

1. Matching: connect the definitions and facts by writing the appropriate letter in the blank to the left of the terms in the first column:

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|------------------------|---|
| ___ Alfred Pigou | (a) British Economist who argued that an optimal tax system minimizes deadweight loss |
| ___ Tax Base | (b) A tax that does not directly alter relative prices |
| ___ Neutral Tax | (c) The activity or thing subject to a tax. |
| ___ Positive Statement | (d) Total benefits less total costs, maximizing it can be used as a model of rational decision making |
| ___ Net Benefit | (e) A statement about what is, what was, or what will be. |
| ___ Externality | (f) A British economist who argued that externalities generated by market activity should be corrected through taxes. |
| ___ Frank Ramsay | (g) The result of any activity that imposes costs or benefits on persons not involved in a particular activity |
| ___ James Buchanan | (h) The burden of the a tax above the revenues collected. |
| ___ Excess Burden | (i) An American economist who argued that an optimal tax system cannot be devised without know how the money will be spent. |

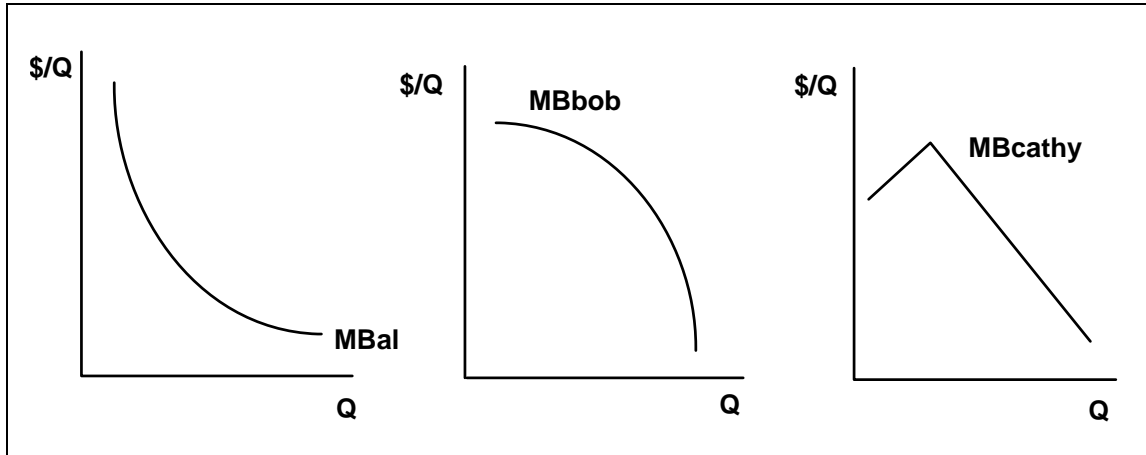
2. Identify and/or Define the following:

- | | |
|----------------------|---------------------------------|
| a. marginal benefit | j. proportional tax |
| b. marginal cost | k. lump sum subsidy |
| c. consumer surplus | l. conditional lump sum subsidy |
| d. deadweight loss | m. social net benefit |
| e. excise tax | n. indifference curve |
| f. Ramsay tax | o. lump sum tax |
| g. tax base | p. normative statement |
| h. marginal tax rate | q. negative externality |
| i. average tax rate | r. externality problem |

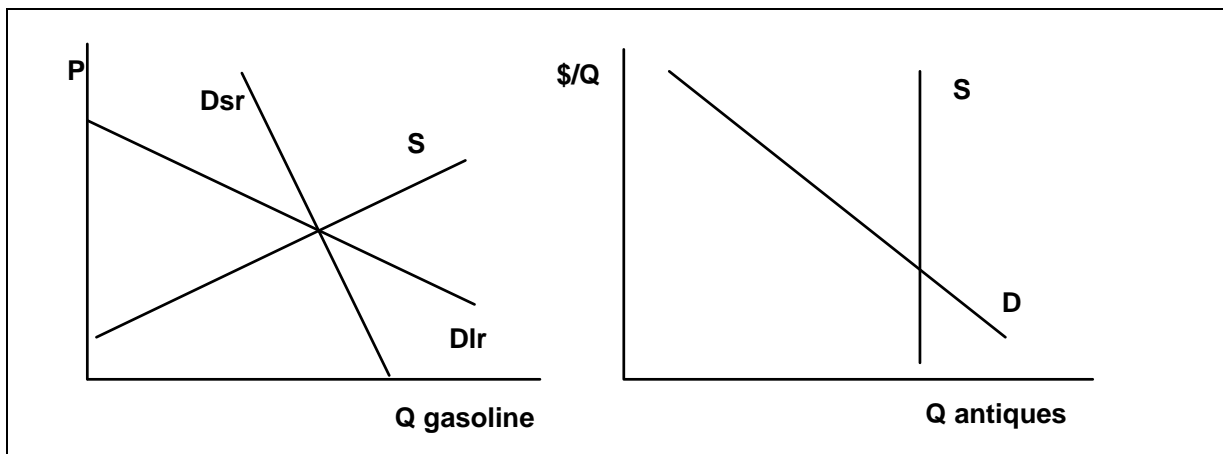
3. Use diagrams for (i) a market, (ii) a typical consumer in that market, and (iii) a typical firm in that market, to show the short run and long run effects of an excise tax. Clearly label all important details, and discuss the logic of your analysis.

