An Introduction to Economics

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A note on Problem Set 2

- Problem 1(e) had a typo. Instead of saying, "alongside the change in prices of mobile devices from part (c)," it should say "part (d)."

Surplus: Motivating Example

- A local supplier is able to produce air conditioners at an increasing cost. It costs \$110 to produce the first unit, and \$130 to produce the second unit.
- There are two consumers:
  - Consumer A lives on the third floor of an old house and is willing to pay up to \$200 for the air conditioner
  - Consumer B lives on the first floor of a new apartment complex and is willing to pay up to \$120 for an air conditioner

Surplus: Motivating Example (2)

- Is there a price at which the supplier would agree to sell both units and in which both consumers would be willing to purchase at this price?
- Suppose now that the supplier knows the willingness to pay of each buyer and can charge them different prices. If they want to maximize profit, what should they do?
- What is the *net social benefit* generated when the supplier trades their first air conditioner to consumer A?
- Suppose that we were interested in finding the trades that maximize net social benefit, what trades should occur? What prices allow this to happen?

Total Surplus

Definition

The *total surplus* is the difference between the consumer's willingness to pay and the producer's cost of providing the good.

- Can be thought of as the *net social benefit* arising from the transaction.
- When a consumer's willingness to pay is greater than the producer's cost of providing the good, there is surplus to be had and the two agents can split the surplus by determining an agreeable price.

Consumer Surplus: An Interpretation

Definition

The *consumer surplus* generated by a transaction is the difference between the consumer's willingness to pay and the actual price that they pay.

- Consumer surplus is a measure of the *net benefit* for a consumer from making an exchange at a given price.
- Can be thought of as the "consumer's cut" of the *total surplus* generated by the transaction.

Producer Surplus: An Interpretation

Definition

The *producer surplus* generated by a transaction is the difference between the price and the producer's cost of providing the good.

- This it the "producer's cut" of the *total surplus* generated by the transaction.
- For an individual firm, this is their profit from the transaction.

Surplus in the Market

- Within a setting with a large number of agents, we consider the willingness to pay of the marginal consumer at a point along the demand curve.
- Similarly, a point on the supply curve denotes the marginal cost of supplying another unit to the market.
- To determine total consumer surplus, we must consider the total benefits accrued by every consumer along the demand curve. A similar argument holds for producers.

Numerical Example

Consider the following supply and demand curves in the market for used economics textbooks:

$$Q_d = 25 - P$$

$$Q_s = \frac{3P}{2} - 20$$

- Can we determine the consumer and producer surplus graphically?
- How does this relate to efficiency?

Numerical Example (2)

