14.03 Midterm 2 Review

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Spring 2020

1 Applied Competitive Analysis

Market demand curve: the set of consumers arranged in inverse ordering from the person with the highest willingness to pay (WTP) to the person with the lowest WTP for a commodity. It is aggregated from Marshallian demands.

Market supply curve: the set of producers arranged in order from the firm willing to produce at the lowest price to the firm demanding the highest price to produce a good.

Consumer surplus: the difference between the maximum value that a consumer is willing to pay for a commodity and the market price of that commodity.

Producer surplus: what the producer receives for goods in excess of the cost of production.

A competitive market maximizes the sum of producer and consumer surplus: all gains from trade are realized; all transactions that benefit both parties occur; no transactions occur that do not benefit both parties.

1.1 How to calculate consumer and producer surplus?

Denote the equilibrium price before a price change as p_{mkt}.
Consumer surplus is the region below the demand curve and above the price, and is equal to:

$$\int_{p_{mkt}}^{\infty} D(p)\mathrm{d}p.$$

Let p_{min} denote the price required to supply 0 units of the good. Producer surplus is the region below the market price and above the supply curve, and is equal to:[1]

$$\int_{p_{min}}^{p_{mkt}} S(p)\mathrm{d}p.$$

Suppose that there is a change in the price paid by consumers (from p_{mkt} to p^C) and received by suppliers (from p_{mkt} to p^S). Then, the change in consumer surplus is:

$$\int_{p^C}^{\infty} D(p)\mathrm{d}p - \int_{p_{mkt}}^{\infty} D(p)\mathrm{d}p = \int_{p_{mkt}}^{p^C} D(p)\mathrm{d}p.$$

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[1]Usually $p_{min} = 0$.

The change in producer surplus is:

$$\int_{p_{min}}^{p^S} S(p)\mathrm{d}p - \int_{p_{min}}^{p_{mkt}} S(p)\mathrm{d}p = \int_{p_{mkt}}^{p^S} S(P)dP.$$

1.2 Deadweight loss

Deadweight loss is the difference between the total producer and consumer surplus and the maximized producer and consumer surplus in competitive market. There is deadweight loss whenever the quantity is not equal to the quantity in the competitive market, and the gains from trading are not maximized (either unrealized beneficial trading or harmful trading).

The deadweight loss only depends on the quantity consumed. The price alone determines the transfer between consumer and producer but does not affect the total surplus.

1.3 Elasticity

The elasticity of supply/demand is:
$$\varepsilon = \frac{dQ}{dP}\frac{P}{Q}$$

Tax burden falls more on the side that is less elastic (the absolute value of elasticity is smaller).

2 General Equilibrium in Exchange Economy

Two consumers, A and B, two goods, F and S.
They have endowment:
$$E_A = (E_A^F, E_A^S)$$
$$E_B = (E_B^F, E_B^S)$$

Without trade, they each consume their endowment:

$$X_A = E_A$$

$$X_B = E_B$$

With trade, the only constraint is that market clears :

$$X_A^F + X_B^F = E_A^F + E_B^F$$

$$X_A^S + X_B^S = E_A^S + E_B^S$$

Walras' Law: when one market clears the other one also clears.

To solve for the equilibrium, first derive each consumer's Marshallian demand, and then apply the market clearing condition to solve for the equilibrium prices.

2.1 Pareto Efficiency

At a Pareto efficient allocation, it is not possible to make one person better o without making at least one other person worse off. At a Pareto efficient allocation, all gains from trade are exhausted.

At a Pareto efficient allocation, the indifference curves of A and B will be tangent. The set of points that satisfy this criterion comprise the **Contract Curve** (CC). On the contract curve the MRS of the two consumers are equal:

$$\left(\frac{\partial U/\partial F}{\partial U/\partial S}\right)_A = \left(\frac{\partial U/\partial F}{\partial U/\partial S}\right)_B$$

2.2 Welfare Theorems

First Welfare Theorem: If

(C1) No externalities

(C2) Perfect competition

(C3) No transaction costs

(C4) Full information

Then competitive equilibrium is Pareto efficient.

Second Welfare Theorem: Providing that preferences are convex and conditions C1-C4 are satisfied, any Pareto efficient allocation can be supported as a market equilibrium. (there is no intrinsic trade-off between equity and efficiency.)

The second welfare theorem indicates that we can achieve any allocation of resources **on the contract curve** through lump-sum distributions. That is, a planner can achieve **any competitive equilibrium** she desires through lump-sum distributions, but cannot achieve points off the contract curve as long as agents are free to trade.[2]

3 International Trade and Comparative Advantage

International trade relaxes the constraint that "no more goods can be demanded/consumed than the economy is endowed with, and the sum of the consumption of both parties cannot exceed the total endowment."

The movement from autarky (no trade) to free trade usually expands the Home's budget set, and therefore Home can achieve higher utility. The gap between production and consumption reflects the gains from trade.

Gains from trade come entirely from differences between countries. There is no gains from trade if relative prices are the same under autarky and trade:

$$\left(\frac{P_F}{P_S}\right)_A = \left(\frac{P_F}{P_S}\right)_W$$

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[2]A planner will never be able to achieve an allocation that is not on the contract curve without banning trade outright. If she tried to achieve a non-equilibrium point, agents will just trade with each other and converge to an equilibrium on the contract curve.

Countries have *comparative advantage* if the relative prices in autarky differ from the world price, and this may be due to preferences, technology, or endowments.

Principle of comparative advantage: as long as relative prices differ between two countries, both countries experience gains from trade. Because trade allows Home to specialize in production of the good in which it is has comparative advantage relative to the rest of the world, and use that good to trade for other goods in the world market.

International trade is Pareto improvement relative to initial endowment but not necessarily Pareto improvement relative to autarky (in the sense of **within-country trade**).[3] But through an appropriate set of transfers, we can both exhaust all gains from trade and achieve any Pareto efficient allocation desired.

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[3]See the ADH diagram in Lecture 14. In particular, some parties within the economy might be worse-off than in a situation with only **within-country** trade, but will still be better-off than in a situation where they are forced to consume their initial endowments.