ECONOMICS Lecture 15
Production Theory: Profit

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Topics

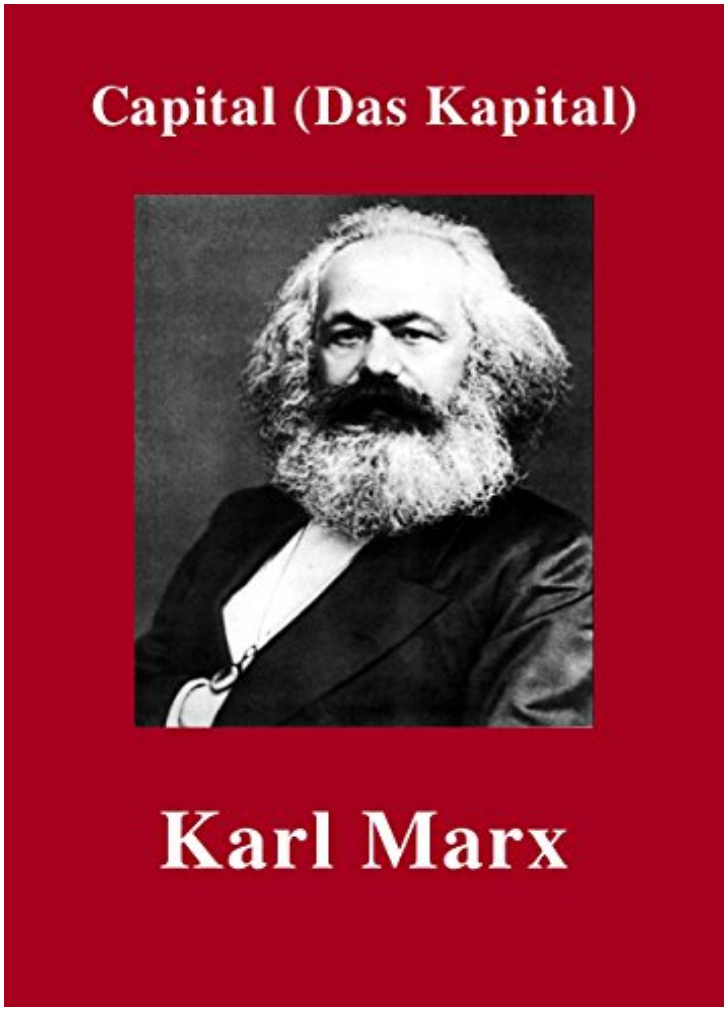
- Marx on Profit
- Economic Profit
- Profit Maximization
- Economic Rent

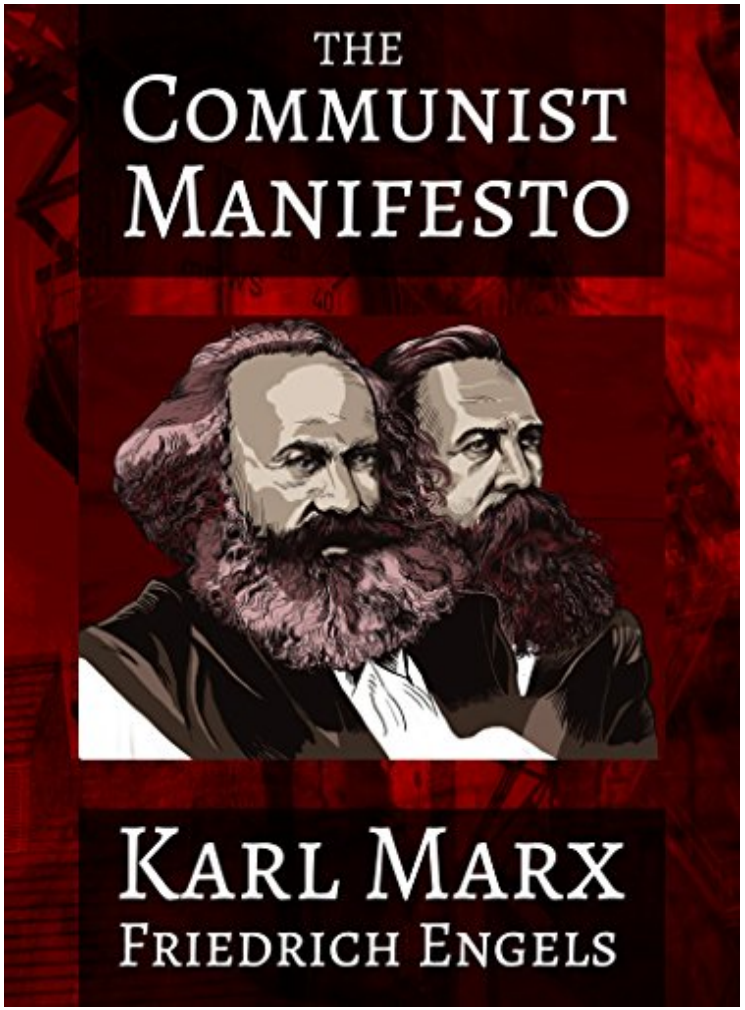
This lecture explains the difference between accounting profit and economic profit, answers why and how it matters in business decisions, and derives the principle for profit maximization.

