PUBP 620/LAW 328 - Regulation of Markets
College of William and Mary February 26, 2014
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Midterm Exam - Solutions

You have until 4:50pm to complete the exam, be certain to use your time wisely. You may answer questions directly on the exam or submit typed responses. Answer all questions completely but concisely. Including additional incorrect information in an otherwise correct answer may result in the loss of points. The exam is open notes and open book. You may use your notes, the textbook and any of the materials posted on our course Blackboard site. Other materials are not permitted. Remember to put your name or exam code on the exam. Good luck!

Name or Exam Code:

1. (15 points) Recall the method used to choose the lead counsel in the Sotheby's and Christie's civil suit as described in Ashenfelter and Graddy (2005):

   > "The law firms were asked to name a dollar amount that was the minimum sum they expected they could win for the plaintiffs, excluding fees or expenses. The law firm with the highest bid would then win the position of lead counsel and would receive 25% of any settlement in excess of that dollar amount. The remaining 75% of the excess would go to the class members."

   (a) Explain why this method of choosing a firm may have led to more efficient outcomes than traditional methods of choosing a firm.

   Efficiency here is a little different than our typical context where we are considering consumers and producers of goods. Here, the outcome of the civil suit will not really change total surplus. If the plaintiffs win, surplus is transferred from Sotheby's and Christie's to the plaintiffs and the lead counsel. If the plaintiffs lose, there is no transfer of surplus. Either way, there is no new surplus being generated or surplus being destroyed. We aren't producing anything that generates a net benefit to society or preventing the production of anything that is beneficial to society. The only way in which efficiency may come in to play is the costs of the firm. Suppose that a better firm can achieve the same outcome at lower costs. If this is the case, choosing the most efficient would generate a greater amount of total surplus from any given settlement (the same redistribution of surplus from the auction houses to the plaintiffs would be achieved at a lower cost meaning greater net surplus). The bidding process should select the most efficient firm as that will be the firm willing to submit the highest bid.

   (b) Explain why this method of choosing a firm may have led to a more equitable outcome than traditional methods of choosing a firm.

   There are two primary channels through which the bidding on the firm may lead to a more equitable outcome. First, the bidding led to a greater portion of the settlement going to the plaintiffs rather than the lawyers. You may argue that this is a fairer distribution of surplus given that it was the plaintiffs who suffered the injury. Second, by potentially selecting the best firm the bidding process will

make the overall settlement as large as possible, transferring a greater amount of surplus from the auction houses to the plaintiffs. Given that the auction houses were illegally gouging the plaintiffs, you could easily argue that this larger transfer from auction houses to customers would be more equitable.

(c) Can you think of any ways to change the bidding process to create an even more efficient or equitable outcome?

There are a variety of things you could discuss in your answer. In general, a good answer will explain a way to change the bidding process to either increase the likelihood of choosing the best firm, incentivize firms to offer even higher bids, or reduce the administrative costs of the bidding process. These are really the key dimensions that may influence how efficient or equitable the bidding process and resulting settlement will be.

One possible way to improve the bidding process is to change it to something more along the lines of a second price auction. The issue with the original auction format is that firms may be hesitant to really submit their best bid. Think about their best bid as being the one where they just break even. If they think there is a chance they could win with a slightly lower bid, then they would submit that lower bid to give them slightly higher profits (in this case, a bigger cut of the ultimate settlement by lowering the minimum amount they promise to win). This would be a better strategy than submitting their best bid which, if they win, would leave them with zero profits. However, if they get to use the second lowest bid, their profits are not dependent on their bid amount, just that their bid was higher than the second highest bid. This change in the bidding process would help guarantee that the best firm is selected, since all firms would submit their true high bids, and that the plaintiffs are getting the best deal possible, potentially improving both efficiency and equity as described in the answers to the two previous parts.

In answering both questions, be certain to be clear about which groups are gaining or losing surplus as a result of the bidding process.

2. (25 points) One area of regulation we have not touched on in class is foreign trade policy. Policies toward international trade tend to be far different than policies governing domestic trade. One area in which policies can differ substantially is in terms of regulating competition. Politicians and lobbyists occasionally push for regulations protecting domestic firms from foreign competition. One such way of protecting domestic firms is to impose tariffs on imported goods. If there is a tariff of the amount T placed on a particular good that sells for the price p in the domestic market, a domestic firm will get to keep the full amount p on each unit sold while the foreign firm will keep the amount $p - T$, with the amount T going to government revenues.