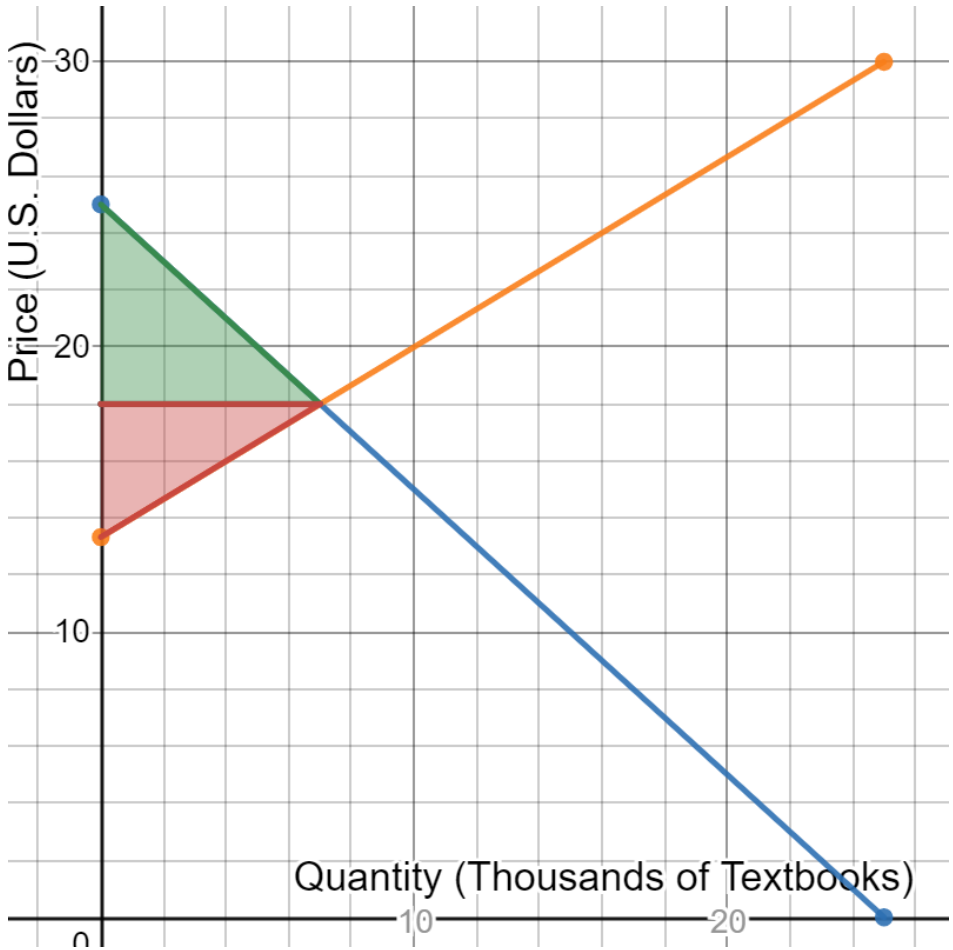


Figure 1: Consumer Surplus (Green) and Producer Surplus (Red)

Surplus and Efficiency

- Recall our interpretation of the demand curve as each point representing the willingness to pay of the marginal consumer. This is the marginal social benefit to providing another unit of the good.
- Similarly, each point on the supply curve describes the marginal social cost of providing another unit of the good to the market.
- At the equilibrium point, marginal social benefit is equal to marginal social cost in this market.
- To the right of the equilibrium point, the marginal social cost is greater than the marginal social benefit, and so these transactions actually reduce total surplus.

Inefficiencies: Deadweight Loss

- In perfectly competitive markets without externalities or other distortions, allocations other than those achieved by the equilibrium are inefficient.
- These inefficiencies can typically be seen graphically, and are referred to as deadweight loss.

Definition

The total loss in surplus resulting from an inefficient allocation, as compared to the efficient benchmark.

- For our purposes, the efficient benchmark is typically the competitive equilibrium, though this is not *always* the case.
- We will see later that externalities and other forms of market failure can result in inefficient equilibria.

Example: Price Ceiling

Let us consider the market for rental apartments in a metropolitan area. The supply and demand curves are sketched below. Suppose that, in order to control rent prices, a price ceiling of $1200 is imposed (a price below the market price).

