# Final Exam Review (Chapter 13 –21)

## Chapter 13

Total Revenue, Total Cost, Profit

- We assume that the firm's goal is to maximize profit.

Costs: Explicit vs. Implicit

- **Explicit costs** require an outlay of money,
  *e.g.*, paying wages to workers.
- **Implicit costs** do not require a cash outlay,
  *e.g.*, the opportunity cost of the owner's time.
- Remember one of the Ten Principles:
  ***The cost of something is***
  ***what you give up to get it*.**
- This is true whether the costs are implicit or explicit. Both matter for firms' decisions.

Explicit vs. Implicit Costs: An Example
You need $100,000 to start your business.
The interest rate is 5%.

- Case 1: borrow $100,000
  - explicit cost = $5000 interest on loan
- Case 2: use $40,000 of your savings,
  borrow the other $60,000
  - explicit cost = $3000 (5%) interest on the loan
  - implicit cost = $2000 (5%) *foregone* interest you could have earned on your $40,000.

Economic Profit vs. Accounting Profit

- **Accounting profit**

= total revenue minus total explicit costs

- **Economic profit**

= total revenue minus total costs (including explicit and implicit costs)

- Accounting profit ignores implicit costs,
  so it's higher than economic profit.

Costs in the Short Run & Long Run

- Short run:
  Some inputs are fixed (*e.g.,* factories, land).
  The costs of these inputs are *FC*.
- Long run:
  All inputs are variable
  (*e.g.,* firms can build more factories,
  or sell existing ones).

- In the long run, *ATC* at any ***Q*** is cost per unit using the most efficient mix of inputs for that ***Q*** (*e.g.*, the factory size with the lowest *ATC*).

How ATC Changes as the Scale of Production Changes

- Economies of scale occur when increasing production allows greater specialization:
  workers more efficient when focusing on a narrow task.
  - More common when ***Q*** is low.
- Diseconomies of scale are due to coordination problems in large organizations.
  *E.g.*, management becomes stretched, can't control costs.
  - More common when ***Q*** is high.

SUMMARY:

- Implicit costs do not involve a cash outlay,
  yet are just as important as explicit costs
  to firms' decisions.
- Accounting profit is revenue minus explicit costs. Economic profit is revenue minus total (explicit + implicit) costs.
- The production function shows the relationship between output and inputs.
- The marginal product of labour is the increase in output from a one-unit increase in labour, holding other inputs constant. The marginal products of other inputs are defined similarly.
- Marginal product usually diminishes as the input increases. Thus, as output rises, the production function becomes flatter, and the total cost curve becomes steeper.
- Variable costs vary with output; fixed costs do not.
- Marginal cost is the increase in total cost from an extra unit of production. The MC curve is usually upward-sloping.
- Average variable cost is variable cost divided by output.
- Average fixed cost is fixed cost divided by output. AFC always falls as output increases.
- Average total cost (sometimes called "cost per unit") is total cost divided by the quantity of output. The ATC curve is usually U-shaped.
- The MC curve intersects the ATC curve
  at minimum average total cost.
  When MC < ATC, ATC falls as ***Q*** rises.
  When MC > ATC, ATC rises as ***Q*** rises.
- In the long run, all costs are variable.
- Economies of scale: ATC falls as ***Q*** rises. Diseconomies of scale: ATC rises as ***Q*** rises. Constant returns to scale: ATC remains constant as ***Q*** rises.

## Chapter 14

Characteristics of Perfect Competition

**1.** Many buyers and many sellers.
**2.** The goods offered for sale are largely the same.
**3.** Firms can freely enter or exit the market.

The Revenue of a Competitive Firm

- Total revenue (*TR*)
- **Average revenue (*AR*)**
- **Marginal revenue (*MR*)**:
  The change in *TR* from
  selling one more unit.

MR = P for a Competitive Firm

- A competitive firm can keep increasing its output without affecting the market price.
- So, each one-unit increase in ***Q*** causes revenue to rise by ***P***, *i.e.*, $MR = P$.