Karl Marx, Capitalism, and Profit

- Karl Marx (1818–1883) is best known not as a philosopher but as a revolutionary, whose works inspired the foundation of many communist regimes in the twentieth century.
- Marx's economic analysis of capitalism is based on his version of the labour theory of value, and includes the analysis of **capitalist profit as the extraction of surplus value from the exploited proletariat**.
- Capitalism is distinctive, Marx argues, in that it involves not merely the exchange of commodities, but the advancement of capital, in the form of money, with the purpose of generating profit through the purchase of commodities and their transformation into other commodities which can command a higher price, and thus yield a profit.
- Marx claims that no previous theorist has been able adequately to explain how capitalism as a whole can make a profit. Marx's own solution relies on the idea of exploitation of the worker.

https://plato.stanford.edu/entries/marx/





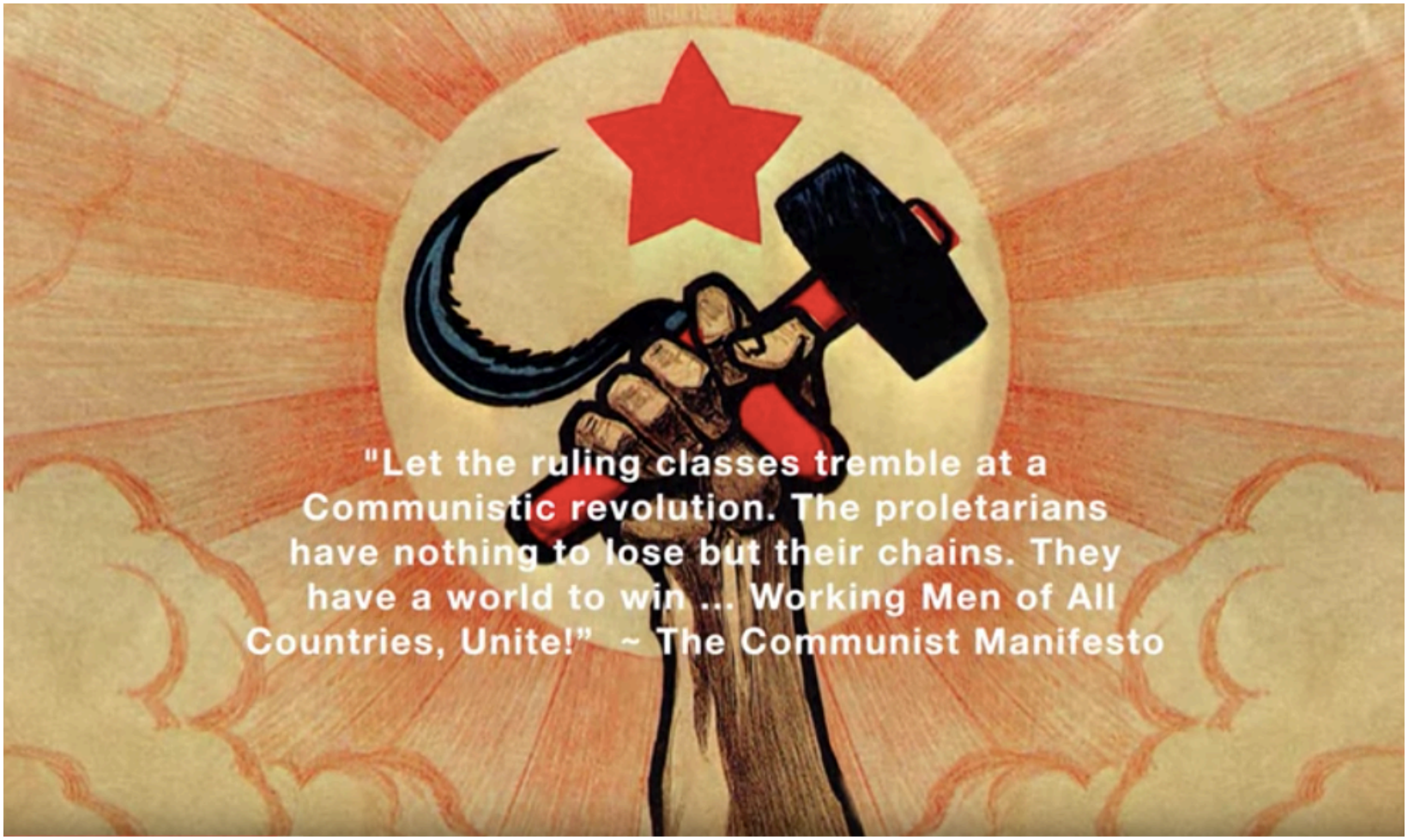
www.amazon.com

Marx Surplus Value Theory of Profit

- In setting up conditions of production the capitalist purchases the worker's labour power — his ability to labour — for the day. The cost of this commodity is determined in the same way as the cost of every other; i.e. in terms of the amount of socially necessary labour power required to produce it.
- In this case **the value of a day's labour power is the value of the commodities necessary to keep the worker alive** for a day. Suppose that such commodities take four hours to produce. Thus the first four hours of the working day is spent on producing value equivalent to the value of the wages the worker will be paid. This is known as necessary labour. Any work the worker does above this is known as surplus labour, producing surplus value for the capitalist.
- **Surplus value, according to Marx, is the source of all profit.** In Marx's analysis labour power is the only commodity which can produce more value than it is worth, and for this reason it is known as variable capital. Other commodities simply pass their value on to the finished commodities, but do not create any extra value. They are known as constant capital. **Profit, then, is the result of the labour performed by the worker beyond that necessary to create the value of his or her wages.** This is the surplus value theory of profit.