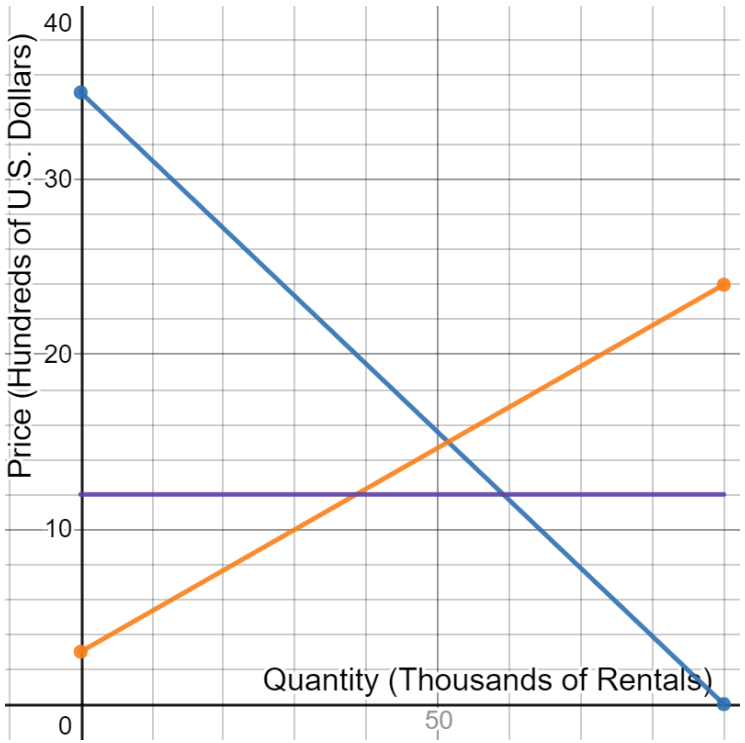
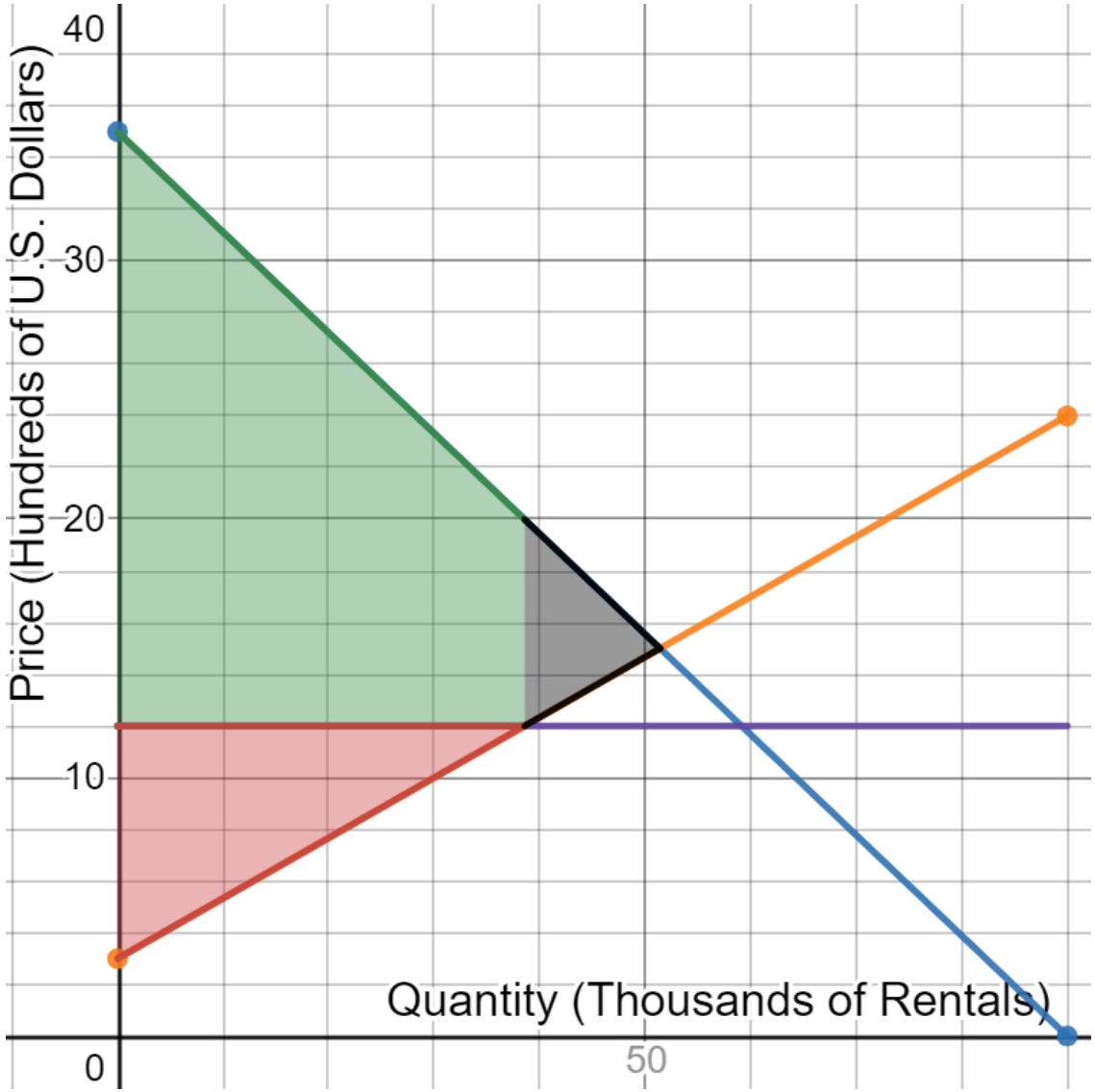


Figure 2: The market for rental apartments with a price ceiling of $1200

Example: Price Ceiling (2)



Deadweight Loss: An Interpretation

- In the previous example, we saw that when the price was "stuck" too low, there were some transactions which were precluded.
- These transactions *could* have occurred if the price was not artificially constrained.
- In this case, deadweight loss is the surplus that *would* have been generated at the equilibrium price but which do not take place due to the price ceiling.