Profit Maximization

- What ***Q*** maximizes the firm's profit?
- To find the answer, "***think at the margin***."
  If increase ***Q*** by one unit,

revenue rises by *MR*,
cost rises by *MC*.

- If $MR > MC$, then increase ***Q*** to raise profit.
- If $MR < MC$, then reduce ***Q*** to raise profit.

Shutdown vs. Exit

- **Shutdown**:
  A short-run decision not to produce anything because of market conditions.
- **Exit**:
  A long-run decision to leave the market.
- A key difference:
  - If shut down in SR, must still pay *FC*.
  - If exit in LR, zero costs.

A Firm's Short-run Decision to Shut Down

- Cost of shutting down: revenue loss = *TR*
- Benefit of shutting down: cost savings = *VC*
  (firm must still pay *FC*)
- So, shut down if $TR < VC$
- Divide both sides by ***Q***: $TR/Q < VC/Q$
- So, firm's decision rule is:

The Irrelevance of Sunk Costs

- **Sunk cost**: a cost that has already been committed and cannot be recovered
- Sunk costs should be irrelevant to decisions; you must pay them regardless of your choice.
- *FC* is a sunk cost: The firm must pay its fixed costs whether it produces or shuts down.
- So, *FC* should not matter in the decision to shut down.

A Firm's Long-Run Decision to Exit

- Cost of exiting the market: revenue loss = *TR*
- Benefit of exiting the market: cost savings = *TC* (zero *FC* in the long run)
- So, firm exits if $TR < TC$
- Divide both sides by $\boldsymbol{Q}$ to write the firm's decision rule as:

Market Supply: Assumptions

**1)** All existing firms and potential entrants have identical costs.

**2)** Each firm's costs do not change as other firms enter or exit the market.

**3)** The number of firms in the market is

- fixed in the short run (due to fixed costs)
- variable in the long run (due to free entry and exit)

Entry & Exit in the Long Run

- In the LR, the number of firms can change due to entry & exit.
- If existing firms earn positive economic profit,
  - new firms enter, SR market supply shifts right.
  - $\boldsymbol{P}$ falls, reducing profits and slowing entry.
- If existing firms incur losses,
  - some firms exit, SR market supply shifts left.
  - $\boldsymbol{P}$ rises, reducing remaining firms' losses.

The Zero-Profit Condition

- **Long-run equilibrium**: The process of entry or exit is complete – remaining firms earn zero economic profit.
- Zero economic profit occurs when $\boldsymbol{P} = ATC$.
- Since firms produce where $\boldsymbol{P} = MR = MC$, the zero-profit condition is $\boldsymbol{P} = MC = ATC$.
- Recall that *MC* intersects *ATC* at minimum *ATC*.
- Hence, in the long run, $\boldsymbol{P}$ = minimum *ATC*.

Why Do Firms Stay in Business if Profit = 0?

- Recall, economic profit is revenue minus all costs – including implicit costs, like the opportunity cost of the owner's time and money.
- In the zero-profit equilibrium,
  - firms earn enough revenue to cover these costs
  - accounting profit is positive

SUMMARY:

- For a firm in a perfectly competitive market, price = marginal revenue = average revenue.
- If ***P*** > *AVC*, a firm maximizes profit by producing the quantity where *MR* = *MC*. If ***P*** < *AVC*, a firm will shut down in the short run.
- If ***P*** < *ATC*, a firm will exit in the long run.
- In the short run, entry is not possible, and an increase in demand increases firms' profits.
- With free entry and exit, profits = 0 in the long run, and ***P*** = minimum *ATC*.

## Chapter 15

Introduction

- A **monopoly** is a firm that is the sole seller of a product without close substitutes.
- In this chapter, we study monopoly and contrast it with perfect competition.
- The key difference:
  A monopoly firm has **market power**, the ability to influence the market price of the product it sells. A competitive firm has no market power.

Why Monopolies Arise

The main cause of monopolies is **barriers to entry** – other firms cannot enter the market.