   (a) How would you expect the principles underlying the regulation of competition in domestic trade to differ from the principles underlying the regulation of competition in international trade? In other words, how would the objectives of the regulator differ in the two different areas of trade? You can assume the regulator is a federal agency.

   There are a variety of issues you may discuss in terms of objectives of regulators. This answer will focus on regulators concerned with increasing total surplus. However, the big issue here is that regulators aren't necessarily thinking about *total* total surplus, they're thinking about their constituents' total surplus, in other words the total surplus of domestic firms and consumers. So officials will favor regulations that maximize domestic producer and consumer surplus even if those regulations lead to inefficiency in the sense of world total surplus being reduced.

   (b) Suppose that officials are worried about the American auto industry and decide to impose a tariff on foreign cars. Would you expect the tariff to increase or decrease total surplus in the world market for cars (which includes domestic firms and consumers)? Explain your answer.

   This would tend to decrease total surplus as it reduces competitive pressures on car prices in the United States. With the tariff imposed on foreign car manufacturers, they cannot place as much pressure on domestic car prices. So the domestic car price will be higher and the total sales will be lower than the efficient level. This will therefore reduce total surplus in the domestic market (including the surplus of the foreign firms selling cars in the domestic market) and as a result the world overall. If we assume that the tariffs in the domestic market do not affect prices in foreign markets, we would expect surplus in foreign markets to remain unchanged.

   (c) Would you expect the tariff to increase or decrease total surplus in the domestic market for cars (excluding foreign firms and consumers)? Explain your answer.

   For the same reasons discussed in the previous part we may expect surplus to decrease in the domestic market as there are cars that led to a net benefit no longer being sold in the domestic market. This may seem odd that regulations designed to protect domestic business lower domestic surplus. The reason this is happening is that the gains in producer surplus for domestic auto manufacturers are coming not only from the loss in producer surplus for foreign car manufacturers but also from reductions in domestic consumer surplus. If these

reductions in domestic consumer surplus are larger than the gains in domestic producer surplus, we would see domestic total surplus decline. However, if a large number of consumers switch from foreign to domestic cars, the gain in domestic producer surplus may be large enough such that there is a net gain in domestic total surplus.

(d) A politician defends the tariff on the following grounds: There are economies of scale in the car manufacturing industry. We need to protect fledgling domestic car manufacturers from competition until they are large enough to achieve similar levels of productivity as foreign firms at which point they can provide healthy competitive pressure on car prices. Discuss the merits of the politician's claim.

This claim boils down to an assumption that there are falling average costs in the auto industry. This seems like a reasonable assumption. There are large fixed costs in setting up manufacturing facilities, research and testing facilities and so on. You can also imagine that there are big gains to division of labor within manufacturing plants (the auto industry is what gave us the assembly line) that can be exploited as a manufacturer becomes larger. So the claim that there are economies of scale seems valid. This would imply that large companies have lower average costs than small companies, making it impossible for smaller companies to offer the same prices as larger companies. Protecting a fledgling domestic auto industry while it grows may therefore be necessary to make them competitive in the long run.

The more difficult part of the argument to accept is the idea that there will be big advantages from future competitive pressure on car prices. First, if there are already multiple large firms, there may already be sufficient competitive pressure on prices (even if all of those large firms are foreign firms). Second, even if the tariff will lead to greater competition and therefore greater total surplus in the future, it comes at the cost of higher prices and lower total surplus today. Whether the future gains outweigh the current costs will depend on the relative sizes of those gains and costs and the discount rate relevant to policy makers and their constituents.

