

PROBLEM SET #3 Suggested Solutions

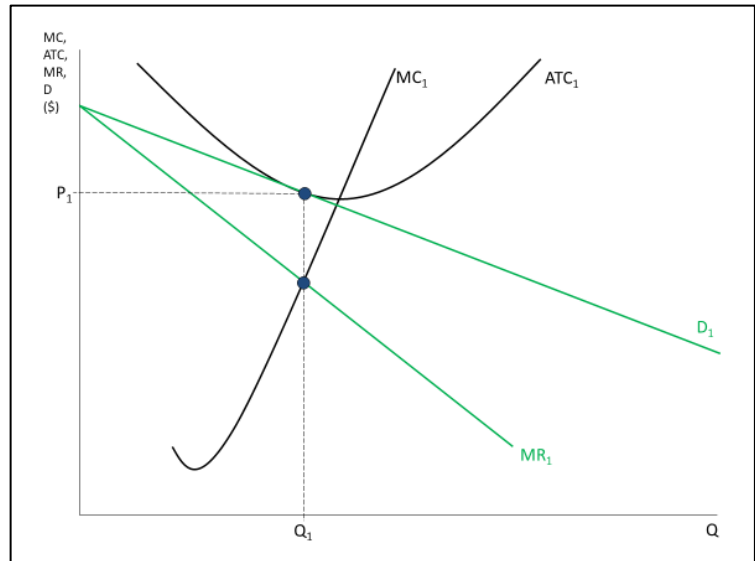
1. Monopolistic Competition (2 points total; ½ point per part)

Let's go back to (part of) the gentrification question from MT1. Consider a restaurant in an area that is experiencing rapidly rising rents. The restaurant operates in a monopolistically competitive industry. The industry is initially – before rents begin to rise – in long run equilibrium.

A. At the right, draw the initial long-run equilibrium for the typical restaurant. Assume the time frame is per month. Use subscripts "1" to label everything. (The ½ point offered here will be for the entire graph, both parts A & D.)

To make it easier to see the graphs, I'm going to split this into three graphs. All you were expected to draw is what you see in the third graph. The first two show the steps in getting to the final product.

First, draw the long-run equilibrium for a firm in a monopolistically competitive industry. (I underlined that phrase because I want you to remember that there is no "industry" or "market" graph for monopolistic competition. Because the businesses are producing a heterogeneous product, we can't aggregate (add together) the firms into one market or industry.) You should have a downward sloping demand curve (see part B) and therefore a downward sloping MR curve. The MR curve should split the distance between the vertical axis and the demand curve, which means it has the same intercept and twice the slope of the D curve. (Come to office hours and I'll show you the calculus behind that statement.) Then you want the standard MC curve. For long run equilibrium in monopolistic competition, $\pi = 0$. That means the ATC curve should be tangent to the demand curve at the profit maximizing quantity Q_1 .



Why tangent and not intersecting? Because the slopes of the ATC and AR (=demand) curves are determined by the MC and MR at that quantity, and the MR & MC are equal at quantity q_1 , which means the slopes of the ATC and AR curves must be equal at quantity q_1 : tangent. (You don't have to understand or ever repeat that logic, in Econ 1 anyway – it's there for those of you who are worried about why the ATC is tangent rather than intersecting D at the original equilibrium.)

B. In perfect competition, the typical firm faced a horizontal demand curve at the market equilibrium price. Because the D curve was horizontal, the MR curve was also horizontal & identical to the D curve. Why is the demand curve facing the typical monopolistically competitive firm (here, restaurant) downward sloping rather than horizontal?

