6. MARKET EFFICIENCY

ECON1005 Principles of Economics I (Microeconomics)

1. WHAT IS MARKET EFFICIENCY?

- In a market economy, no single person directs the process of resources allocation. Instead, prices act as signals that coordinate the decisions of buyers and sellers.
  - ***Do markets do a good job ensuring resources go where they are more valued?***

- **Market efficiency** (also called *allocative efficiency*) happens when resources are used in a way that **maximizes the total benefits to all participants in the market**.
  - That is, the goods produced are exactly what people want, and no resources are wasted.
  - So, all potential benefits in the market are captured.

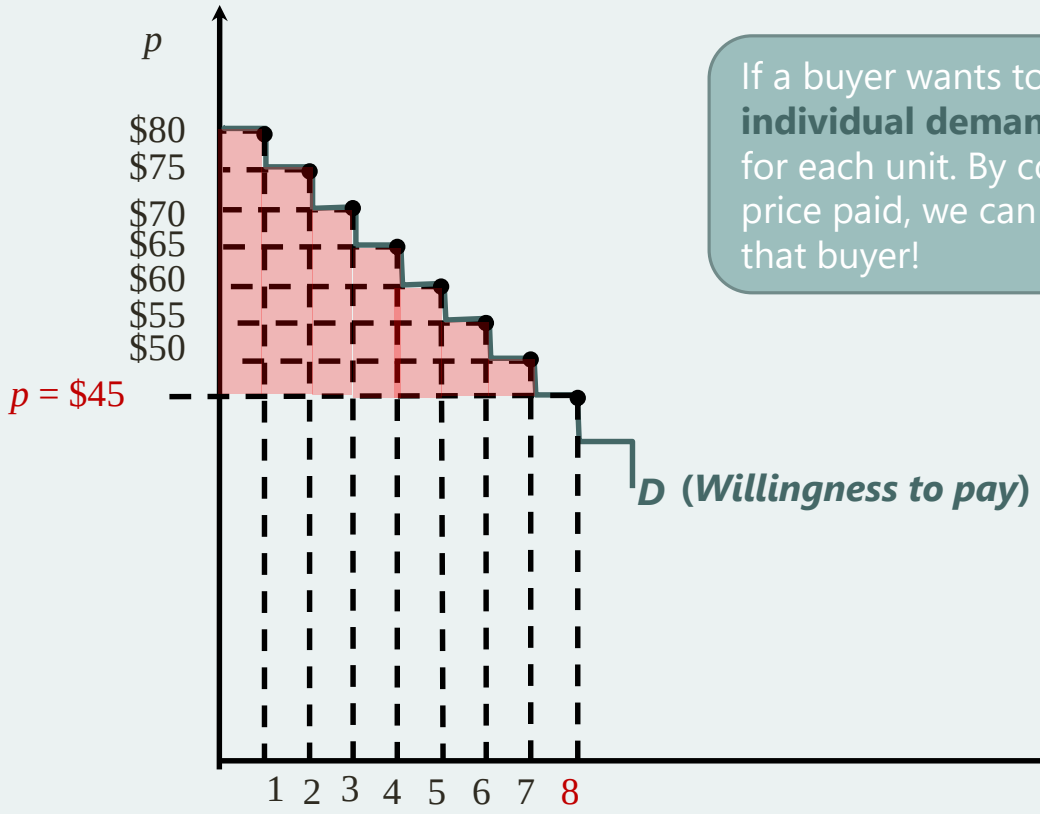
- Recall that it is inefficient (or *productive inefficient*) if more of one good can be produced without reducing production of any other good (i.e. inside the PPF), due to unemployment of resources or misallocation of resources (see Topic 1).
  - **Productive efficiency** is necessary but not enough for market efficiency. Avoiding waste is necessary, but the economy also needs to produce the right mix of goods that people value most.

- To measure the benefits created for market participants, economists use **consumer surplus** and **producer surplus**, which are measured ***in monetary terms***.

2. CONSUMER SURPLUS

- **Consumer surplus** is the difference between the maximum price a buyer is willing to pay for a good and the actual price they pay.