Three sources of barriers to entry:

**1.** A single firm owns a key resource.
*E.g.*, DeBeers owns most of the world's diamond mines

**2.** The govt gives a single firm the exclusive right to produce the good.
*E.g.*, patents, copyright laws

Monopoly vs. Competition: Demand Curves

In a competitive market, the market demand curve slopes downward.
But the demand curve for any individual firm's product is horizontal at the market price.

The firm can increase ***Q*** without lowering ***P***,
so *MR* = ***P*** for the competitive firm.

Understanding the Monopolist's MR

- Increasing ***Q*** has two effects on revenue:
  - ***Output effect***: higher output raises revenue
  - ***Price effect***: lower price reduces revenue
- To sell a larger ***Q***, the monopolist must reduce the price on all the units it sells.
- Hence, *MR* < ***P***
- *MR* could even be negative if the price effect exceeds the output effect (*e.g.*, when Common Grounds increases ***Q*** from 5 to 6).

Profit-Maximization

- Like a competitive firm, a monopolist maximizes profit by producing the quantity where ***MR*** = ***MC***.
- Once the monopolist identifies this quantity, it sets the highest price consumers are willing to pay for that quantity.
- It finds this price from the ***D*** curve.

Price Discrimination

- Discrimination: treating people differently based on some characteristic, *e.g.* age or gender.
- **Price discrimination:** selling the same good at different prices to different buyers.
- The characteristic used in price discrimination is willingness to pay (WTP):
  - A firm can increase profit by charging a higher price to buyers with higher WTP.

Price Discrimination in the Real World

- In the real world, perfect price discrimination is not possible:
  - No firm knows every buyer's WTP
  - Buyers do not announce it to sellers
- So, firms divide customers into groups based on some observable trait that is likely related to WTP, such as age.

Examples of Price Discrimination

<u>Movie tickets</u>

Discounts for seniors, students, and people who can attend during weekday afternoons. They are all more likely to have lower WTP than people who pay full price on Friday night.

<u>Airline prices</u>

Discounts for Saturday-night stayovers help distinguish business travelers, who usually have higher WTP, from more price-sensitive leisure travelers.

Public Policy Toward Monopolies

- Increasing competition with antitrust laws
  - Ban some anticompetitive practices, allow govt to break up monopolies.
- Regulation
  - Govt agencies set the monopolist's price.
  - For natural monopolies, *MC* < *ATC* at all ***Q***, so marginal cost pricing would result in losses.
  - If so, regulators might subsidize the monopolist or set ***P*** = *ATC* for zero economic profit.

SUMMARY:

- A monopoly firm is the sole seller in its market. Monopolies arise due to barriers to entry, including: government-granted monopolies, the control of a key resource, or economies of scale over the entire range of output.
- A monopoly firm faces a downward-sloping demand curve for its product. As a result, it must reduce price to sell a larger quantity, which causes marginal revenue to fall below price.
- Monopoly firms maximize profits by producing the quantity where marginal revenue equals marginal cost. But since marginal revenue is less than price, the monopoly price will be greater than marginal cost, leading to a deadweight loss.
- Monopoly firms (and others with market power) try to raise their profits by charging higher prices to consumers with higher willingness to pay. This practice is called price discrimination.

## Chapter 16

Between Monopoly and Competition

*Two extremes*

- Perfect competition: many firms, identical products
- Monopoly: one firm

*In between these extremes: imperfect competition*

- **Oligopoly**: only a few sellers offer similar or identical products.
- **Monopolistic competition**: many firms sell similar but not identical products.

Characteristics & Examples of Monopolistic Competition

Characteristics:

- Many sellers
- Product differentiation
- Free entry and exit

Examples:

- apartments
- books

- clothing
- fast food

Monopolistic Competition and Monopoly

- *Short run*: Under monopolistic competition, firm behavior is very similar to monopoly.
- *Long run*: In monopolistic competition, entry and exit drive economic profit to zero.
  - If profits in the short run: New firms enter market, taking some demand away from existing firms, prices and profits fall.
  - If losses in the short run: Some firms exit the market, remaining firms enjoy higher demand and prices.