- Show a case in which the tax burden falls mostly on consumers.
- Show a case in which the tax burden falls mostly on firms.
- Show the typical case in which the tax burden is shared.

4. Use the following individual marginal valuation curves to derive demand curves for each of the following consumers and in a separate diagram for the market composed of these three consumers. (Discuss your reasoning and label all important details.)



5. Show the distribution of tax burden that occurs in the following markets as a consequence of a \$2.00/unit excise tax. (Discuss your reasoning and label all important details.)



6. Use indifference curves to illustrate the superiority of a lump sum tax over an excise tax that generates the same revenue from an individual tax payer.
- Label all important details and discuss the implication of your diagram.
 - On a separate diagram show the affects of a general sales tax that raises the prices of all goods by 20%.
 - On a separate diagram show the affects of a general income (or wealth) tax that reduces income (or wealth) of all taxpayers by 20%.
 - Are either of these taxes neutral? Why or why not?
7. **Puzzle.** Discuss why lump sum taxes are rarely used in spite of your answers to #5 above, although other neutral taxes such as sales taxes and VATs are widely used.

8. Repeat #3, 5, and 6 for a targeted (marginal) subsidy.
- After doing so:
- Discuss why economists often prefer a negative income tax to subsidies for housing and food.
 - Are food stamps a lump sum, conditional lump sum, or a marginal subsidy?
 - Show that there are circumstances in which a conditional lump sum subsidy can generate the same results as an unconditional lump sum subsidy.
9. Use labor supply and demand curves to analyze the effect of an excise tax (proportional tax) on labor income.
- Show the effects of the tax on employees and employers, and note any deadweight losses that exist.
 - Show that reducing this tax affects the magnitude of the tax burden, tax revenue, and deadweight loss.
 - What tax rate maximizes tax revenue in your diagram?
 - How is this income tax revenue maximizing tax affected by the price sensitivities (elasticities) of particular demand and supply curves for labor?
 - Are there any important differences between your diagrams and ones that you would use to analyze a proportional or progressive tax on labor income?
10. It is sometimes claimed that firms and their employees "share" the social security tax, because by law **half of the money** is paid from employee salaries and the other half is paid by the firm.
- Use the tools developed in class to analyze this assessment of the tax burden of the social security tax.
 - Show that the slopes of the demand and supply curves in various labor markets affect how the tax is distributed among suppliers (employees) and demanders (employers) of labor.
 - Is there any case in which the distribution of the tax burden of social security is shared equally?
 - Show how this tax may have different effects on labor markets in the short and long run.
 - The social security tax has a flat marginal tax rate on labor income up to approximately 110K/year. Is this tax progressive, proportional, or regressive? Explain.
11. The "Obama care" health care system can be thought of as a subsidy on health care for "lower middle class" citizens of the US. Use a supply and demand curve for health care to show the effects on prices for persons eligible for the plan. What happens to prices for other persons who are not eligible for the plan? Explain.
12. Many proposed "green energy programs" can be thought of as subsidies for particular methods of producing electricity, as with programs that support windmills, solar panels, gasohol, biomass, and battery powered cars. In the space below draw two diagrams. In the first diagram (a) show the case in which the entire value of the subsidy accrues to owners of windmills. On the second diagram (b) show the case in which the entire value of the subsidy accrues to purchasers of windmills. Label all important details including the cost of the subsidy.