Sources of Deadweight Loss

- In a competitive market with no externalities or market failures, our efficient benchmark is the competitive equilibrium.
  - In this case, any allocation that isn't the equilibrium allocation is inefficient and result in some deadweight loss.
  - Any constraint or policy which would prevent the market from reaching equilibrium would result in some deadweight loss:
    - Binding price floors and ceilings
    - Taxes on supply or demand
    - Limits on the number of goods supplied

Sources of Deadweight Loss (2)

- When the market equilibrium is not efficient, then our benchmark changes. We use an outcome which would be chosen by an individual seeking to maximize social surplus as our benchmark.
  - In this case, the market equilibrium features some amount of deadweight loss as compared to the socially efficient benchmark.
- The market equilibrium can be inefficient for a number of reasons, which are sometimes simple violations of perfect competition:
  - Asymmetric information
  - Positive or negative externalities
  - Market power among a single or small number of firms
  - Collusion or cartel agreements among firms
  - Predatory behavior among firms deterring entry

Deadweight Loss: Numerical Example

Consider the following labor market for full-time entry-level jobs in a town in the Midwest:

$$Q_d = 100 - 2P$$
$$Q_s = -5 + 3P$$

where price is in U.S. dollars per hour, and quantity is in thousands of labor hours per week.

- Who in this market represents the supply side? The demand side?
- Sketch the supply and demand curves and compute the equilibrium price and quantity. Label consumer and producer surplus.
- What is consumer and producer surplus at this equilibrium?
- Suppose now that a minimum wage of \$30 per hour is imposed. What does this result in? Sketch and compute consumer surplus, producer surplus, and deadweight loss after this policy.

Deadweight Loss: Numerical Example (2)

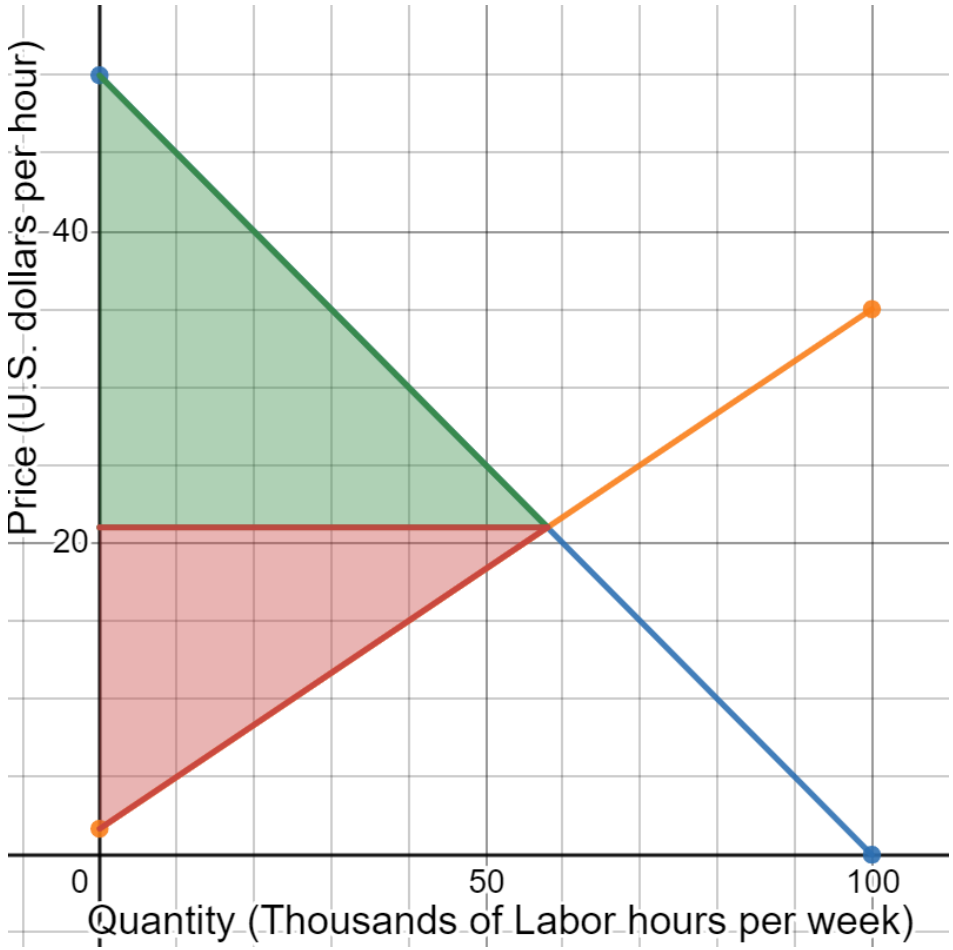


Figure 4: Consumer and Producer surplus: Equilibrium

Deadweight Loss: Numerical Example (3)