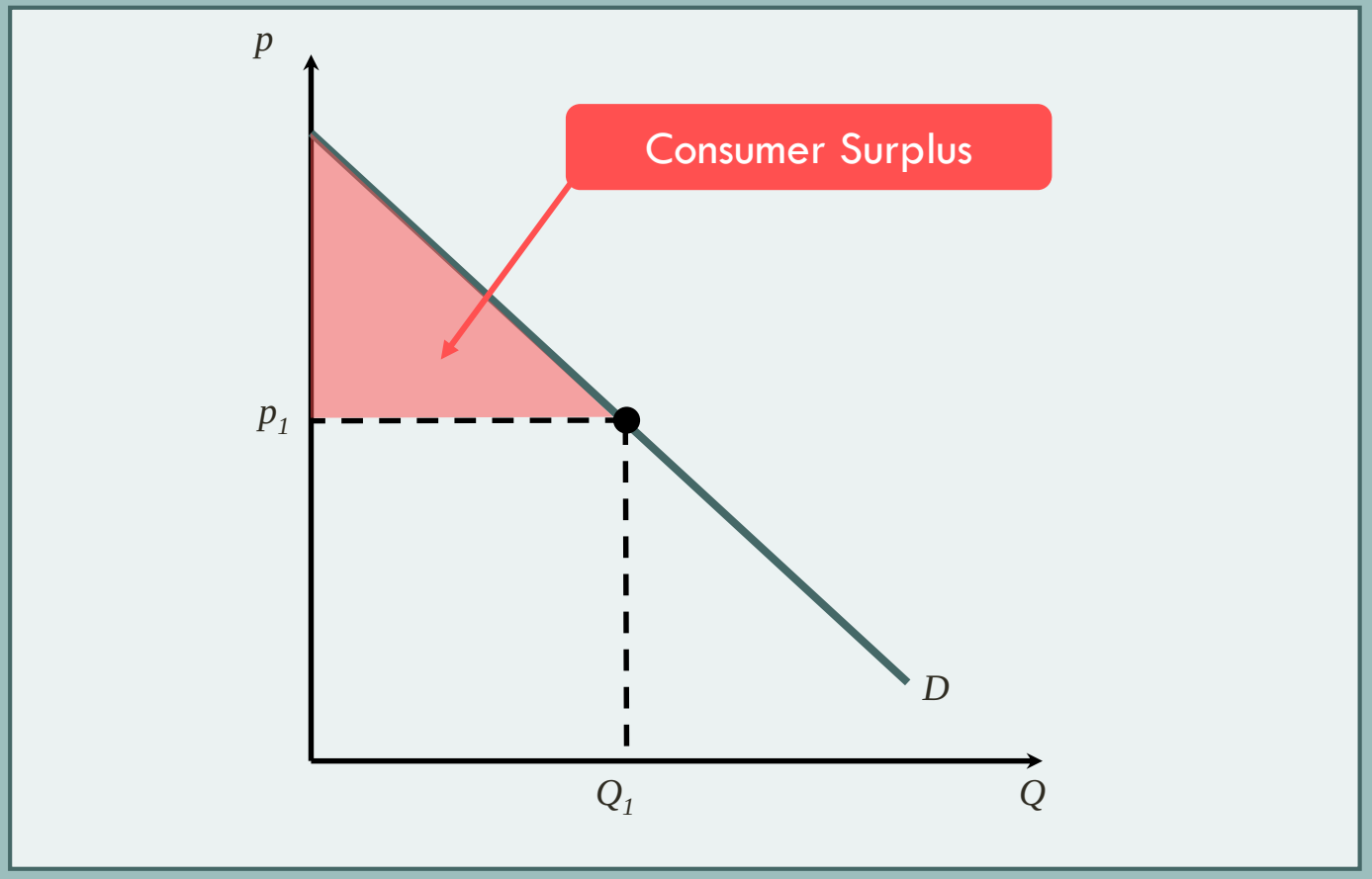
Consumer Surplus (CS) = Maximum Willingness to Pay – Price Actually Paid



If a buyer wants to purchase multiple units, their **individual demand curve** shows their willingness to pay for each unit. By comparing these amounts to the actual price paid, we can calculate the total consumer surplus for that buyer!