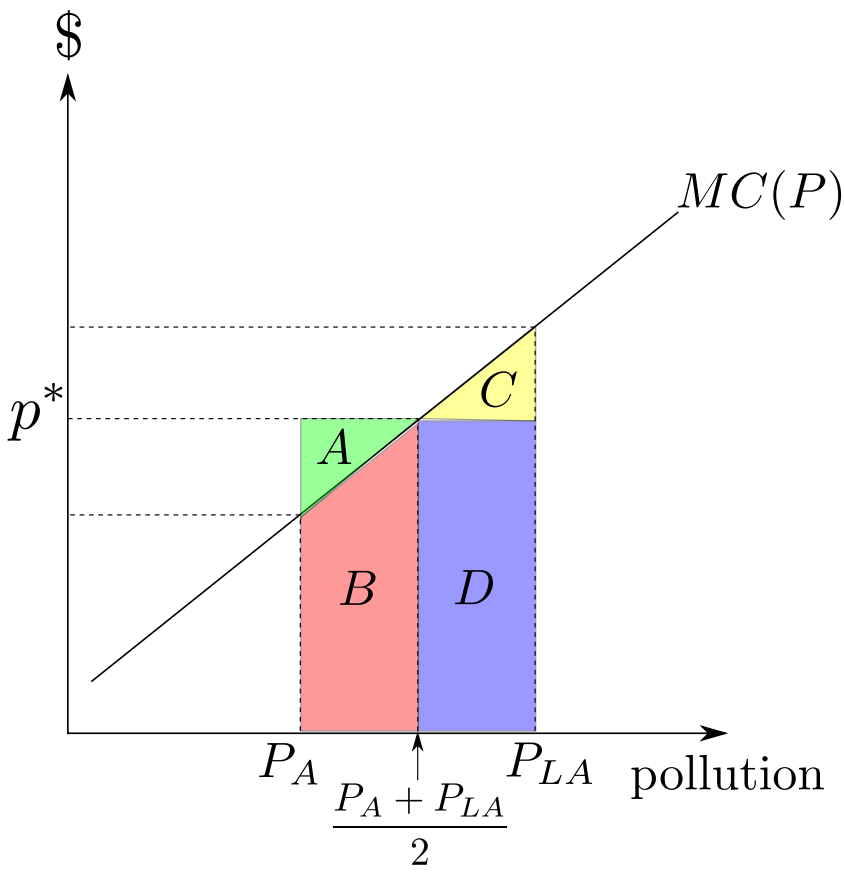
3. (20 points) Consider the second point in Larry Summers' memo on policies regarding the international trade of pollution:

> "The costs of pollution are likely to be non-linear as the initial increments of pollution probably have very low cost. I've always thought that under-populated countries in Africa are vastly under-polluted, their air quality is probably vastly inefficiently low compared to Los Angeles or Mexico City."

(a) Use a graph of the marginal costs of pollution to demonstrate Summers' point about inefficiency in the market for pollution assuming that pollution is tradeable and that it is essentially costless to ship pollution from one county to another. On your graph, show the following items: the current level of pollution in Africa, the current level of pollution in Los Angeles, and the deadweight loss associated with that current allocation of pollution.

Summers is suggesting that the total costs of pollution are not only increasing with the level of pollution but increasing at an increasing rate. In other words, the 10th unit of pollution increases total costs less than the 100th unit of pollution. This implies a positive, increasing marginal cost of pollution. Your graph should show a marginal cost curve that is above the horizontal axis at all values of pollution and that has a positive slope. Whether it is linear or nonlinear is not important. See the graph below for one possible marginal cost curve. The level of pollution for Africa, P_A, should be to the left of the level of the pollution for Los Angeles, P_{LA}, on the horizontal axis and correspond to a lower marginal cost on the vertical axis.

As for thinking about the deadweight loss, the first issue is to figure out what the efficient allocation of pollution would be. To maximize total surplus, we should minimize total costs of the pollution by putting each unit of pollution in the location where it has the lowest marginal cost. To think of it a little differently, if the last unit of pollution in Los Angeles has a higher marginal cost there than it would in Africa, moving it to Africa will produce a social savings equal to the difference in marginal costs. The only point where we can't save any more in costs is when the marginal costs are equal between the two locations. Given that marginal costs are always increasing, the two locations can only have the same marginal costs if they have the same level of pollution. So the efficient allocation of pollution is where the pollution is split evenly between then two locations. So each location should be at $\frac{P_A+P_{LA}}{2}$ units of pollution. The deadweight loss will be the difference between the additional pollution costs of moving Africa from P_A to $\frac{P_A+P_{LA}}{2}$ and the reduction in costs from moving Los Angeles from P_{LA} to $\frac{P_A+P_{LA}}{2}$. These costs can be measured as the area under the marginal cost curves between the relevant pollution quantities. So moving from the current allocation of pollution to the efficient allocation would increase pollution costs to Africa by the area B on the graph and decrease pollution costs by the area $C+D$ for Los Angeles. The gain in total surplus would therefore be the difference in these areas, $(C+D)-B$. This is the deadweight loss generated by the current allocation of pollution.