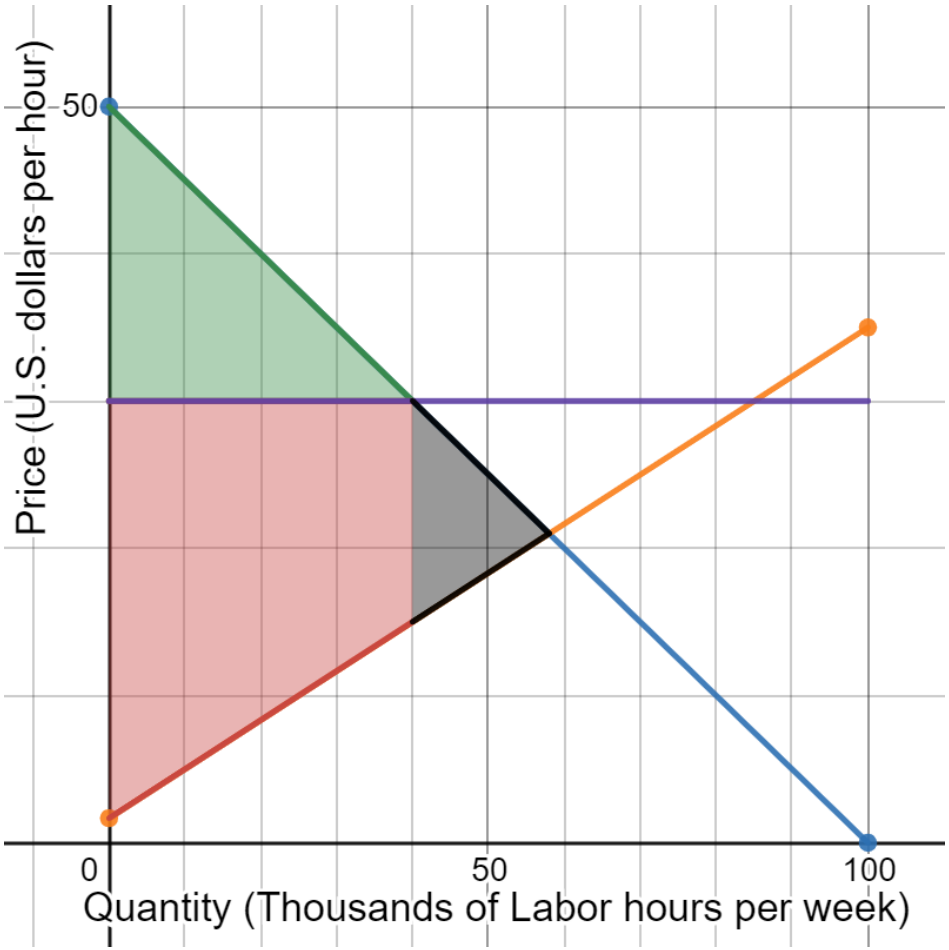


Figure 5: Surplus and Deadweight Loss after the minimum wage.

Winners and Losers

- Every worker who was able to land a job received a *much* better wage, but fewer workers were hired in the end.
- Notice that in the previous example producer surplus rose after the price floor, but consumer surplus fell.
- Compare this last fact to the definition of Pareto efficiency. It shouldn't be surprising to find that when one group is better off after a policy that moves us away from equilibrium, the other group is worse off after the policy.

Interventions: Motivating Example

- You are a policymaker with the ability to affect market outcomes by using various instruments. You have recently noticed that your city has extremely poor air quality due to a high usage of motor vehicles combined with serious congestion along your major roadways. In the same vein, you also find that the quality of your highways and bridges has diminished due to overuse.

Interventions: Motivating Example (2)

- What can you say about the current usage of motor vehicles as compared to the socially optimal level?
- What policy instrument could you use to reduce air pollution, alleviate congestion, and generate revenue that you can allocate to improving transportation infrastructure?
- How would your proposed policy produce the intended affects?
- Are there any drawbacks to your proposed policy?