https://plato.stanford.edu/entries/marx/

The Communist Manifesto



https://www.youtube.com/watch?v=vN6xPqOfGsw

Profit Derives from Revenue

- Revenue is the income of business. How to generate income?
- **Revenue Function**: the relation between sales revenue and quantity sold by the firm. **Total Revenue :TR=PQ.**
- Obviously, revenue will increase as sales increase. It's positively related to the quantity sold in the market.
- For a given P, More sales Q, more revenue TR.
- For a given Q, Higher price P, more revenue TR.
- Along the demand curve, TR is maximized when E=1.
- However, the business decision maker is not to maximize total revenue because cost must also be taken into account.

Revenue Function: Examples

- Suppose the unit price of a product is \$2, what are the TR and MR when quantity demanded Q=10?

- Suppose the demand curve is P=10-Q, what are the TR, AR, and MR when quantity demanded Q=1 and Q=9?

- Suppose the demand curve is $P=(100-Q^2)^{1/2}$, draw the graphs for TR, AR, and MR as a function of Q?

Production Costs: Explicit & Implicit

- Good economists include all opportunity costs when analyzing a firm, whereas accountants record just explicit costs.
- **Explicit Costs** require an outlay of money by the firm. Explicit costs are historical costs, including fixed cost and variable cost. Accountants record them on the income and cash flow statements.
- **Implicit Costs** do not require an outlay of money by the firm, which are often neglected by accountants. Implicit costs are part of, but not all, the opportunity costs for doing the business.
- Since explicit costs are backward-looking book values, decision-making based on them can be misleading. In contrast, markets are forward-looking: all decisions are ongoing and can incur costs and benefits real time. The right business decision shall consider O.C.

Accounting Costs and Profit

Accounting profit is referred to as bookkeeping profit or financial profit, is net income earned after subtracting all explicit costs from total revenue. In effect, it shows the amount of money a firm has left over after deducting the explicit costs of running the business. According to generally accepted accounting principles (GAAP), it includes the explicit costs of doing business, such as operating expenses (SG&A), depreciation, interest paid to creditors and taxes paid to the governments.