13. The green energy programs mentioned in problem 12 may or may not be Pigovian subsidies according to their levels. Assume that alternative energy production produces a positive externality (positive external benefits). Illustrate three cases: (i) subsidies that are below Pigovian levels, (ii) subsidies that are at Pigovian levels, and subsidies that exceed Pigovian levels. Note both their output effects, effects on social net benefits, and associated dead weight losses (if any).
14. Pigovian taxes are said to have no deadweight losses. (i) Draw an illustrating example and demonstrate that there are no deadweight losses from a Pigovian tax, because social net benefits are increased rather than reduced by such taxes (assuming that the tax revenues are not wasted). (ii) Show that a tax on an externality generating activity that is too high (above Pigovian levels) will have a dead weight loss.
15. Draw four diagrams that illustrate (a) the normative problems associated with positive and negative **externalities** and (b) cases in which externalities exist but there is no problem.
 - a. Label all important details and briefly explain the nature of the two problematic cases.
 - b. Show how Pigovian taxes or subsidies can be used to address the cases characterized.
 - c. Now, construct two cases in which externalities exist (positive or negative), but the outcome is not a problem from the perspective of the social net benefit maximizing norm.
 - d. Is there any easy way to distinguish part c from the over and under supply cases of part a in the real world? Explain.

Additional Puzzles and Applications

16. President Obama's 2009 “stimulus program” can be thought of as a series of subsidies for various classes of goods and services. Consider just his program for mortgage refinance, which reduces the cost of refinancing one’s house. In the space below draw two diagrams.
 - a. In the first diagram, show the case in which the entire value of the subsidy accrues to current asset owners (of mortgage backed securities).
 - b. On a second diagram show the case in which the entire value of the subsidy accrues to purchasers of those assets.
 - c. Label all important details in both diagrams including the cost and deadweight loss of the subsidy.
17. Use the neutrality, deadweight loss (Ramsay) and net benefit (Buchanan) tax principles to analyze the relative merits of a high excise tax on gasoline, a flat (proportional) corporate income tax, and a consumption tax.
 - a. First assume that the same revenue is generated by each tax, and that all the revenue generated will be spent on general government services.
 - b. Next assume that the gasoline tax is “earmarked” so that it is entirely spent on transportation services (roads, bicycle paths, and mass transit) and that the others are used to finance general government programs as before. How does this earmark affect your analysis of the merits of gasoline taxes under these two normative theories?

- c. Explain how positive analysis plays a role in your normative analysis of the relative merits of these tax instruments. (No diagrams are necessary for your answers, although they may help.)
18. During the early 1980s, the Reagan administration proposed a radical "flattening" of the tax schedule faced by ordinary US income tax payers. A very finely graded tax schedule was replaced with one that included just three marginal tax rates 0, 15 and 28%, but generated roughly the same revenue as the previous more steeply progressive tax schedule.
- Analyze the effects of this tax reform using the tools developed in class. (Hint: use supply and demand for labor diagrams to show what happens to employment levels, dead weight loss, and tax payments for low, middle, and high income earners, whose marginal tax rate is reduced.)
 - Discuss why reductions in marginal tax rates tend to reduce excess burden.
 - Are there cases in which a reduction in tax rates can increase tax revenues? Explain why.
19. Many economists (and conservative commentators) argue that a consumption tax would increase the savings rates of the average person in the U.S., which would increase long term growth rates. Use indifference curves and a choice setting defined over consumption in the present (C_1) and consumption in the future (C_2) to analyze the effects of (i) a temporary consumption tax that affects only consumption in the current period and a permanent one that is in effect for both periods. (To simplify a bit, assume that all life time income or wealth will be consumed, which implies that the two period budget constraint is $W = C_1 + C_2/(1+r)$, where r is the interest rate.)
- Use indifference curves and a budget line defined over current and future income to illustrate (i) an individual's pretax choice, (ii) the effect of a consumption tax on future consumption, and (iii) the effect of a consumption tax on both present and future consumption.
 - Does a temporary consumption tax increase savings? (Why?)
 - Is there a deadweight loss from a temporary consumption tax?
 - Does a permanent consumption tax increase savings? (Why?)
 - Is a sales tax or a VAT (value added tax) a tax that only affects current consumption? (Why or why not?)
 - Is a sales tax normally progressive, proportional, or regressive? (In what sense?)
20. Determine marginal and average tax rates for the following income, Y , tax schedule:

$$T = -1000 + .20Y$$

- Is this tax progressive, regressive, or proportional? Explain.
- Suppose that instead of -1000, the intercept of the tax schedule is C .
- Determine the values of C that makes the tax schedule
 - regressive
 - proportional
 - progressive.
 - [Hint, remember the definition of average and marginal tax rates and apply them to this equation with a bit of algebra.]