A Monopolistic Competitor in the Long Run
Entry and exit occurs until
$P = ATC$ and profit = zero.
Notice that the firm charges a markup of price over marginal cost and does not produce at minimum *ATC*.

Why Monopolistic Competition Is Less Efficient than Perfect Competition

1. ***Excess capacity***
   - The monopolistic competitor operates on the downward-sloping part of its *ATC* curve, produces less than the cost-minimizing output.
   - Under perfect competition, firms produce the quantity that minimizes *ATC*.
2. ***Markup over marginal cost***
   - Under monopolistic competition, $P > MC$.
   - Under perfect competition, $P = MC$.

Monopolistic Competition and Welfare

- Monopolistically competitive markets do not have all the desirable welfare properties of perfectly competitive markets.
- Because $P > MC$, the market quantity is below the socially efficient quantity.
- Yet, not easy for policymakers to fix this problem: Firms earn zero profits, so cannot require them to reduce prices.

Advertising as a Signal of Quality
A firm's willingness to spend huge amounts on advertising may signal the quality of its product to consumers, *regardless of the content of ads*.

- Ads may convince buyers to try a product once, but the product must be of high quality for people to become repeat buyers.
- The most expensive ads are not worthwhile unless they lead to repeat buyers.
- When consumers see expensive ads, they think the product must be good if the company is willing to spend so much on advertising.

The Critique of Brand Names

- Critics of brand names believe:
  - Brand names cause consumers to perceive differences that do not really exist.
  - Consumers' willingness to pay more for brand names is irrational, fostered by advertising.
  - Eliminating govt protection of trademarks would reduce influence of brand names, result in lower prices.

SUMMARY:

- A monopolistically competitive market has many firms, differentiated products, and free entry.
- Each firm in a monopolistically competitive market has excess capacity – produces less than the quantity that minimizes *ATC*. Each firm charges a price above marginal cost.
- Monopolistic competition does not have all of the desirable welfare properties of perfect competition. There is a deadweight loss caused by the markup of price over marginal cost. Also, the number of firms (and thus varieties) can be too large or too small. There is no clear way for policymakers to improve the market outcome.
- Product differentiation and markup pricing lead to the use of advertising and brand names. Critics of advertising and brand names argue that firms use them to reduce competition and take advantage of consumer irrationality. Defenders argue that firms use them to inform consumers and to compete more vigorously on price and product quality.

## Chapter 17

Oligopoly

- **Oligopoly**: a market structure in which only a few sellers offer similar or identical products.
- Strategic behaviour in oligopoly:
  A firm's decisions about *P* or *Q* can affect other firms and cause them to react. The firm will consider these reactions when making decisions.
- **Game theory**: the study of how people behave in strategic situations.

The Equilibrium for an Oligopoly

- **Nash equilibrium**: a situation in which economic participants interacting with one another each choose their best strategy given the strategies that all the others have chosen
- Our duopoly example has a Nash equilibrium in which each firm produces ***Q*** = 40.
  - Given that Rogers produces ***Q*** = 40, Telus's best move is to produce ***Q*** = 40.
  - Given that Telus produces ***Q*** = 40, Rogers's best move is to produce ***Q*** = 40.

A Comparison of Market Outcomes

When firms in an oligopoly individually choose production to maximize profit,

- oligopoly ***Q*** is greater than monopoly ***Q*** but smaller than competitive ***Q***.
- oligopoly ***P*** is greater than competitive ***P*** but less than monopoly ***P***.

The Output & Price Effects

- Increasing output has two effects on a firm's profits:
  - **Output effect**: If ***P*** > *MC*, selling more output raises profits.
  - **Price effect**: Raising production increases market quantity, which reduces market price and reduces profit on all units sold.
- If output effect > price effect, the firm increases production.
- If price effect > output effect, the firm reduces production.

