Exam Review 1

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Contents

1 Exam Structure

Very similar to Exam 1

1. Short Questions
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2 Exam Topics

- **Tax incidence and Salience**

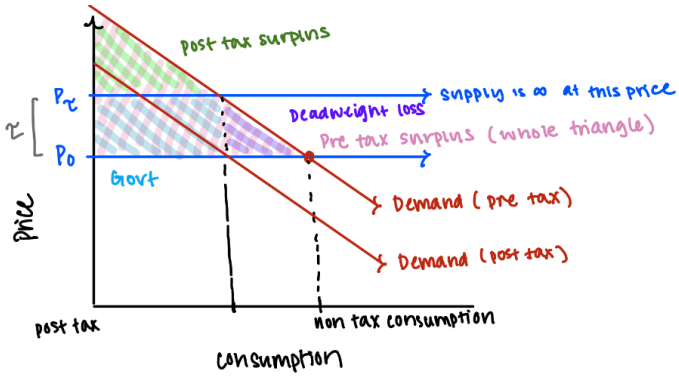
  Infinitely Elastic Supply: A country takes the prices (p) as given, and so they have an infinitely elastic supply (a flat line). Imposing a tariff on this would just be some τ that is added to the price, such that the new price under this tax is $p_\tau = p + \tau$. Then the demand function is similarly shifted by τ.
  Q: Under what conditions would a country face Elastic Supply? Inelastic?

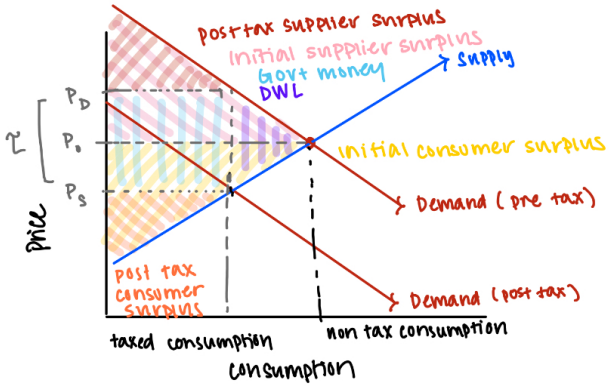
  Supply with some elasticity: Imposing a tariff means that the demand function is similarly shifted by τ. However, the price that the producers and consumers pay is no longer the same because of this tax. Then, the producers have to pay some p_p and the consumers have to pay some p_c such that $p_p - p_c = \tau$. The incidence of the tax is now divided between both parties,

*Taking elements from lecture notes, recitations and the exam review of 2024

though the exact proportion is dependent on the shape of the demand and supply curves, and the magnitude of τ.

Q: How do we see the tax incidence graphically?





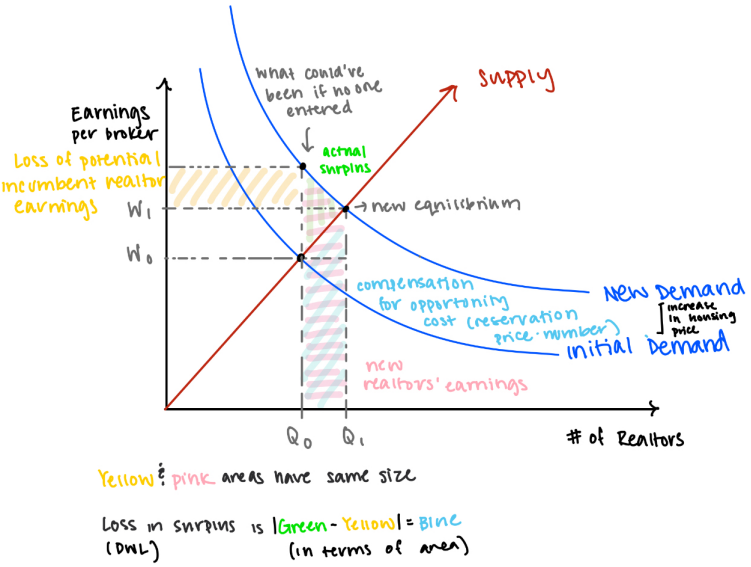
- **Market Economy**

  Economic rent: any payment to an owner or factor of production in excess of the costs needed to bring that factor into production