(b) Describe a transaction that could lead to increases in surplus for both residents of Los Angeles and residents of Africa, being as specific as possible. Use your graph to show the gains in surplus for both groups from this transaction.

The basic idea here is that there is a price per unit of pollution that both Africa and Los Angeles could agree to where Los Angeles would ship pollution to Africa and pay Africa p^* for each unit of pollution traded. Any price between the two current marginal costs of pollution would lead to trade taking place: the price would be above Africa's marginal cost of pollution so they would benefit by $p^* - MC_A$ for taking a unit of pollution and the price would be below Los Angeles' marginal cost so they would benefit by $MC_{LA} - p^*$ by getting rid of the pollution. Suppose we set this price at the marginal cost of pollution when pollution is split evenly between the two locations. This is shown as p^* on the graph. At this price, Africa will accept pollution up to the point where their pollution is at $\frac{P_A+P_{LS}}{2}$. After this point, the marginal costs of additional pollution would exceed the payment they would receive for taking it. Los Angeles would be willing to pay Africa to take pollution until their pollution level is down to $\frac{P_A+P_{LA}}{2}$. After this point, it is cheaper for Los Angeles to keep it's pollution and suffer the costs of that pollution rather than pay Africa to take it.
So, pollution will be traded until both areas are at $\frac{P_A+P_{LA}}{2}$. The total payment

from Los Angeles to Africa will be p^* times the number of units of pollution traded. Graphically, this is just area $A + B$ or area D (they are the same size). So Africa earns $A + B$ in payments but has their costs from pollution go up by area B for a net gain of A. Los Angeles gets to reduce pollution costs by area $C + D$ but has to pay Africa area D for a net gain of C.

(c) Discuss the equity implications of the transaction you described in part (b).

There are a variety of ways you could answer this question. A solid answer will address the distribution of total surplus and offer some explanation as to whether the new distribution is fairer than the previous distribution. Note that in the example above, the gains in surplus were evenly split between Africa and Los Angeles. You may argue that this is equitable or present arguments that Africa (or Los Angeles) should get a larger share of the gains from the transaction. Answers may also address issues of fairness that are not adequately captured by our measures of surplus.

(d) What flaws may there be in Summers' argument about the efficiency of trading pollution?

There are also a variety of ways to answer this question. Some possible issues that you may want to consider are the role of imperfect information in terms of the health effects of pollution, the impacts of these transactions on future generations, potential negative externalities from the trade of pollution, and the possibility that the underlying assumption of rising marginal costs is incorrect (perhaps the largest marginal costs are incurred when moving from pristine environmental conditions to slightly less than pristine conditions but a little extra smog in a city like Los Angeles actually has no real impact, the damage is already done).

4. (25 points) The graph below shows the demand curve for Tex-Mex food ($p(T)$) in Williamsburg and the marginal cost ($MC(T)$) and average cost ($AC(T)$) curves for a *single* Tex-Mex restaurant.

   (a) Explain why the average cost curve is first downward sloping and then upward sloping. Your answer should be tailored to the industry under focus, a Tex-Mex restaurant.

   We expect average costs to initially fall because fixed costs (the costs of the restaurant space, the ovens, etc.) are being spread across more and more units, pulling down average costs, and because more orders allows for greater efficiency in terms of division of labor within the restaurant (with very few orders, one or two cooks will be doing every aspect of the cooking, taking time to switch between tasks, with many orders you can have one cook permanently on the grill, one permanently on the garnish station, and so on). However, eventually average costs will begin to rise as the restaurant begins to outgrow its space. Cooks in the kitchen will be getting in each others' way, management will spend more time dealing with customers wondering if their table is ready, heavier use of equipment may require more maintenance and repairs, and so on. These issues will have a negative impact on the productivity of the employees and the facilities, leading to higher average costs per customer or meal.