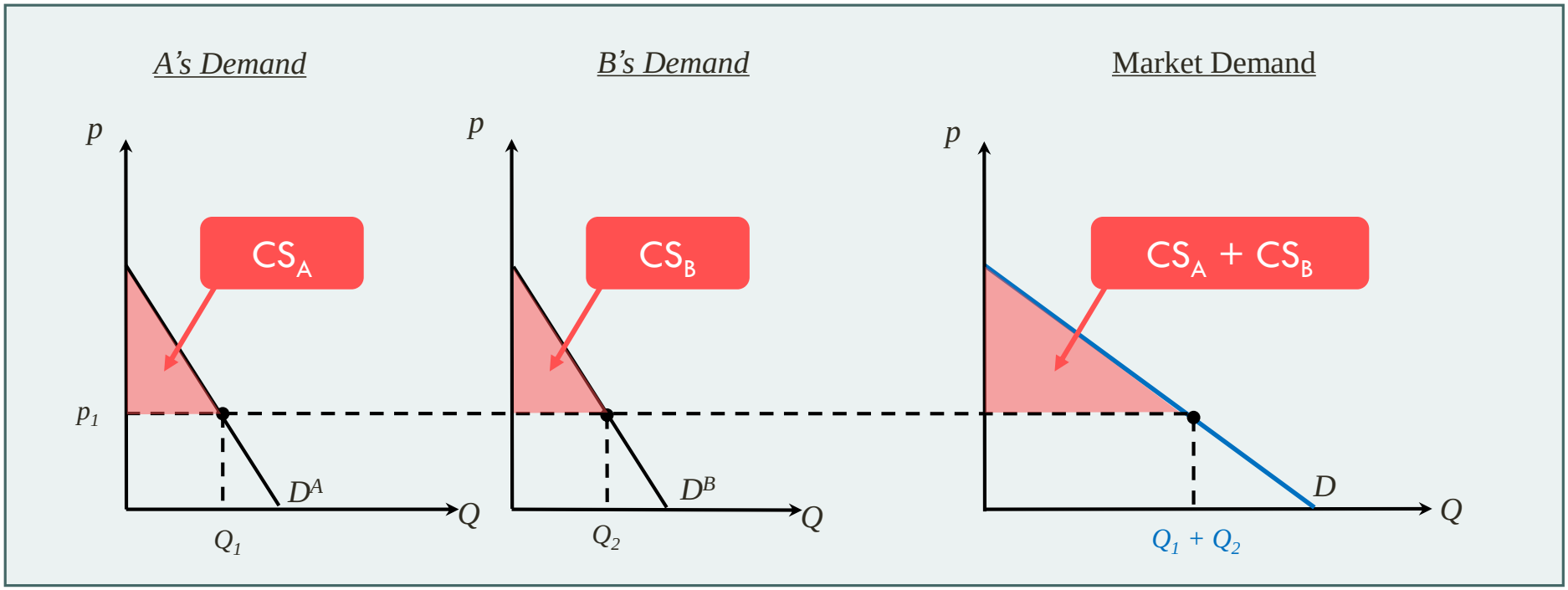


- Consumer surplus can be easily visualized graphically. *For any quantity the consumer buys,*
  - ***the total consumer surplus is the area under the demand curve and above the price paid, from zero up to the quantity bought.***



2. CONSUMER SURPLUS

- The total consumer surplus gained by *ALL* consumers in a market is the sum of the consumer surpluses on all units bought by all consumers.
- As the market demand curve is obtained by the horizontal summation of the individual demand curves, the total consumer surplus can be found directly using the market demand curve.
  - **The area under the market demand curve and above the market price.**



APPLICATION: CONSUMER SURPLUS - UBER

- The effects of Uber on the transportation industry are complex. Most media coverage focuses on the negative impacts, while the **benefits to commuters are often overlooked**.
- Using Uber's "surge" pricing algorithm and the big data analysis, economists (with Uber) have estimated the Uber demand curve (Cohen et al., 2016).
  - Based on nearly 50 million individual-level observations from four largest U.S. markets, they estimated **price elasticities mainly between -0.4 and -0.6**
  - For each dollar spent by consumers, **Uber generates about $1.60 in consumer surplus**, amounting **$6.8 billion in consumer surplus** across the U.S. in 2015.
- Further research using Uber, U.S. government and Google map data, Qiu (2021) found:
  - Consumer surplus per trip ranges from **$0.76 to $2.85 per person**,
  - Total **annual consumer surplus** from Uber in **San Francisco** alone is **around $100 million**!



(Source: Qiu, J., What does Uber bring for consumers?, *Data Science and Management 2*, 2021: 20-27; Cohen P., Hahn, R., Hall, J., Levitt, S., & Metcalfe, R. (2016). *Using big data to estimate consumer surplus: The case of Uber*. National Bureau of Economic Research.)

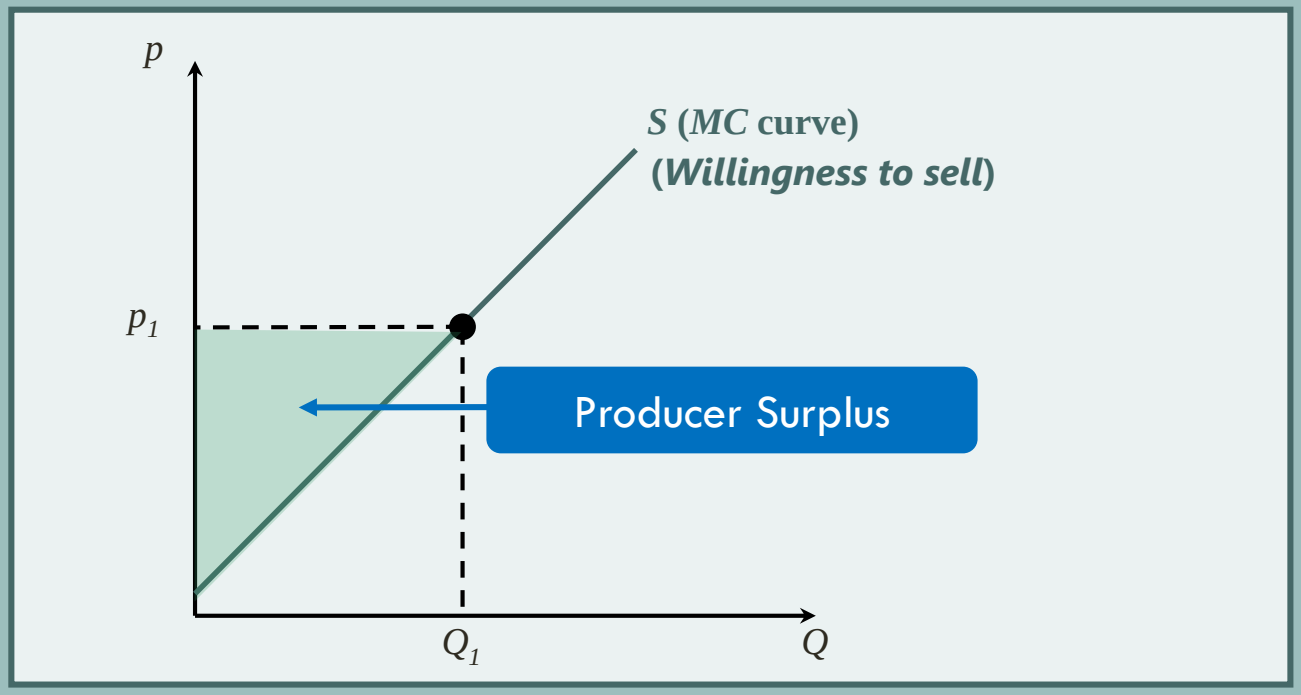
3. PRODUCER SURPLUS

- **Producer surplus** is the difference between the price a seller actually receives for a good and the minimum price they are willing to sell it.