  In the housing example, rents are anything the brokers earn that are higher than the opportunity cost (whatever they would be doing if they weren't a realtor, which is also their reservation price.). These happen at the margin: the last broker will join the market when they earn rent, or the last homeowner will join the market when they earn rent. This also means that someone is earning a surplus on this marginal trade, which should not happen at equilibrium.

  In a competitive equilibrium, rents are dissipated by rent seeking behavior (example: new realtors entering the market when housing prices increase, the rents that would've been gained are reduced).

  Q: What do the surpluses look like graphically?



Q: Why is there deadweight loss?

Q: What if the entry of new realtors was limited?

- **General Equilibrium and the Edgeworth Box**
  General equilibrium is when we allow the market to include many things at a time. Budget sets are now functions of how much of each good you have, and this allows us to let changes in goods propagate through different markets.

  The Edgeworth box is a zoomed in example where we only look at two goods and two agents. We start with initial endowments and preferences, and let the agents freely trade with each other in a way that fulfills these conditions:

  1. No transaction costs
  2. No market power (Agents take prices as given)
  3. No externalities
  4. Full information about the goods
  5. Property rights (All goods are owned by somebody).
  6. Consumer Theory Axioms

  After they finish trading, three conditions will be met:

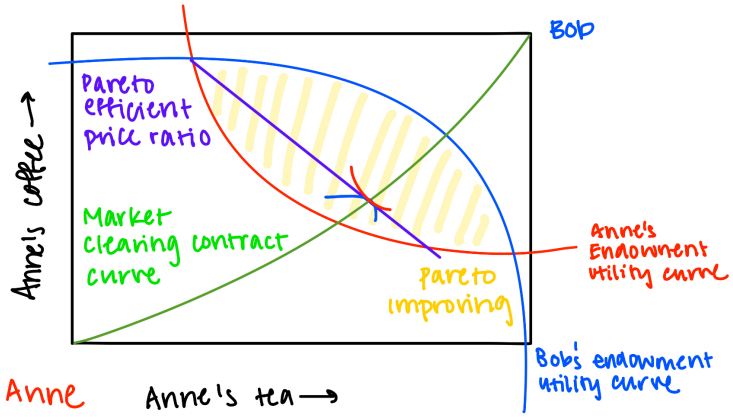
  1. Preferences are respected (everyone is weakly better off)
  2. Pareto efficient (all gains from trade exhausted)
  3. Market clearing (everything belongs to someone)

Through these conditions, the parties will reach an allocation that is 1) within the lens, 2) on the equilibrium price ratio and 3) on the contract curve (point where marginal rates of substitutions.).

Q: What happens if the government tries to manually change the price ratio?

Q: What happens if initial endowments are changed?

Q: What if you could convert one good into the other, at a price ratio other than the equilibrium solution?