Explicit costs include:

- Raw materials purchasing
- Labor, HR, management costs
- Inventory needed for production
- Transportation and logistic costs
- Sales, marketing, distribution costs
- Interest payments and taxes
- Depreciation and loan deductions

Implicit costs include:

- Company-owned buildings, plant and equipment (no outlays)
- Self-employment resources
- The cost of capital (equity)

https://www.investopedia.com/terms/a/accountingprofit.asp

Application: AAPL. Income Statement

Quarterly Data | Millions of US $ except per share data		2019-06-30	2019-03-31	2018-12-31	2018-09-30	2018-06-30
Revenue		**$53,809**	**$58,015**	**$84,310**	**$62,900**	**$53,265**
Cost Of Goods Sold		$33,582	$36,194	$52,279	$38,816	$32,844
Gross Profit		**$20,227**	**$21,821**	**$32,031**	**$24,084**	**$20,421**
Research And Development Expenses		$4,257	$3,948	$3,902	$3,750	$3,701
SG&A Expenses		$4,426	$4,458	$4,783	$4,216	$4,108
Other Operating Income Or Expenses		-	-	-	-	-
Operating Expenses		$42,265	$44,600	$60,964	$46,782	$40,653
Operating Income		**$11,544**	**$13,415**	**$23,346**	**$16,118**	**$12,612**
Total Non-Operating Income/Expense		$367	$378	$560	$303	$672
Pre-Tax Income		**$11,911**	**$13,793**	**$23,906**	**$16,421**	**$13,284**
Income Taxes		$1,867	$2,232	$3,941	$2,296	$1,765
Income After Taxes		**$10,044**	**$11,561**	**$19,965**	**$14,125**	**$11,519**
Other Income		-	-	-	-	-
Income From Continuous Operations		**$10,044**	**$11,561**	**$19,965**	**$14,125**	**$11,519**
Income From Discontinued Operations		-	-	-	-	-
Net Income		**$10,044**	**$11,561**	**$19,965**	**$14,125**	**$11,519**
EBITDA		**$14,477**	**$16,455**	**$26,741**	**$18,872**	**$15,277**
EBIT		**$11,544**	**$13,415**	**$23,346**	**$16,118**	**$12,612**
Basic Shares Outstanding		4,571	4,674	4,736	4,955	4,882
Shares Outstanding		4,601	4,701	4,773	5,000	4,927
Basic EPS		**$2.20**	**$2.47**	**$4.22**	**$2.98**	**$2.36**
EPS - Earnings Per Share		**$2.18**	**$2.46**	**$4.18**	**$2.95**	**$2.34**

www.macrotrends.net/stocks/charts/AAPL/apple/income-statement

https://finance.yahoo.com/quote/AAPL?p=AAPL

Accounting Profit: Example

During the harvest, the apple farm owner hires 20 workers to harvest apples for 8 hours a day. Each worker, on average, can pick 40 apples per hour. Suppose the worker's wage is $10 per hour and each apple is sold at $0.5 in the market. What is the profit?

1. What is the profit when apple price falls to $0.4?
2. What is the profit when apple price falls to $0.2?
3. What determine the size of accounting profit?
4. Which production factor shall earn the profit?
5. What is the nature of profit? Is it an income? Is it a cost?
6. What is the implicit cost (I.C.) of managing an apple orchard?
7. What is the opportunity cost (O.C.) of owning the apple farm?

Summary of Textbook Costs

The Many Types of Cost: A Summary

Term	Definition	Description
Explicit costs	Costs that require an outlay of money by the firm	
Implicit costs	Costs that do not require an outlay of money by the firm	
Fixed costs	Costs that do not vary with the quantity of output produced	FC
Variable costs	Costs that vary with the quantity of output produced	VC
Total cost	The market value of all the inputs that a firm uses in production	$TC = FC + VC$
Average fixed cost	Fixed cost divided by the quantity of output	$AFC = FC/Q$
Average variable cost	Variable cost divided by the quantity of output	$AVC = VC/Q$
Average total cost	Total cost divided by the quantity of output	$ATC = TC/Q$
Marginal cost	The increase in total cost that arises from an extra unit of production	$MC = \Delta TC/\Delta Q$