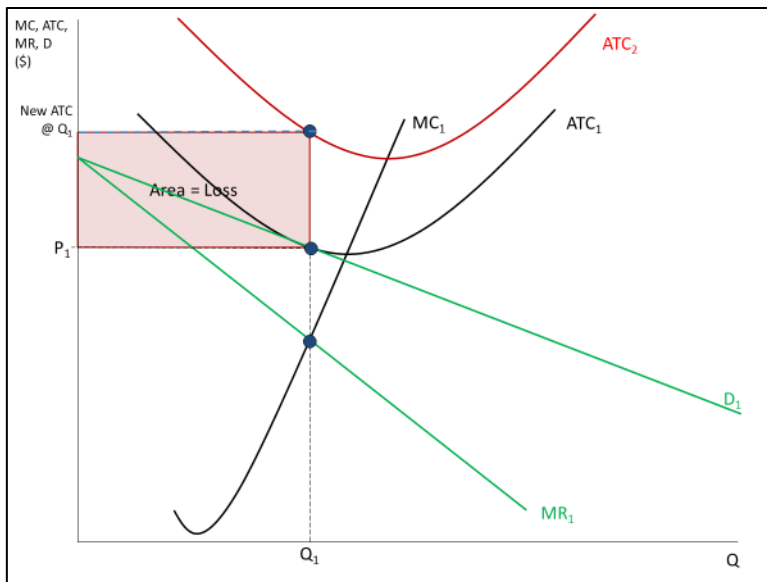
A monopolistically competitive firm sells a heterogeneous product. That means the product is not identical to the product sold by its competitors. Coffee from Starbucks is different than Peet's coffee is different than Philz coffee is different than Dunkin' Donuts coffee. Many people see the products as very close if not perfect substitutes. Some people see the products as not very close substitutes. On average for the economy as a whole, the demand is relatively price elastic but not perfectly elastic.

C. Now suppose the restaurant does not own its building and is instead renting the space. Suppose the rent doubles. In the short run, what is the effect on the profit-maximizing quantity of meals sold per month and price charged by the typical restaurant? Why?

Effect on q = no change in q

Effect on p = no change in p

You aren't asked to draw the graph for this part, but it will be helpful to see it to understand the solution. The key thing to remember is that the MC curve tells us about how costs change as the quantity of output produced changes. But rent is a fixed, not variable cost. An increase in rent does not change variable cost, it changes fixed cost. Therefore an increase in rent has no effect on the MC curve. It shifts the ATC up (and, not drawn, the AFC curve). Remember that the ATC will still hit its minimum as it crosses MC, so what it looks like (see graph) is that the ATC shifted up and to the right to ATC_2 . That's just an artifact of how things are drawn.



Because MR and MC are unchanged, the profit-maximizing quantity remains the same. There is no change in D and MR, so the profit maximizing price remains the same.

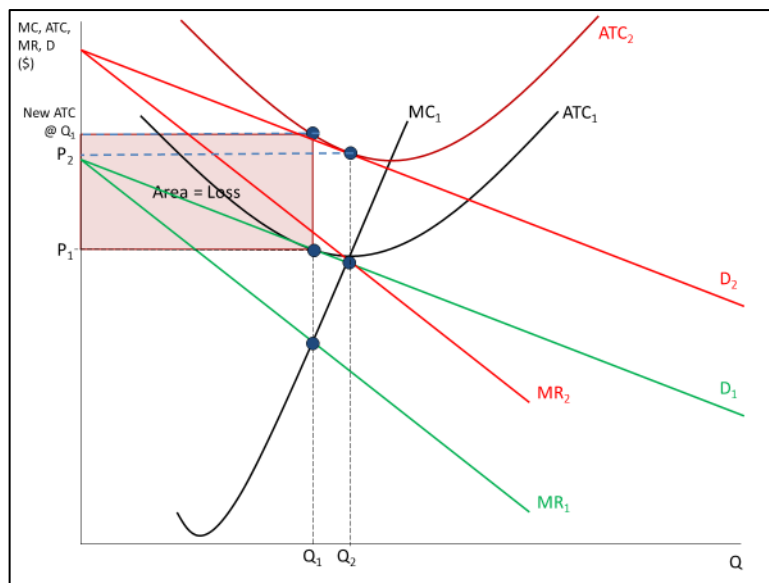
What changes in the SR is ATC has increased and therefore the typical firm is now incurring economic loss. As we'll see in part D, there will be long-run exits of firms from the industry.