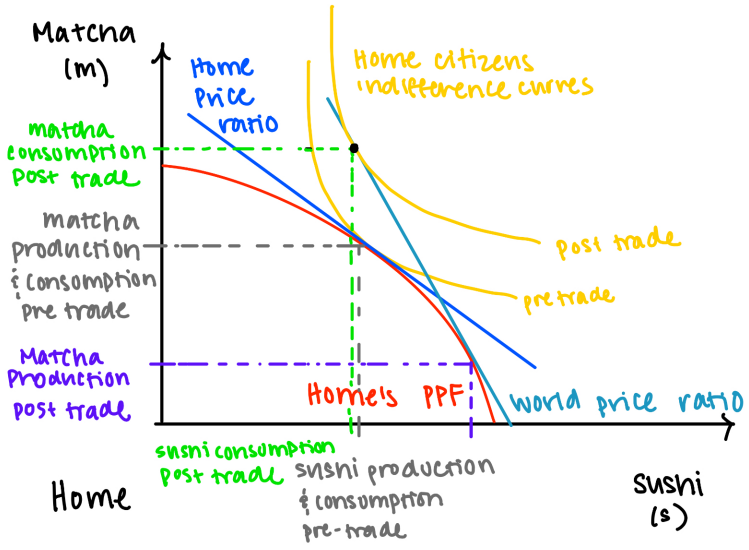


- **Trade**

  Now we bring production into the mix. Similar to people working at home, choosing between leisure and consumption, countries have to decide how to optimize their production. Like most other problems we've seen, they must find the point on their PPF tangent to the citizens' utility curve. That slope will also be their price ratio.

  When there's a difference between that price ratio and the rest of the world's price ratio, then there is an opportunity to improve their situation. Wherever that price ratio is tangent to their PPF is their new efficient production (As if they traded all goods for money), and wherever their utility curve is tangent to the price ratio is the new consumption.

  Q: Why will everyone use this new price ratio?



If these price ratios aren't equal, then the country has a **comparative advantage** in the product that is relatively less expensive. Comparative advantage is a function of technologies (production), preferences, and endowments. The price ratio summarizes these three. However, we cannot understand differences in these three functions just from knowing price ratio.

Consider an example of set meals (consisting of sushi and matcha). Home is relatively inefficient at production, so it takes them 5 worker hours from fishing to cheffing to make the sushi, and 10 worker hours of farming and roasting and barista-ing to make sushi. The rest of the world, meanwhile, only needs 2 worker hours for matcha and 3 worker hours to make sushi. Home is worse at everything, but their price ratio of sushi to matcha is less than the rest of the world, meaning they have a comparative advantage in sushi production. Under Autarky (where trades only happen domestically), Home has to spend 15 hours per set and the rest of the world spends 5 hours per set. If they combine their forces, Home making sushi and getting matcha from the rest of the world, everyone is better off!

Table 1: Hours per set and effective wage (autarky vs. trade).

Country	Alone (Autarky)		Specialize & Trade	
	Hours per set	Effective wage ($/hr)	Hours produced per set	Effective wage ($/hr)
Home	15	$4	5 (sushi)	$6
Foreign	5	$12	2 (matcha)	$15

Q: Does everyone everyone benefit from trade? Why or why not?

A Trade Example (adapted from 2016 exam)

Emma and Salo live in a a two-good economy where they can trade textbooks and weights. Their initial endowments are given by:

$$(E_E^w, E_E^t) = (6, 1)$$
$$(E_S^w, E_S^t) = (0, 5)$$

Both Emma and Salo have the same utility function:

$$U_E(w,t) = U_S(w,t) = \frac{1}{2}\ln(w) + \frac{1}{2}\ln(t)$$

- Solve for the contract curve.

  In order to find the contract curve, we eqaute the MRSes of Emma and Salo:

$$\begin{aligned} MRS_K &= \frac{MU_w}{MU_t} = \frac{t_E}{w_E}, \\ MRS_R &= \frac{t_S}{w_S} = \frac{6 - t_{SE}}{6 - t_E}, \\ &\Rightarrow t_E(6 - w_E) = w_E(6 - t_E) \Rightarrow w_E = t_E. \end{aligned}$$

  So, the contract curve is a straight diagonal from the bottom right to top left corner.

- Solve for the equilibrium outcomes when Emma and Salo trade.