N. Mankiw, CH13, Principles of Microeconomics, 8th edition. Cengage.

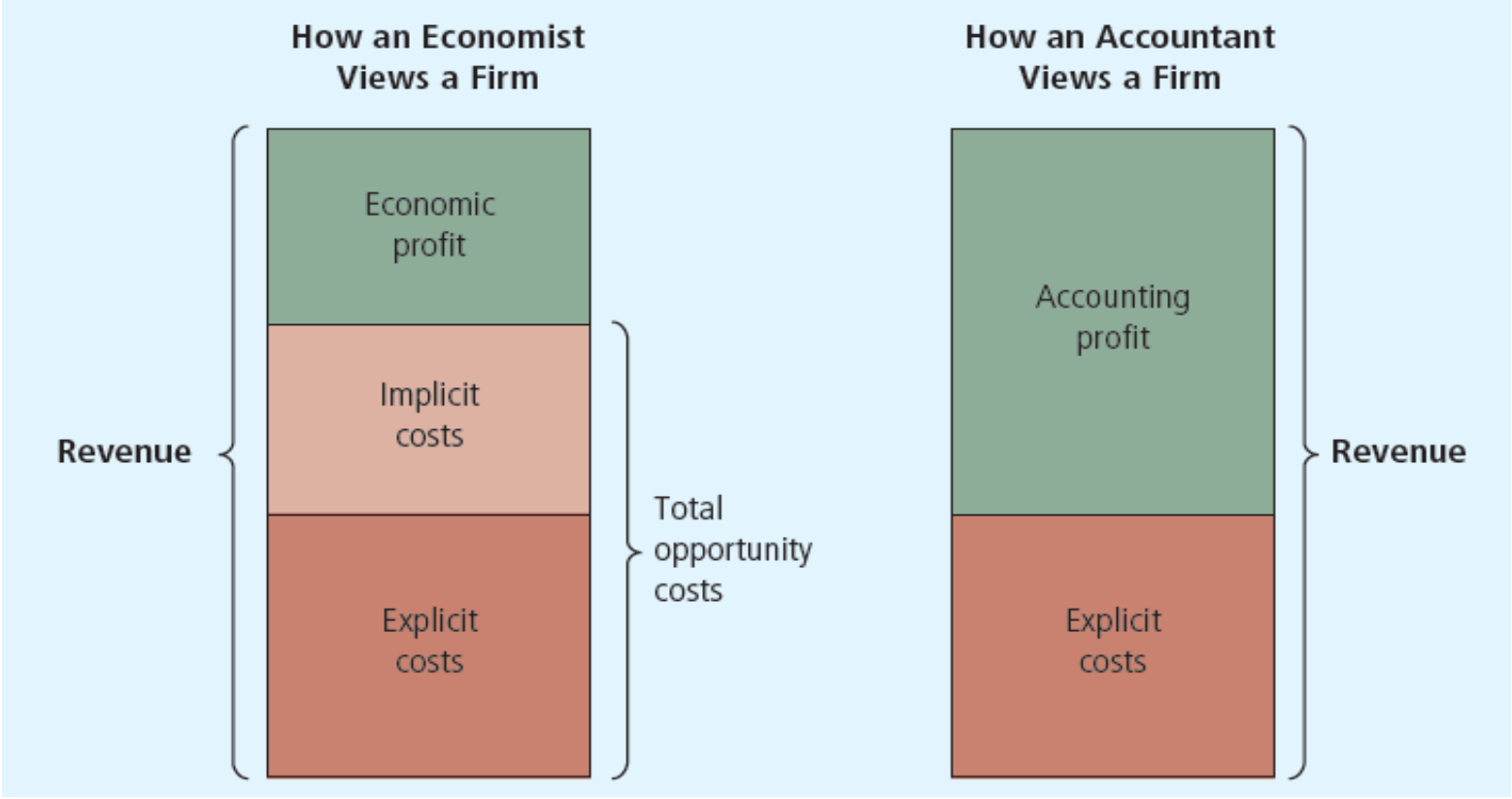
Direct Cost vs Overhead Cost

- **Direct Cost:** the amount paid as production and operation continues. It changes directly with the quantity of output being produced. It is similar to explicit cost, which includes variable and fixed costs.
- To start up a business, some initial investment is indispensable. Once in business, the investment is not a direct cost any more.
- However, for book-keeping purposes, accountants record past investment as historical or sunk costs, accounting for depreciation.
- Economists shall NOT focus on historical or accounting costs because the decision maker can change or sell the business.
- **Overhead Cost:** the amount earned by selling the entire business outright (liquidation). This is the alternative of staying in business, therefore an economic cost (not a historical or fixed cost). Overhead cost is not a cost in the short run as long as the business continues to operate.

Accounting vs Economic Profit

- **Total Revenue=TR=Price*Quantity**
- **Total Costs=EC+IC=DC+OC=FC+VC**
- **Accounting Profit=TR-EC=PQ-EC**
- **Economic Profit= TR-TC=TR-(EC+IC)=(P-ATC)Q**
- **Given price P and wage W, profit is also a function of Q.**
- Accounting is based on the explicit costs on the book. In practice, accounts do not count dividends paid to shareholders as profit. Instead, they distribute dividends from the profit.
- Economic profit nets out the tied-up capital costs, which includes interest to lenders and dividends to the shareholders.
- Economic profit is more conservative than accounting profit to serve as a benchmark return for business and investment.