D. For a restaurant that does not exit but instead chooses to “weather the storm,” what are the long run effects on its profit-maximizing quantity of meals sold per month and price charged by the typical restaurant? Why? Amend your graph above using subscripts “2” to depict the new curve(s) in the long run for the firms that both pay the higher rent and survive the industry shake-out.

Effect on q = increase in q

Effect on p = increase in p

The typical firm incurs economic loss as a result of the rent increase, leading in the long run to exit from the industry. As firms exit, the firms that remain (those that “weather the storm”) will see an increase in demand for their restaurants as they gain some of the customers of the restaurants that closed. For the surviving firms, their demand and MR increase to D_2 and MR_2 , leading to an increase in profit-maximizing quantity and price. The process continues so long as there are losses, ending when demand is again tangent to ATC at the profit-maximizing price P_2 and the firm is producing the profit-maximizing quantity Q_2 .



2. Externality and Optimal Tax (2 points total; ½ point per part)

Can we address climate change, at least a part of it, through taxation? Every time someone takes an airline flight, that action generates carbon emissions. Economists (someone with the job title “analyst”) estimate the additional cost to society associated with increased carbon emissions. Suppose that for a 1,000 mile flight, economists estimate that the marginal damage cost of the flight is \$50.

A. Is this a situation in which the Coase Theorem would apply? Why or why not?

No, the Coase Theorem does not apply in this case. For the Coase Theorem to apply, three conditions must be satisfied. If any one of the three conditions isn't satisfied, then the Coase Theorem doesn't apply. The three conditions are:

- Few parties to the transaction
- Well defined property rights
- Minimal transaction / bargaining costs

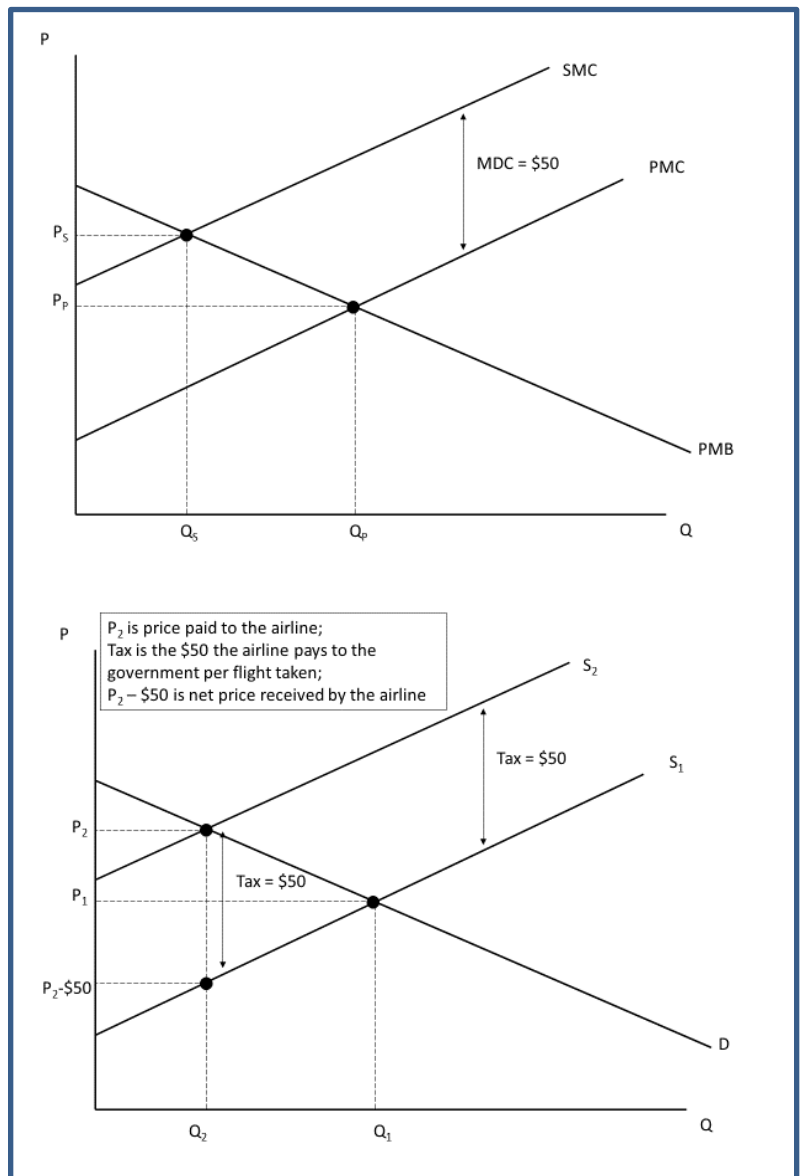
In the case of people taking 1,000-mile airline flights, there are too many parties to the transaction. Moreover, the effect of their behavior is on the environment (carbon emissions) and there is no well-defined property right to "the environment." No one owns it. No one has the right, therefore, to determine what happens to it.