   (b) On the graph show the quantity of tacos the restaurant will sell and the price it will charge if it has a monopoly on the Tex-Mex market in Williamsburg.

   The restaurant will operate at the quantity where marginal revenue equals marginal cost. If it produced less than this, the next unit would add to profits since revenues would exceed costs on that unit. If they produced beyond this point, the last unit produced would have reduced profits since the costs on that unit would have exceeded the revenues. For a monopolist facing a linear demand curve, the marginal revenue curve is a downward sloping line twice as steep as the demand curve but with the same vertical intercept. This curve is shown on the graph below. The monopoly quantity of tacos is where this curve intersects the marginal cost curve, labelled T_m on the graph. The price the restaurant will charge is whatever consumers are willing to pay at that quantity. This is the price corresponding to the demand curve at the quantity T_m. The monopoly price is labeled p_m on the graph.

   (c) Suppose that a second Tex-Mex restaurant opens up but the two restaurants collude to keep prices at the level you found in part (b). Use the graph to determine the effects of this second restaurant's entry on total surplus. Include a written explanation of how surplus has changed for the consumers and for each restaurant.

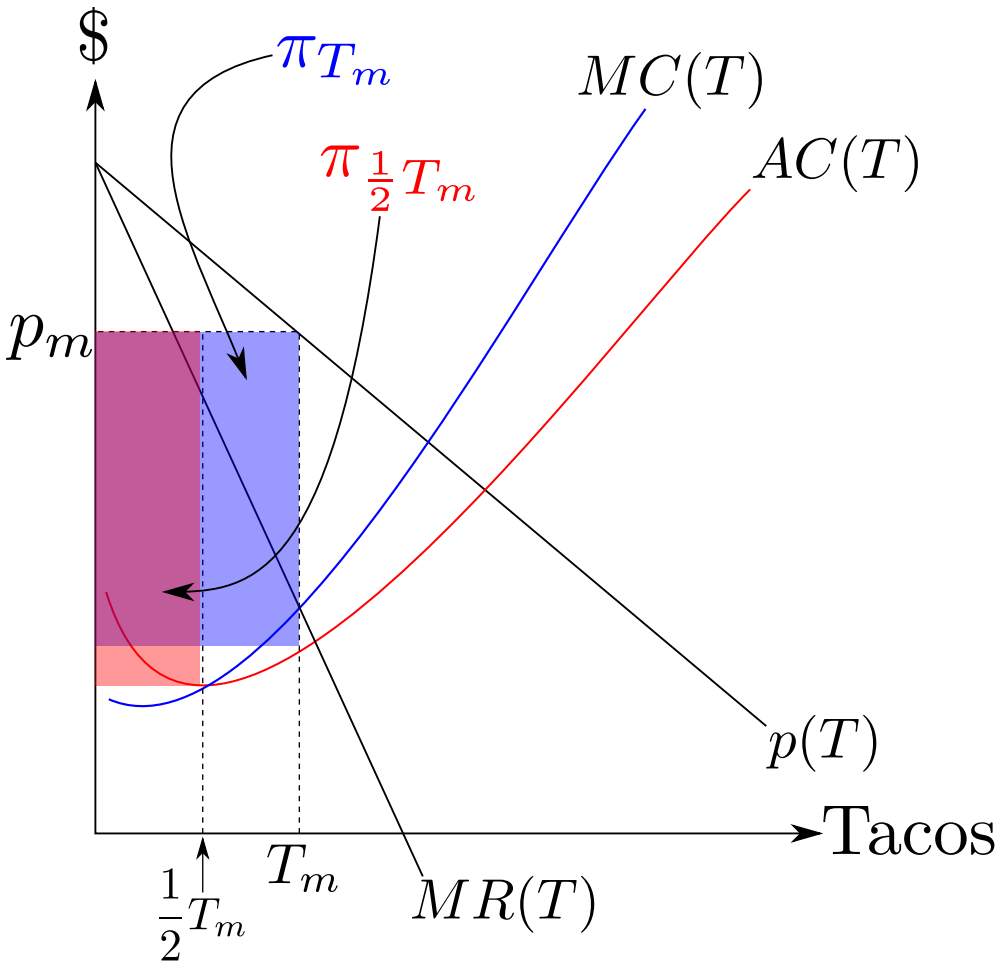
   Price will stay at p_m because of the collusion, so total quantity will stay at T_m and from the consumers' perspective nothing has changed: they pay the same price for the same amount of food and receive the same amount of consumer surplus. On the producer side, each firm is now producing $\frac{1}{2}T_m$. Each firm's profits are then given by the profit per unit (the difference between p_m and the average costs at $\frac{1}{2}T_m$) multiplied by the number of units sold, $\frac{1}{2}T_m$. This is the red area shaded on the graph. The previous profits were the blue area