Economic Profit vs Accounting Profit



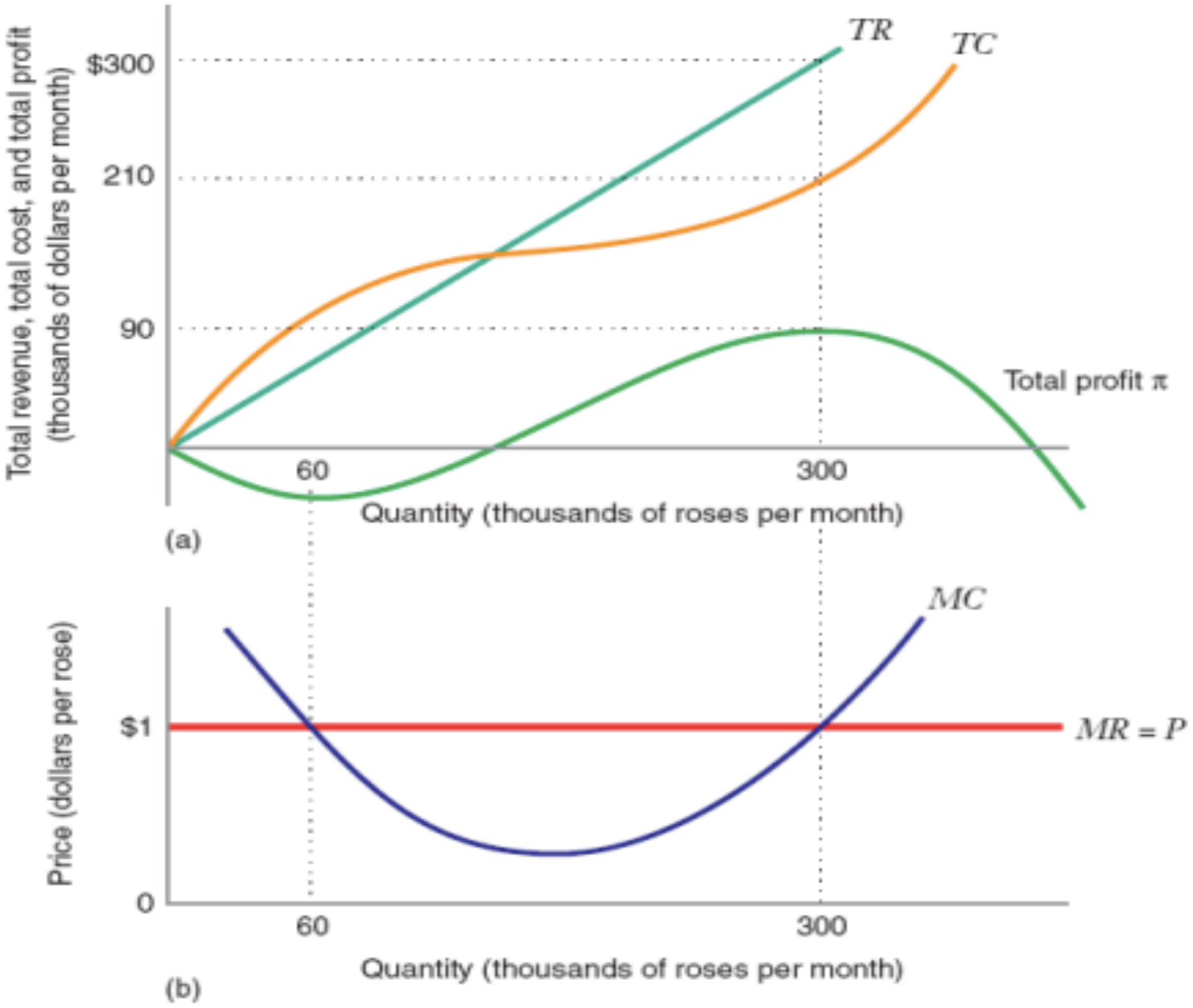
- Economic profit: total revenue minus total cost (TR-TC).
- Accounting profit: total revenue minus total explicit cost.

N. Mankiw, CH13, Principles of Microeconomics, 8th edition. Cengage.

Profit Maximization: Example

- Suppose P=$3, MC=$(Q-2)^2+1$, what is the Q that maximizes profit? Graph the relation for profit and Q.
- Can you derive the functions for TR and TC?

