel delivery market: UPS, USPS, FedEx, and Amazon. Given that a few suppliers control the shipping industry, it is considered to be a(n):

- a. Monopoly.
- b. Oligopoly.
- c. Monopolistic competition.
- d. Perfect competition.

Answer: B.

3. According to the article, compared to 2022, UPS expected a decline in their domestic deliveries while Amazon had a clear increase in the parcels they delivered in 2023. Is the reported difference between the number of packages delivered by Amazon and UPS underestimated or overestimated provided that “UPS and FedEx’s figures include packages they hand off to the US Postal



Service for final delivery” whereas Amazon’s figures “only include packages that Amazon shipped from beginning to end”?

Answer: Given the information above, the reported difference underestimates the actual difference, that is the actual difference is larger than what the reported figures suggest.

4. True or false? Amazon is one of UPS’s customers, that is, UPS delivers a certain number of packages for Amazon.

Answer. True. According to the article, Amazon “accounts for 11% of UPS’s revenue.” Amazon and UPS have an “agreement about the number of packages we [UPS] will deliver for them [Amazon] and the number of packages they [Amazon] deliver[s] in support of their retail business.”

5. One reason for Amazon’s success in the shipping industry could be the adoption of “new robots and artificial intelligence-backed technologies,” including the robotics system Sequoia. How have these technological advancements affected Amazon’s performance, the time it takes Amazon to fulfill orders and identify inventory?

Answer: According to the article, the new technology has allowed Amazon “to list items for sale on its website faster,” and it is “able to more easily predict delivery estimates.” In addition, “Sequoia is expected to reduce the time it takes to fulfill an order by up to 25%, and can identify and store inventory as much as 75% faster.”

When UPS and Amazon make decisions, it is likely that they consider the potential reactions of their competitors in the shipping industry. Suppose that Amazon is deciding whether to make a high-tech upgrade or not, and UPS is choosing whether to focus on delivering parcels only to customers who gain the most value or all customers. The following is the payoff matrix that presents the expected net profit margin (i.e., generated net profit as a percentage of revenue) of Amazon and UPS given that Amazon and UPS choose a certain combination of strategies.

Consider a simultaneous-move game of complete information. Use the payoff matrix to answer Questions 6 to 8.



| | | UPS | |
|--------|--------------------------|--|---------------------|
| | | Focus on customers who gain the most value | Serve all customers |
| Amazon | Make a high-tech upgrade | 6.9%, 7.5% | 6.3%, 6.2% |
| | Not upgrade | 4.7%, 7.4% | 4.3%, 7.4% |

6. What is Amazon's dominant strategy (if any)?

- Make a high-tech upgrade.
- Not make a high-tech upgrade.
- Amazon does not have a dominant strategy.
- It cannot be determined.

Answer: If UPS focuses on customers who gain the most value, Amazon is better-off choosing to make a high-tech upgrade because it prefers a net margin of 6.9% to a net margin of 4.7%. If UPS chooses to serve all customers, Amazon's best response is still to make the upgrade, because a net margin of 6.3% is better than that of 4.3%. Therefore, regardless of what UPS chooses, Amazon is better-off making an upgrade. This implies that Amazon has a dominant strategy, and it is to make a high-tech upgrade.

7. What is UPS's dominant strategy (if any)?

- Focus on customers who gain the most value.
- Serve all customers.
- UPS does not have a dominant strategy.
- It cannot be determined.

Answer: If Amazon makes an upgrade, UPS's best response is to focus on customers who gain the most value because a net margin of 7.5% is preferred to a net margin of 6.2%. If Amazon does not make the upgrade, UPS is indifferent between its two strategies. Therefore, there is no strategy that is always better for UPS. This implies that UPS does not have a dominant strategy.



8. What is/are the Nash equilibrium/equilibria (NE) of the game (if any)?

Answer: The game has 1 NE: (Amazon makes a high-tech upgrade; UPS focuses on customers who gain the most value). If Amazon makes a high-tech upgrade, UPS prefers to focus on customers who gain the most value, and if UPS focuses on customers who gain the most value, Amazon's best response is to make a high-tech upgrade. Therefore, (Amazon makes a high-tech upgrade; UPS focuses on customers who gain the most value) is a NE. For all other three combinations of strategies, at least one of the companies has an incentive to deviate.

9. If Amazon manages to eliminate some of its competitors in the package delivery market, do you expect the price of shipping services to increase or decrease?

Answer: Less competition is expected to lead to higher prices.