  Producer Surplus (PS) = Price Actually Received – Minimum Willingness to Sell

- For sellers, the **minimum willingness to sell** for each unit equals its **marginal cost (MC)**, as they are willing to sell only if the marginal cost of that unit is covered.

  - The firm's ***MC* curve** (also the individual **firm's supply curve** in competitive markets) shows their willingness to sell for each unit. By comparing these amounts to the actual price received, we can calculate the total producer surplus for that seller!



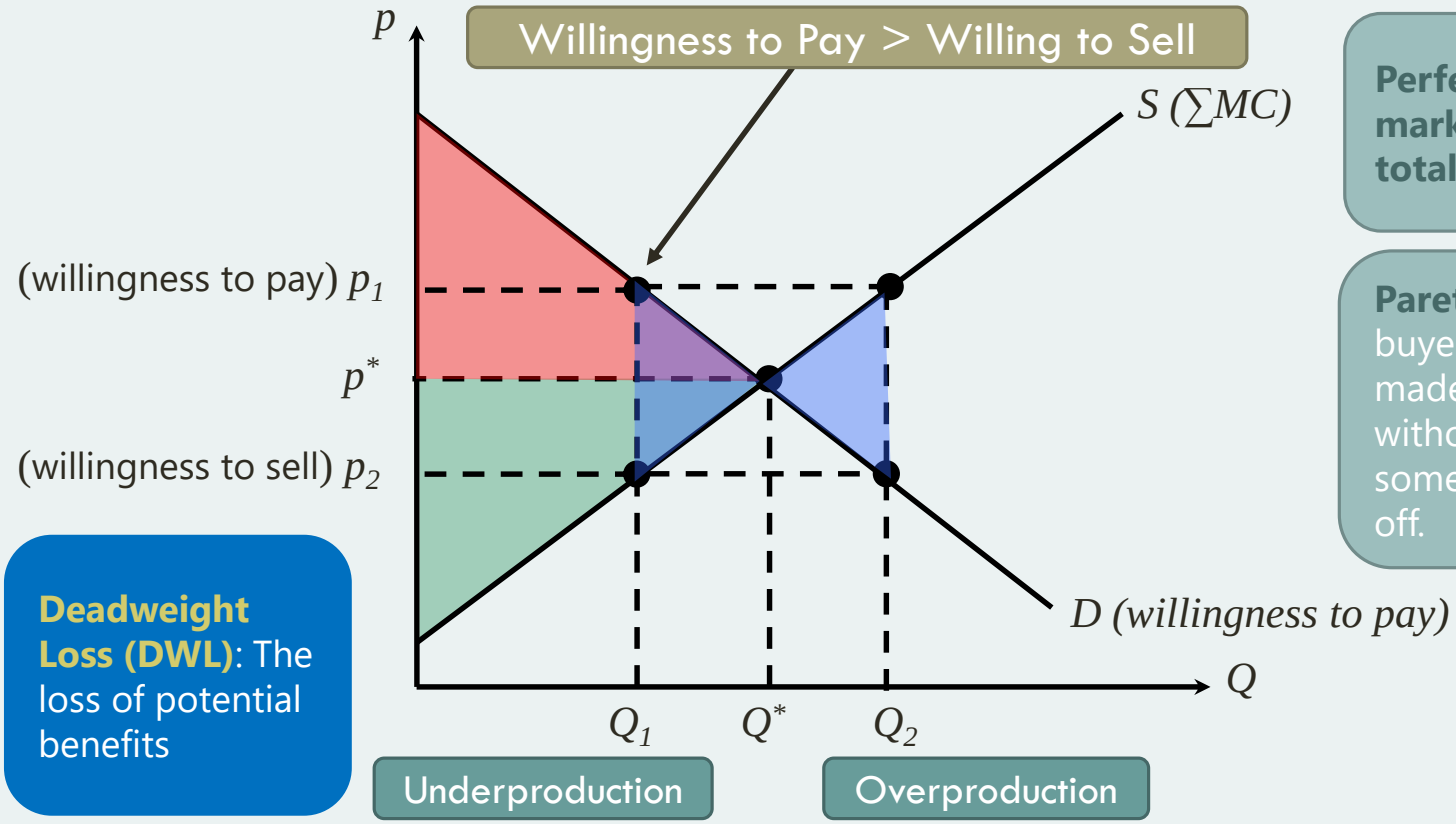
- The total producer surplus gained by *ALL* sellers in a market is the sum of the producer surpluses on all units sold by all sellers.

- As the market supply curve is obtained by the horizontal summation of the individual supply curves, the total producer surplus can be found directly using the market supply curve (for competitive markets).
  - **The area above the market supply curve and below the market price.**

4. DO PERFECTLY COMPETITIVE MARKETS EFFICIENT?

- A commonly used measure of the total benefits in a market is **total surplus** (also called **social welfare** in welfare economics). In a market **without government intervention**:

Total Surplus (or Welfare) = *CS* + *PS*



Perfectly competitive markets maximize total surplus!