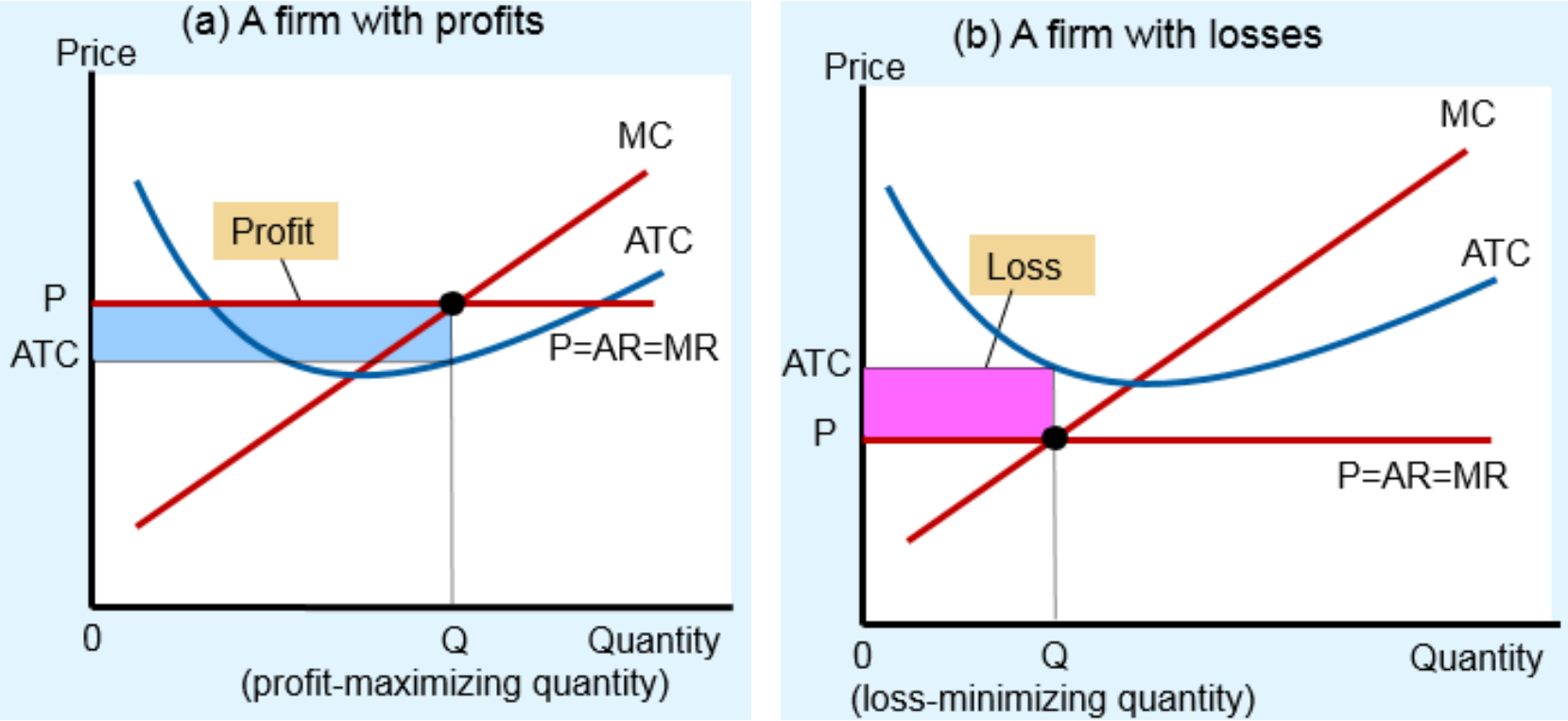
Q	P $	TR $	MR $	MC $	TC $	TR-TC $
1	3					
2	3					
3	3					
4	3					
5	3					


Total revenue, total cost, and total profit (thousands of dollars per month)
$300
210
90
TR
TC
Total profit π
60
300
Quantity (thousands of roses per month)
(a)
Price (dollars per rose)
$1
0
MC
MR = P
60
300
Quantity (thousands of roses per month)
(b)