The Size of the Oligopoly

- As the number of firms in the market increases,
  - the price effect becomes smaller
  - the oligopoly looks more and more like a competitive market
  - ***P*** approaches *MC*
  - the market quantity approaches the socially efficient quantity

Game Theory

- Game theory helps us understand oligopoly and other situations where "players" interact and behave strategically.
- **Dominant strategy**: a strategy that is best for a player in a game regardless of the strategies chosen by the other players
- **Prisoners' dilemma**: a "game" between two captured criminals that illustrates

why cooperation is difficult even when it is mutually beneficial

Oligopolies as a Prisoners' Dilemma

- When oligopolies form a cartel in hopes of reaching the monopoly outcome, they become players in a prisoners' dilemma.
- Our earlier example:
  - Telus and Rogers are duopolists in Smalltown.
  - The cartel outcome maximizes profits: Each firm agrees to serve ***Q*** = 30 customers.
- Here is the "payoff matrix" for this example…

1. Resale Price Maintenance ("Fair Trade")

- Occurs when a manufacturer imposes lower limits on the prices retailers can charge.
- Is often opposed because it appears to reduce competition at the retail level.
- Yet, any market power the manufacturer has is at the wholesale level; manufacturers do not gain from restricting competition at the retail level.
- The practice has a legitimate objective: preventing discount retailers from free-riding on the services provided by full-service retailers.

2. Predatory Pricing

- Occurs when a firm cuts prices to prevent entry or drive a competitor out of the market, so that it can charge monopoly prices later.
- Illegal under antitrust laws, but hard for the courts to determine when a price cut is predatory and when it is competitive & beneficial to consumers.
- Many economists doubt that predatory pricing is a rational strategy:
  - It involves selling at a loss, which is extremely costly for the firm.
  - It can backfire.

3. Tying

- Occurs when a manufacturer bundles two products together and sells them for one price (*e.g.*, Microsoft including a browser with its operating system)
- Critics argue that tying gives firms more market power by connecting weak products to strong ones.
- Others counter that tying cannot change market power: Buyers are not willing to pay more for two goods together than for the goods separately.
- Firms may use tying for price discrimination,

which is not illegal, and which sometimes increases economic efficiency.

SUMMARY:

- Oligopolists can maximize profits if they form a cartel and act like a monopolist.
- Yet, self-interest leads each oligopolist to a higher quantity and lower price than under the monopoly outcome.
- The larger the number of firms, the closer will be the quantity and price to the levels that would prevail under competition.
- The prisoners' dilemma shows that self-interest can prevent people from cooperating, even when cooperation is in their mutual interest. The logic of the prisoners' dilemma applies in many situations.
- Policymakers use the antitrust laws to prevent oligopolies from engaging in anticompetitive behaviour such as price-fixing. But the application of these laws is sometimes controversial.

## Chapter 18

Factors of Production and Factor Markets

- **Factors of production**: the inputs used to produce goods and services.
  - Labour
  - Land
  - **Capital**: the equipment and structures used to produce goods and services.
- Prices and quantities of these inputs are determined by supply & demand in factor markets.

Derived Demand

- Markets for the factors of production are like markets for goods & services, except:
- Demand for a factor of production is a **derived demand** – derived from a firm's decision to supply a good in another market.

Two Assumptions

**1.** We assume all markets are competitive.
The typical firm is a price taker
   - in the market for the product it produces
   - in the labour market

**2.** We assume that firms care only about maximizing profits.
   - Each firm's supply of output and demand for inputs are derived from this goal.

Marginal Product of labour (MPL)

- **Marginal product of labour:** the increase in the amount of output from an additional unit of labour where
  **Δ*Q*** = change in output
  **Δ*L*** = change in labour

The Value of the Marginal Product

- Problem:
  - Cost of hiring another worker (wage) is measured in dollars
  - Benefit of hiring another worker (*MPL*) is measured in units of output
- Solution: convert *MPL* to dollars
- **Value of the marginal product**: the marginal product of an input times the price of the output
  *VMPL* = value of the marginal product of labour
  = *P* x *MPL*

Labour Supply

- Trade-off between work and leisure:
  The more time you spend working,
  the less time you have for leisure.
- The opportunity cost of leisure is the wage.