Pareto Efficiency: No buyer or seller can be made better off without making someone else worse off.

Deadweight Loss (DWL): The loss of potential benefits

4. DO PERFECTLY COMPETITIVE MARKETS EFFICIENT?

- Perfectly competitive markets maximize total surplus and achieve market efficiency, even though each individual is only pursuing their own self-interest.

- This is what Adam Smith, the father of economics, meant when he suggested the term **invisible hand** in his book, *The Wealth of Nation*, to describe the force that leads a competitive economy toward economic efficiency:

> *[The individual] neither intends to promote the public interest, nor knows how much he is promoting it … he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was not part of his intention.*

APPLICATION: UBERNOMICS AT WORK?

(Source: Hall J., Kendrick, C., Nosko C. (2015). *Dynamic Labor Supply in the Sharing Economy*. (working paper))

- Hall et al. (2015) explored Uber's use of **surge pricing** and examine how it achieves market efficiency with a natural experiment.

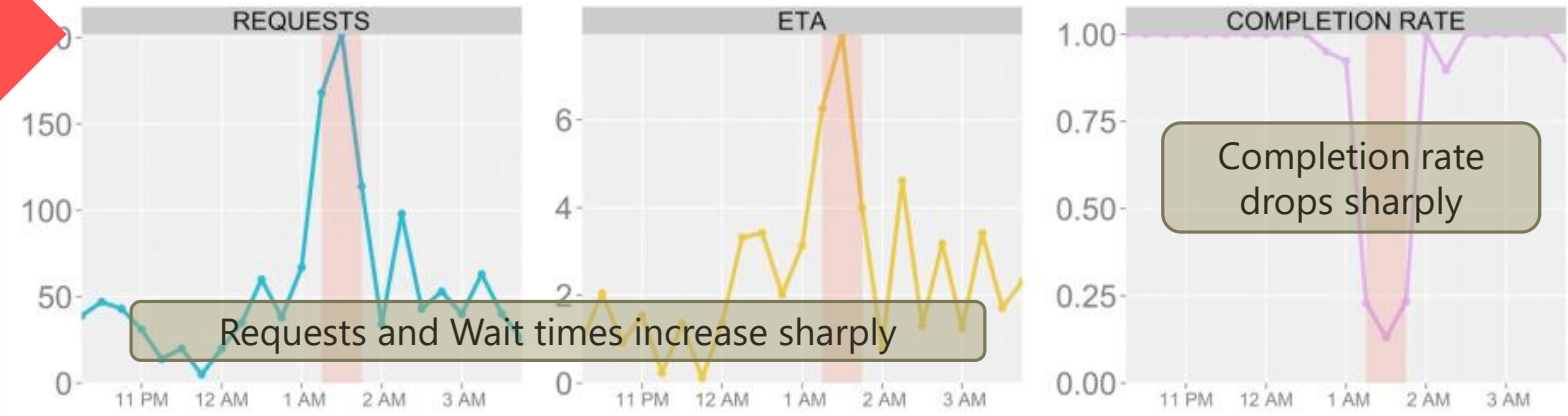
After Ariana Grande concert

Demand Surge with Flexible Pricing (normal)