B. We will use the axes at the right to depict the externality (top set of axes) and the penalty (bottom set of axes). Consider the market for 1,000 mile airline flights. Assume the time frame is "per month." First, set up the initial conditions. In the absence of a tax, ignoring social costs or benefits, draw the graphs for the determination of the privately optimal quantity of 1,000 mile airline flights taken per month (top graph) and for the market equilibrium quantity of 1,000 mile airline flights taken per month (bottom graph).

C. Now, using the information in the prompt above, show the effect of the negative externality in the top graph, which is also where you'll show the socially optimal quantity of 1,000 mile airline flights taken per month. In the bottom graph, show the optimal tax and the resulting market equilibrium quantity of 1,000 mile airline flights taken per month.

D. In the first part of the course, we showed that a tax generates a "deadweight loss" – a loss of potential *woo-hoo* to buyers and sellers – a result that leads some economists to oppose taxes. In this example, what is the optimal dollar amount of the per-flight tax? Why was a tax a "bad" thing in the first part of the course, but a "good" thing now? (It's a normative question. Remember that to answer any normative question, you must first state a goal, then answer the question, then defend your answer with reference to the goal.)

The optimal tax in general is a tax equal in size to the marginal damage cost (MDC). Here, the prompt tells us the MDC = \$50 per flight so the tax should be \$50 per flight. Note that the tax does not eliminate the behavior (equilibrium quantity is not 0) but does decrease it.



A tax was a "bad" thing earlier in the course when our (implicit) goal was to maximize efficiency and when we assumed no externalities existed. In that case, a tax lowers total surplus and creates a deadweight loss. A tax is a "good" thing in the face of externalities if our goal is to move the market quantity away from the private optimum and toward the social optimum. The tax lowers the quantity sold in the market, moving us closer to the social optimum.

3. Income Distribution (1 point)

Go to this NY Times article, <https://www.nytimes.com/interactive/2019/10/06/opinion/income-tax-rate-wealthy.html>, and most importantly, look at the graph. If you can't access NYTimes because you've used up your free looks for the month, you can look at the graph here: https://twitter.com/gabriel_zucman/status/1181009202837254144. The graph is based on groundbreaking work by UC Berkeley economists Emmanuel Saez and Gabriel Zucman, highlighted in their new book, *The Triumph of Injustice*, released to the public after this PS goes live. Based on the graph, the article, what you can find on their websites (<https://eml.berkeley.edu/~saez/> and <http://gabriel-zucman.eu/>), at the Center for Equitable Growth (<http://ceg.berkeley.edu/index.html>), or the Washington Center for Equitable Growth (<https://equitablegrowth.org/>), (whew ... not all, at least the graph, and the reader article, and your brain, but also those resources are worth checking if you're interested in really delving into the topic), write a paragraph on this topic: Provide and discuss one explanation for why the distribution of income has become more unequal in the United States over the last several decades.

Isn't that the most amazing animated graphic? Based on the graphic, which is in turn based on the work of Saez & Zucman, the rise in inequality is at least in part associated with a decline in average tax rates paid by the upper income groups. Zucman on Twitter: This chart shows the effective tax rate, i.e., the dollar amount of taxes collected divided by pre-tax income, for each group of the population.