Productivity and Wage Growth in Canada
Recall one of the Ten Principles:
***A country's standard of living depends on its ability to produce good and services.***
Our theory implies wages tied to labour productivity
*W = VMPL.*

The Other Factors of Production

- With land and capital, must distinguish between:
  - **purchase price** – the price a person pays to own that factor indefinitely
  - **rental price** – the price a person pays to use that factor for a limited period of time
- The wage is the rental price of labour.
- The determination of the rental prices of capital and land is analogous to the determination of wages…

Linkages Among the Factors of Production

- In most cases, factors of production are used together in a way that makes each factor's productivity dependent on the quantities of the other factors.
- Example: an increase in the quantity of capital
  - The marginal product and rental price of capital fall.
  - Having more capital makes workers more productive, *MPL* and

*W* rise.

SUMMARY:

- The economy's income distribution is determined in the markets for the factors of production. The three most important factors of production are labour, land, and capital.
- A firm's demand for a factor is derived from its supply of output.
- Competitive firms maximize profit by hiring each factor up to the point where the value of its marginal product equals its rental price.

- The supply of labour arises from the trade-off between work and leisure, and yields an upward-sloping labour supply curve.
- The price paid to each factor adjusts to balance supply and demand for that factor. In equilibrium, each factor is compensated according to its marginal contribution to production.
- Factors of production are used together. A change in the quantity of one factor affects the marginal products and equilibrium earnings of all factors.

## Chapter 21:

- Recall one of the Ten Principles from Chapter 1:
  ***People face tradeoffs***.
  - Buying more of one good leaves less income to buy other goods.
  - Working more hours means more income and more consumption, but less leisure time.
  - Reducing saving allows more consumption today but reduces future consumption.
- This chapter explores how consumers make choices like these.

The Budget Constraint:
What the Consumer Can Afford

- Example:
  Hurley divides his income between two goods:
  fish and mangos.
- A "consumption bundle" is a particular combination of the goods, *e.g.*, 40 fish & 300 mangos.
- **Budget constraint**: the limit on the consumption bundles that a consumer can afford

The Income and Substitution Effects
A fall in the price of fish has two effects on
Hurley's optimal consumption of both goods.

- **Income effect**
  A fall in $P_F$ boosts the purchasing power of Hurley's income, allows him to buy more mangos and more fish.

- **Substitution effect**
  A fall in $P_F$ makes mangos more expensive relative to fish, causes Hurley to buy fewer mangos & more fish.

Notice: *The net effect on mangos is ambiguous.*

CONCLUSION:
Do People Really Think This Way?

- People do not make spending decisions by writing down their budget constraints and indifference curves.
- Yet, they try to make the choices that maximize their satisfaction given their limited resources.
- The theory in this chapter is only intended as a metaphor for how consumers make decisions.
- It explains consumer behaviour fairly well in many situations and provides the basis for more advanced economic analysis.

SUMMARY:

- A consumer's budget constraint shows the possible combinations of different goods she can buy given her income and the prices of the goods. The slope of the budget constraint equals the relative price of the goods.
- An increase in income shifts the budget constraint outward. A change in the price of one of the goods pivots the budget constraint.

- A consumer's indifference curves represent her preferences. An indifference curve shows all the bundles that give the consumer a certain level of happiness. The consumer prefers points on higher indifference curves to points on lower ones.
- The slope of an indifference curve at any point is the marginal rate of substitution – the rate at which the consumer is willing to trade one good for the other.
- The consumer optimizes by choosing the point on her budget constraint that lies on the highest indifference curve. At this point, the marginal rate of substitution equals the relative price of the two goods.
- When the price of a good falls, the impact on the consumer's choices can be broken down into two effects, an income effect and a substitution effect.
- The income effect is the change in consumption that arises because a lower price makes the consumer better off. It is represented by a movement from a lower indifference curve to a higher one.
- The substitution effect is the change that arises because a price change encourages greater consumption of the good that has become relatively cheaper. It is represented by a movement along an indifference curve.
- The theory of consumer choice can be applied in many situations. It can explain why demand curves can potentially slope upward, why higher wages could either increase or decrease labour supply, and why

higher interest rates could either increase or decrease saving.