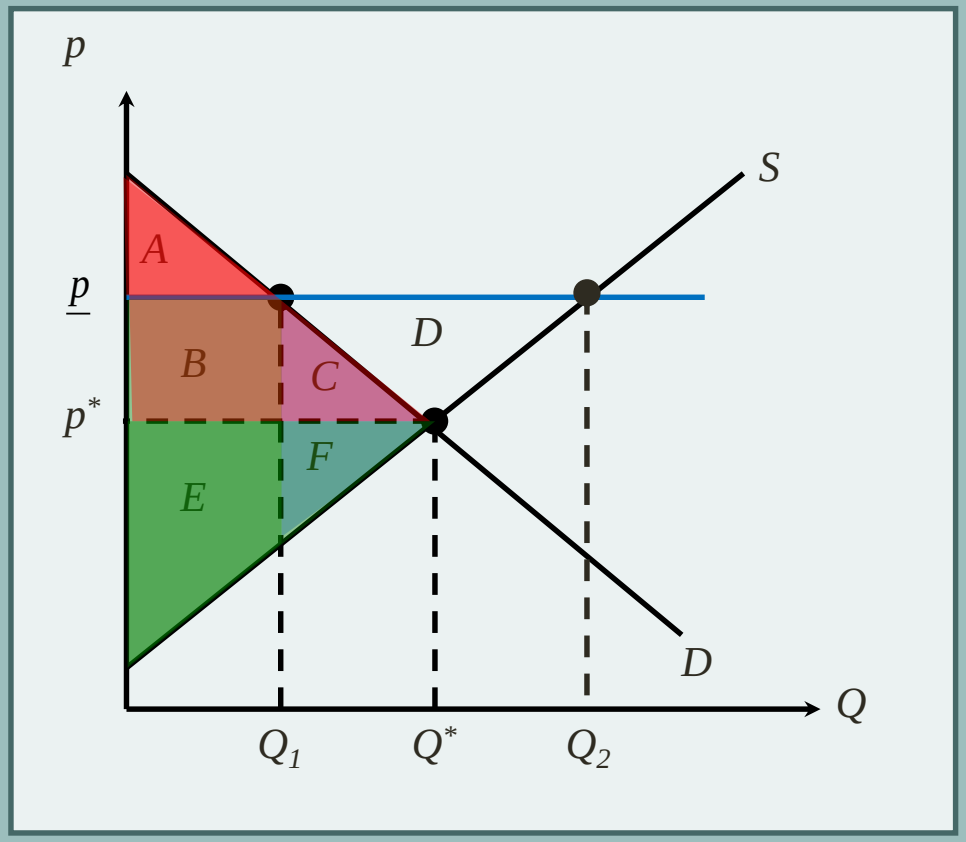


New Year 2015

Demand Surge with Fixed Pricing (20 min without surge)



APPLICATION 1: PRICE FLOOR



How about price ceiling (See HW exercises)

	Competitive Equilibrium	With Price Floor	Change
CS			
PS			
Welfare			

APPLICATION: THE RICE MOUNTAIN

- Asian countries consume 90% of the world's rice. Many Asian countries intervene the rice market through subsidies and other support schemes for domestic producers.
  - But the costs are high
- **Thailand** is a notable example. During the 2011 election campaign, Prime Minister Yingluck Shinawatra promised that if elected, her government would buy rice directly from farmers at about **twice the normal market price** (15,000 baht, or about $500 per tonne).
  - As two-fifths of Thais work as rice farmers, this policy helped her win a landslide election victory.

The Economist

Thai rice

Less paddy power

Populist politics mess up Thailand's biggest crop

Jul 14th 2012 | BANGKOK | from the print edition

IN FEW other countries is self-image as bound up with one crop as it is in Thailand with rice. The country's fragrant Hom Mali grain, in particular, has become justifiably famous among types of jasmine rice. For 30 years or more the country has been the world's biggest rice exporter.



The jasmine-scented whiff of vote-buying

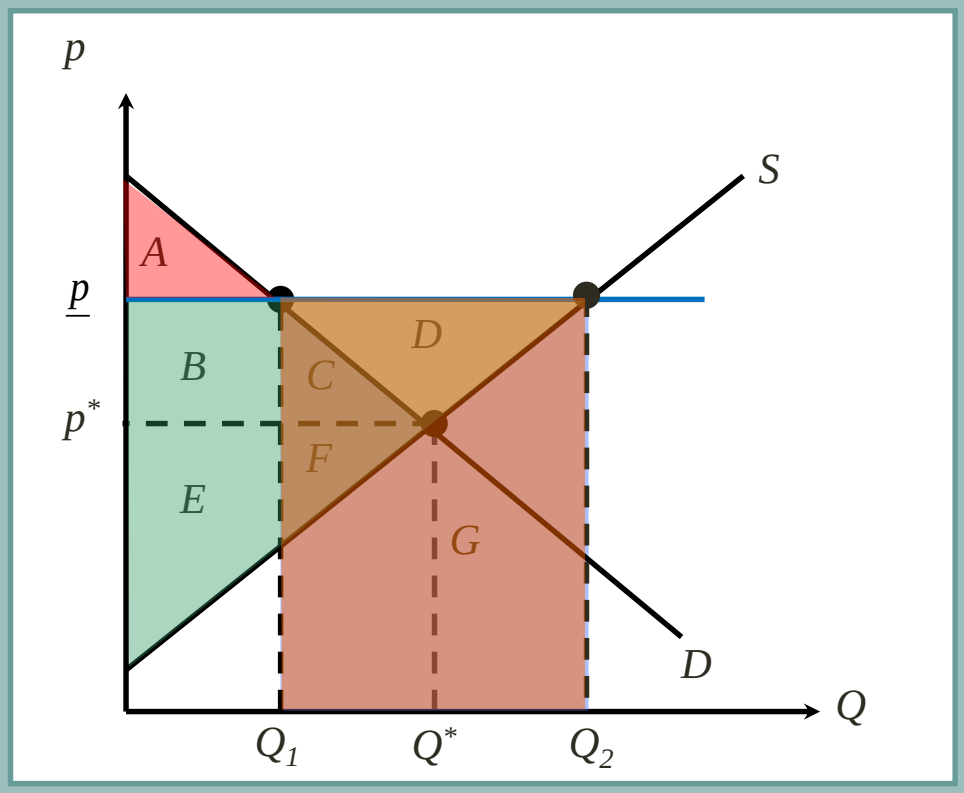
Now, however, its pre-eminence is under threat. The country's most respected economic think-tank, the Thailand Development Research Institute, recently reported that exports had fallen by 44% year-on-year since January, making it almost certain that the country would be knocked off its perch as the number-one exporter by either India or Vietnam. This is alarming exporters and has an unsavoury political taste to it. To many, it is the consequence of a populist new subsidy for rice farmers, who form a bedrock of support for Yingluck Shinawatra, the prime minister elected by a landslide a year ago.