Remember that there is a difference between average and marginal tax rates (just like there's a difference between average and marginal grades, or average and marginal cost, or average and marginal revenue). The average tax rate someone pays is their total taxes paid divided by their income. So if someone pays \$200,000 in taxes on income of \$2,000,000, their average tax rate is 10 percent. The marginal tax rate tells you instead what someone pays on the last dollar of income. So if that same person would have paid \$199,800 in taxes on income of \$1,999,000 (average rate of 9.995 percent) but \$200,000 on income of \$2,000,000 (average rate of 10.0 percent), their marginal tax rate is the change in taxes (200,000-199,800) divided by the change in income (2,000,000 – 1,999,000) or 20 percent.

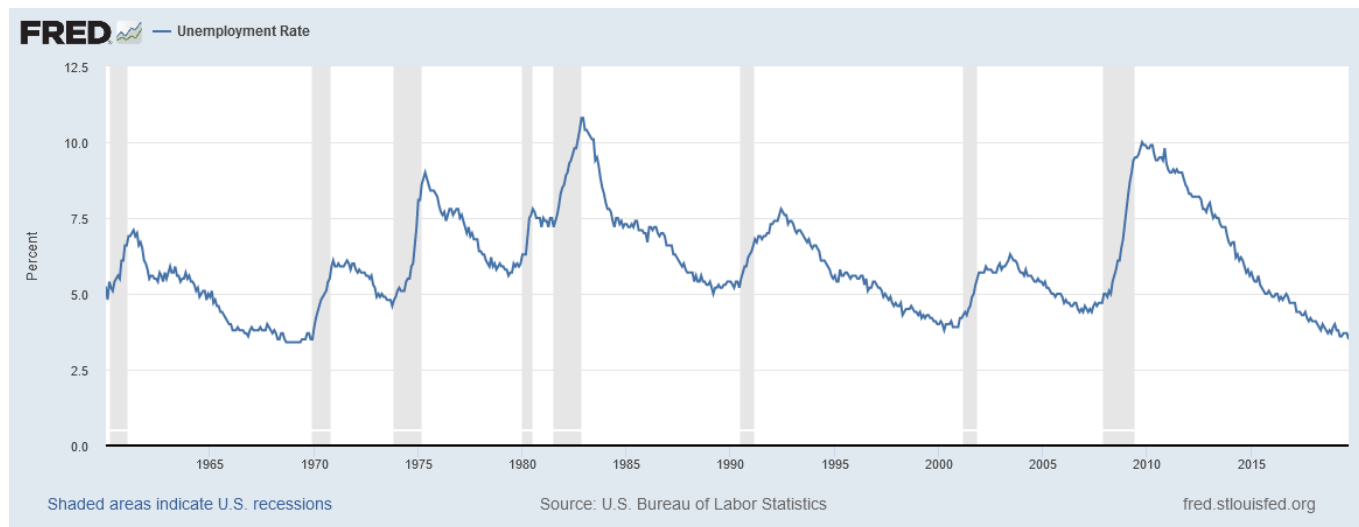
For instance, on my own federal income taxes last year, my marginal tax rate was 24% but my average tax rate was 11.5%

In general, your answers here will vary depending in part on how deep of a dive you did into the Saez and Zucman work. I encourage you, whether it's this term or later, to make that deep dive. Saez will at some point be a Nobel Laureate (mark my words!) He sometimes teaches Econ 131 (100A is a prereq). Zucman teaches Econ 133. Keep your eye out for those classes as you move forward in your studies. Also, more immediately, there will be an October 30 event on campus to introduce their book. When I have more info on when and where, I'll include it in an email blast or a Piazza announcement.

4. Macro data from Fred (2 points; 1 point each)

For this question, you need to download graphs from Fred (<https://fred.stlouisfed.org/>) and write 2 sentences that describe the patterns seen in the graph. The sentences will be written on this page in the space below. The graphs should be included as a separate page (page 4 of the submitted pdf) that immediately follows this page.