  We could certainly set up a Lagrangian here and solve that way, but as a shortcut if you're pressed for time, remember that with these Cobb-Douglas preferences, we already know a lot about Emma and Salo's demand functions! In particular, we know that each of them will spend half their "budget" on weights and half on textbooks, yielding the following Marshallian demands:

$$w_E^* = \frac{6p_w + p_t}{2p_w}$$
$$t_E^* = \frac{6p_w + p_t}{2p_t}$$
$$w_S^* = \frac{5p_t}{2p_w}$$
$$w_S^* = \frac{5p_w}{2p_t}$$

  We then use market clearing to solve for the price ration $\frac{p_t}{p_w}$:

$$w_E^* + w_S^* = 3 + \frac{1}{2}\frac{p_t}{p_w} + \frac{5}{2}\frac{p_t}{p_w} = 6 \Rightarrow \frac{p_t}{p_w} = 1$$

Finally, we plug this price ratio back into the Marshallian demands to get:

$$\begin{aligned} w_E^* &= 3.5 \\ t_E^* &= 3.5 \\ w_S^* &= 2.5 \\ w_S^* &= 2.5 \end{aligned}$$

- Now, we imagine Emma and Salo's economy opens up to international trade, with a world price ratio of $\frac{p_t}{p_w} = 2$. How many weights and textbooks do Emma and Salo consume now?

  Plugging into our Marshallian demand functions, we get:

$$\begin{aligned} w_E^* &= 3 + \frac{1}{2} * 2 = 4 \\ t_E^* &= 3 * \frac{1}{2} + \frac{1}{2} = 2 \\ w_S^* &= \frac{5}{2} * 2 = 5 \\ w_S^* &= \frac{5}{2} \end{aligned}$$

  Q According to your solutions above, do Emma and Salo import or export textbooks?

- Who prefers autarky and who prefers trade?

  Plugging into their utility functions under autarky and trade we get:

$$\begin{aligned} U_E^A &= \frac{1}{2}\ln(3.5) + \frac{1}{2}\ln(3.5) \approx 1.25 \\ U_E^T &= \frac{1}{2}\ln(4) + \frac{1}{2}\ln(2) \approx 1.04 \\ U_S^A &= \frac{1}{2}\ln(2.5) + \frac{1}{2}\ln(2.5) \approx 0.92 \\ U_S^T &= \frac{1}{2}\ln(5) + \frac{1}{2}\ln(2.5) \approx 2.53 \end{aligned}$$

  Salo clearly prefers trade while Emma prefers autarky. This makes sense because Salo's initial has many more textbooks, which become much more valuable under trade.

  Q: What does the Second Welfare Theorem say about this situation?

- **Instrument Variables**

Instrument variables are another way economists use natural experiments to find causal relationships. We are interested in the effect of X on an outcome Y. Unfortunately, there are many other factors that affect both X and Y at the same time, so it is difficult too see the direct causal effect. I then need to find an instrument variable Z that only effects Y through X.

For example, if I wanted to study the effect of charter schools vs. public schools on standardized tests, there might be variables such as the size of school, teacher to student ratio, or even size of a city the school is in, that affect both the school students go to and also their test scores. Then, I might limit my sample to people who participated in the charter school's lottery and use an instrument of whether or not they won the lottery (note that people may win the lottery and still not choose to go). I now have to check three assumptions:

Exclusion: The instrument affects the outcome only through the treatment. Or, the instrument is uncorrelated to everything else that might affect the outcome. This is not confirmable but falsifiable!

Since this is a lottery, I am sure that my instrument will not be correlated with test scores.

First Stage/Relevance The instrument is actually relevant (has a relationship to the treatment)

Since many students will follow their lottery results, winning the lottery is very likely to be relevant.

Treatment-control balance Subjects with different levels of the instrument are comparable (no selection bias).

Since I limited my sample to those who applied for the lottery, these students likely care the same amount about their education, and any other variables. Thus, they are probably comparable.

Once these are fulfilled, I can move forward with the experiment. Let $\rho =$ the effect of the instrument on the outcome. Let $\phi =$ the effect of the instrument on the treatment. Then, the causal effect is ρ/ϕ, or $\frac{\text{Z's effect on Y}}{\text{Z's effect on X}}$.