Under the "rice-mortgage scheme", introduced last September, the government buys rice direct from farmers at about twice the normal market price; 15,000 baht (about $500) a tonne for ordinary white rice

(Source: Paddy-whacked, *The* Economist, Nov 14th, 2016; Less paddy power, *The Economist*, Jul 14, 2012; The rice mountain, Aug 10, 2013.)



PRICE FLOOR (WITH DIRECT PURCHASE)



What is the main problem of this policy?

- Setting a guaranteed price above the market level leads to overproduction, huge government costs, and inefficient allocation of resources.
  - Thai government is forced to stockpile 18 million tonnes of rice – equivalent to nearly half of the annual global trade in rice.
  - It costs the Thai government $12.5 billion in the first year of operation.
  - Storing rice also carries administrative and logistical costs, and demand expensive new warehouses. And rice always deteriorates!

	Competitive Equilibrium	With Price Floor + Direct Purchase	Change
CS	*A + B + C*		
PS	*E + F*		
Gov't Tax Revenue (T)	*0*		
Welfare	*A + B + C + E + F*		



Asia — The Economist August 1

Thailand's economy

The rice mountain

BANGKOK

An increasingly unpopular government sticks to its worst and most costly policy

IT HAS not been a happy second anniversary for the government of Yingluck Shinawatra. Thousands of diehard opponents of her elder brother Thaksin Shinawatra, himself a former prime minister, took to

the market rate, or 15,000 baht (about $500) per tonne. This would put money into poor farmers' pockets and stimulate domestic demand. Naysayers warned that the scheme would be impossibly expen-

nated with substandard rice. (gangs and bent officials are said smuggled in thousands of tonnes grain from Cambodia and Myanm hope of profiting from governm gesse. This rice has got mixed in w grain. A good deal of Thailand's ri grade Hom Mali, or jasmine rice. ty, and reputation, matter.

Poor quality may be one reas the latest auction of rice stocks wa appointing. The government mar sell just 210,000 tonnes, well sh hoped-for 1m tonnes. But this wa matter of plain economics, says Yi

(Source: Paddy-whacked, The Economist, Nov 14th, 2016; Less paddy power, The Economist, Jul 14, 2012; The rice mountain, The Economist, Aug 10, 2013.)

Inside Missouri Cheese Cave: Why Does the U.S. Government Store Billion Pounds of Dairy?

By Conelisa N. Hubilla Published: Jul 06 2023, 09:30 AM EDT

In the U.S., Missouri is known for having many caves. Having approximately 7,500 shelters, Missouri became famous for being the Cave State. It has commercial caves that attract visitors, such as the Fantastic Caverns and Meramec Caverns. There are also less popular, nameless caves along the state parks and landscapes. Unbeknownst to many, Missouri is also home to caverns filled with tremendous cheese.



(PHOTO: WIKIMEDIA COMMONS/ KILLERSAM)

APPLICATION: THE RICE MOUNTAIN

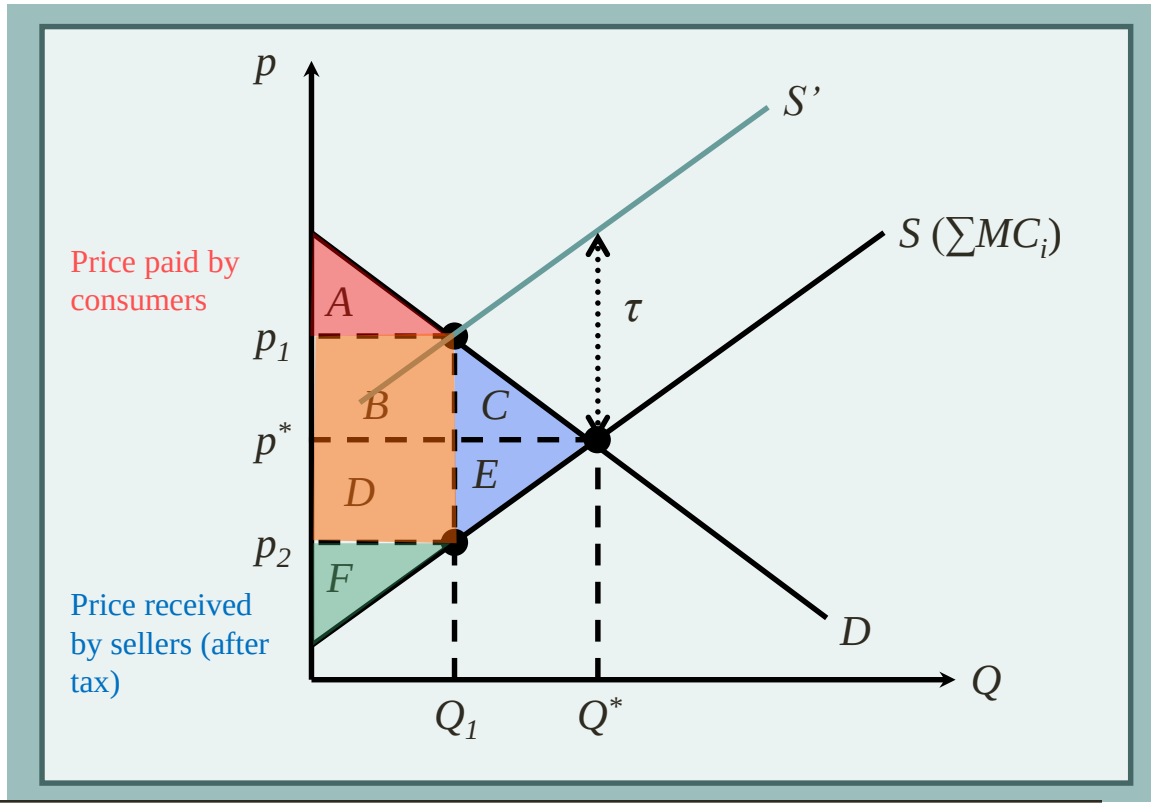
- The scheme is disastrous!
  - Thai's rice became uncompetitive against other countries, including India and Vietnam, and Thailand dropped from the top spot to third place among the world's rice exporters.
- *Why doesn't the Thai government sell the rice to domestic consumers?*
  - Why buy now when the government will be forced to sell overflowing stocks later, at almost any price?
- Thailand is not alone! Government interventions in agriculture often create **deadweight loss**:
  - U.S.: **Cheese cave**
  - EU: CAP (Common Agricultural Policy) - **Butter mountain, Wine lakes**
  - India: MSP (Minimum Price Support) on **Wheat and Rice**
  - China: **Pork and Soybean** Stockpiling