Profit Maximization: MR=MC

- To maximize accounting/economic profit, the firm must balance two factors at the same time—the total revenue and total costs, both are functions of total quantity sold. Profit=TR(Q)-TC(Q)
- Remember the relation between the marginal variable and the total variable. As long as MR>0, TR will increase.
- If MR>MC, total revenue increases faster than the total cost, the firm's economic profit will still increase.
- If MC>MR, total cost rises faster than the total revenue, the firm's profit will start to decrease. Where is the optimal solution then?
- The principle to maximize net income (profit) is called marginal equalization: **MR=MC.** (first order necessary condition)

Economic Profit and Losses



The area of the shaded box between price and average total cost represents the firm's economic profit. The height of this box is price minus average total cost (P – ATC), and the width of the box is the quantity of output (Q). In panel (a), price > average total cost, so the firm has positive profit. In panel (b), price < average total cost, so the firm incurs a loss.

N. Mankiw, CH14, Principles of Microeconomics, 8th edition. Cengage.

Source of Profit: Uncertainty

- Frank H. Knight was one of the founders of the so-called Chicago school of economics, of which Milton Friedman and George Stigler were the leading members from the 1950s to the 1980s.
- In ***Risk, Uncertainty, and Profit (1921),*** Knight set out to explain the source of profits in a perfectly competitive market. His explanation was "uncertainty," which differs from risk.
- According to Knight, "risk" refers to a situation in which the probability of an outcome can be determined, and therefore the outcome insured against. "Uncertainty," by contrast, refers to an event whose probability cannot be known. Knight argued that **even in long-run equilibrium, entrepreneurs would earn profits as a return for putting up with uncertainty–the opportunity cost of forgoing secured income.**

https://www.econlib.org/library/Enc/bios/Knight.html

Adam Smith on the Rate of Profit

OF THE PROFITS OF STOCK

I.9.1 The rise and fall in the profits of stock depend upon the same causes with the rise and fall in the wages of labour, the increasing or declining state of the wealth of the society; but those causes affect the one and the other very differently.

I.9.2 ***The increase of stock, which raises wages, tends to lower profit.*** *When the stocks of many rich merchants are turned into the same trade, their mutual competition naturally tends to lower its profit; and when there is a like increase of stock in all the different trades carried on in the same society, the same competition must produce the same effect in them all.*

https://hurricanecapital.wordpress.com/2015/11/19/adam-smith-on-the-profits-of-stock/

Adam Smith on the Rate of Profit

I.9.3 It is not easy, it has already been observed, to ascertain what are the average wages of labour even in a particular place, and at a particular time. We can, even in this case, seldom determine more than what are the most usual wages. But even this can seldom be done with regard to the profits of stock. ***Profit is so very fluctuating, that the person who carries on a particular trade cannot always tell you himself what is the average of his annual profit.*** *It is affected, not only by every variation of price in the commodities which he deals in, but by the good or bad fortune both of his rivals and of his customers, and by a thousand other accidents to which goods when carried either by sea or by land, or even when stored in a warehouse, are liable. It varies, therefore, not only from year to year, but from day to day, and almost from hour to hour. To ascertain what is the average profit of all the different trades carried on in a great kingdom, must be much more difficult; and to judge of what it may have been formerly, or in remote periods of time, with any degree of precision, must be altogether impossible.*

https://hurricanecapital.wordpress.com/2015/11/19/adam-smith-on-the-profits-of-stock/

Classical Political Economy: Rent

- The classical economists used the term economic rent as that part of the total payment which is made for the use of land only as distinguished from the payment made for the capital invested therein. In modern economics, rent is increasingly being used in the sense of a surplus, i.e., what a factor earns over and above what is essential to maintain its supplies in its present occupation.
- In other words, it is the amount that a factor must earn in its present use to prevent it from moving (i.e., transferring its service) to another use. It is the opportunity cost of resources. An excess of actual return over this amount is treated as surplus income or economic rent. Thus, in modem terminology, transfer income is necessary income and economic rent is surplus income. The composition of the two in total factor income affects the mobility and allocation of factors.

http://www.economicsdiscussion.net/theory-of-rent/rent-meaning-and-economic-rent/1789

Economic Rent: Example

Three income choices A, B, or C

	Income	D.C.	Profit	O.C.	Rent
A	$1000	$1200	-$200	$3000	-$2000
B	$2000	$1200	$800	$3000	-$1000
C	$3000	$1200	$1800	$2000	$1000

What are the economic cost and rent of A, B, C?

Which is the optimal decision? Four equivalent answers.

Highest income, highest profit, lowest cost, highest rent.

Economic rent is a surplus over the second-best profit.

Loosely speaking, rent and profit can be used interchangeably.

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