on the graph. Notice that the red rectangle is exactly half the width of the blue rectangle but has a greater height. So two times the individual firm profit will be larger than the monopoly profit. Therefore total profits have actually increased, increasing total surplus.

This may seem strange at first, the monopoly price and quantity was chosen in order to maximize profits yet total profits go up when we move away from it. What is going on is that by splitting the output, the two firms are able to achieve lower average costs than a single firm can because of the diseconomies of scale. This is the exact opposite of what we did with natural monopoly: at a given price and quantity it is more efficient to have multiple firms producing rather than a single firm.

(d) Explain why the efficient quantity of tacos in this market is *not* where the marginal cost curve intersects the demand curve.

Suppose that we did produce where the marginal cost curve intersected the demand curve. It is true that given one firm, this would be the most efficient quantity: marginal benefit exceeds marginal cost on all units produced and marginal cost exceeds marginal benefit on all units not produced. However, suppose we add a second firm and split the output between them. Now the marginal benefit of the last unit stays the same (we still have the same total quantity and are therefore at the same position on the demand curve) but the marginal costs are much lower since each firm is at a lower position on its marginal cost curve. This suggests that there are additional units that can be produced with marginal benefit exceeding marginal cost. So we were not at the efficient quantity. The efficient quantity will be somewhere to the right and involve several firms producing rather than a single firm.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5. (15 points) Consider the competition between the Trellis and the Fat Canary. Both are high end Williamsburg restaurants that cater to the same customers and are located directly across Merchant Square from one another.

   (a) Explain why their current locations are an equilibrium outcome. In other words, why would you expect Fat Canary and Trellis to retain their current spaces rather than moving their businesses elsewhere in Williamsburg?

   Let's think about location as just position along a line, with Fat Canary just to the left of Trellis on that line. At this point Fat Canary would be capturing all of the customers to the left and Trellis would be capturing all of the customers to the right along the line. Let's think about whether Fat Canary wants to move if Trellis stays put. There is no reason for Fat Canary to move to the left, they already have the customers to the left and would give up some additional customers to their right as they move away from Trellis. Fat Canary could leap frog Trellis and locate somewhere to the right of Trellis. If they did this, they would give up all of the customers on the left to gain all of the customers on the right. If they are currently splitting the customer base in half with their locations, this won't lead to any additional customers for Fat Canary and would likely actually lead to fewer customers unless they located exactly to the right of Trellis. So Fat Canary has no incentive to move if Trellis maintains its current position. The same logic holds for Trellis. Given that neither restaurant wants to change location given the other's location choice, this set of locations in Merchant Square is an equilibrium.

   (b) What are two different ways that Fat Canary and Trellis may try to collude? For each, explain why collusion would tend to increase the restaurants' profits.

   There are a variety of answers you could give. Dimensions that the restaurants may collude on include but are not limited to prices for their meals, the number of customers they will serve, the prices they are willing to pay to their vendors, their advertising and their employment offers to cooks and servers. For whatever dimensions you choose, you need to explain how competing on that dimension reduces the profits of the firms and therefore the firms have an incentive to collude. The explanation of why competition hurts profits will vary depending on what dimension of competition you are looking at.

   (c) Aside from it being illegal, why might you expect the types of collusion identified in part (b) to fail?

   Your answer here will largely depend on the answers given in part (b). Some general points to consider are the profits from breaking the collusive agreement (these will depend on the type of competition you are considering), the size of these profits relative to the collusive profits (the bigger they are relative to the collusive profits the more likely firms are to cheat), the discount rate of the firms (firms that place little weight on the future are more likely to cheat to get larger gains in the near term), and competition from other firms (Fat Canary and Trellis will not be able to sustain high prices or low quantities if other restaurants are willing to enter the market).