APPLICATION 2: SALES TAX



Targeting Big Tech, Maryland becomes first state to tax digital advertising, *CNN Business*, 12 Feb, 2021.

- In 2020, Maryland became the first U.S. state to impose **a digital advertising tax**, i.e. a sales tax on companies that sell digital ads.
- Suppose the government imposes a unit tax of τ on online digital advertising companies.
- The deadweight loss is due to underproduction



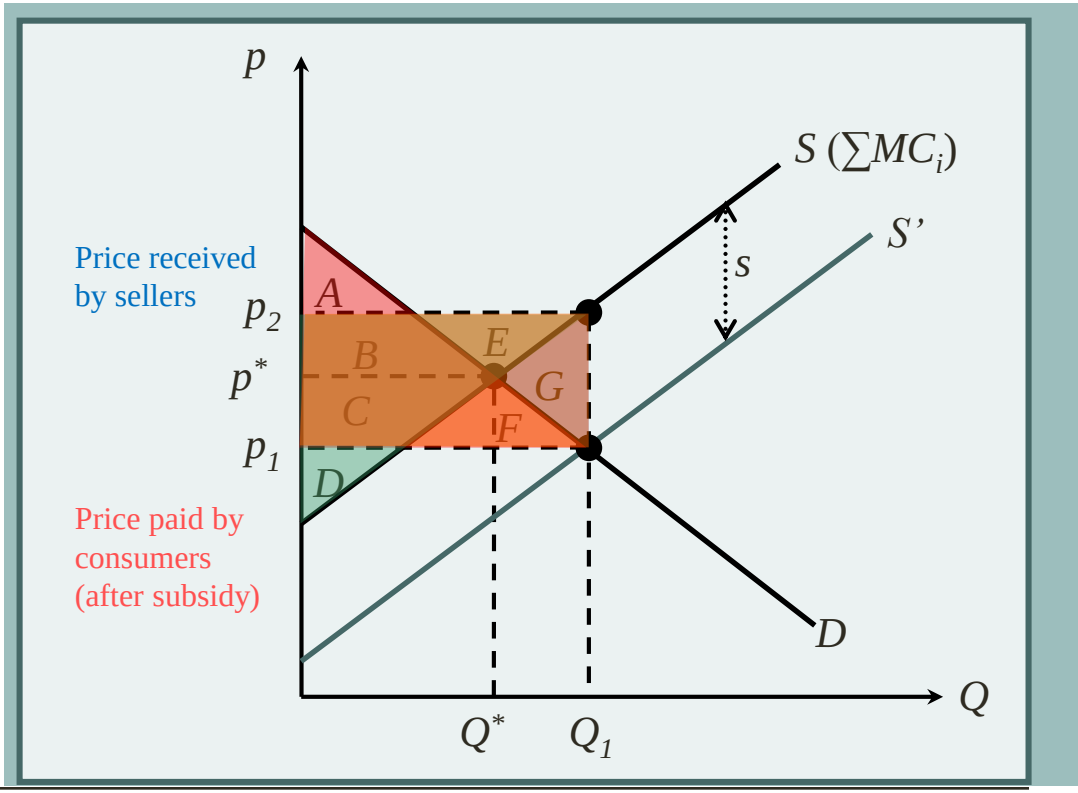
	Competitive Equilibrium	Sales Tax	Change
CS	$A + B + C$		
PS	$D + E + F$		
Gov't Tax Revenue (T)	0		
Welfare	$A + B + C + D + E + F$		

APPLICATION 3: SUBSIDY

Coal subsidies, policy instability threaten Asia's energy transition, *Reuters*, 10 Sept, 2025.



- Many Asian countries, including China and Indonesia, subsidize fossil fuel, such as **coal**.
- Suppose the government provides a unit subsidy of *s* for coal producers.
- The deadweight loss is due to overproduction.



	Competitive Equilibrium	Subsidy	Change
CS	*A + B*		
PS	*C + D*		
Gov't Tax Revenue (T)	*0*		
Welfare	*A + B + C + D*		