A. The U.S. unemployment rate, 1960 - present (use monthly data, seasonally adjusted)

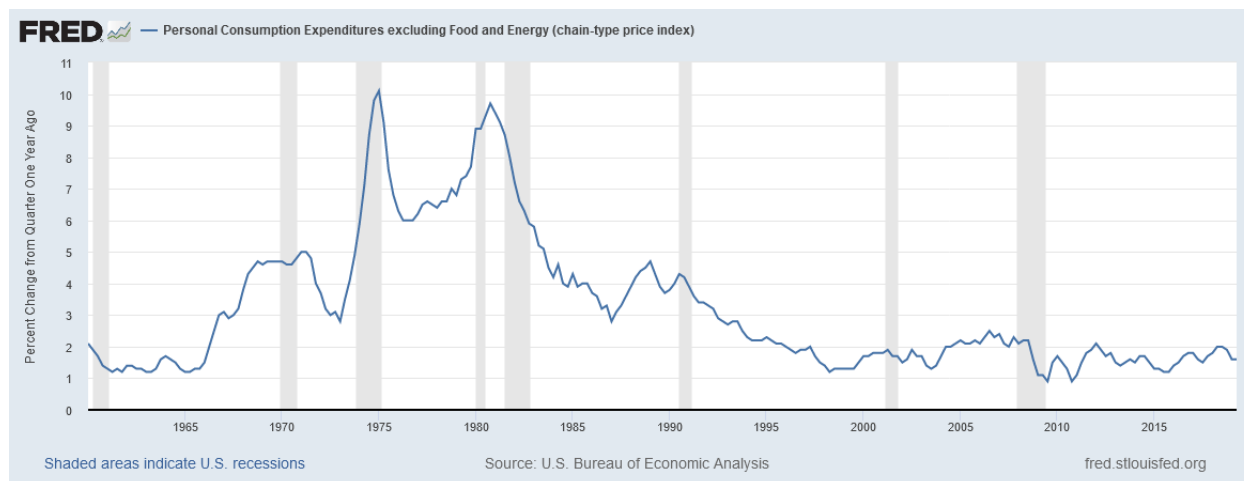


In terms of the graph, be sure you started with 1960 and not Fred's default for this graph which was 1948. You had the chance to update the dates on Fred before downloading the graph. The default graph had a minimum on the vertical axis of 2.5 percent. In order to get the vertical axis to start at 0, I added a "user-created line" as line 2, with the line taking values 0.5 at the beginning and 0.5 at the end. I then turned the line white so you can't see it (except where it crosses the gray recession bars). You didn't need to do that, but now you know the trick if you want to force the axis to go to 0 in the future.

Written descriptions will vary. What you write should make sense and should indicate you looked at and thought about the graph. Here are patterns I see when I look at that graph:

- *Unemployment rises and falls over time.*
- *The increases in unemployment happen rapidly; the decline back to the original unemployment rate take more months than did the increase.*
- *The current unemployment rate is the lowest it has been since the 1960s*
- *The current expansion (time period since unemployment reached its peak) is one of the longest in the last 60 years.*
- *The peak level of unemployment in each business cycle varies. The worst unemployment was the 1982-83 recession. The unemployment in 2009 was second worst over the last 60 years.*

B. The core inflation rate, 1960-present, as measured by the PCE excluding food & energy



Here if you just used the default graph from Fred, you got the right years (it started in 1960 by default) and had a vertical axis beginning at 0. No adjustments necessary on your end.

“Core” inflation refers to the less volatile parts of inflation, thus omitting prices of food and energy. The idea is two fold. [1] The inflation rate that includes food and energy will fluctuate more from quarter to quarter or month to month, and if we get caught up in what happens from one period to the next, we can get jerked around in OMG!! Whew!! OMG!!! Whew!!! reactions to fluctuations that simply come and go. Food & energy prices fluctuate a lot because they are dependent in part on weather, bugs (crops fail sometimes), oil refineries going offline for a few weeks for random reasons, and so on. [2] The central bank’s mandate with regard to price inflation assumes that the central bank, with its monetary policy tools, is able to influence the inflation rate. That assumption may be right in terms of many goods and services, but it’s clearly not right in terms of price fluctuations due to the weather. The Fed can’t change the weather.

Written descriptions will vary. What you write should make sense and should indicate you looked at and thought about the graph. Here are patterns I see when I look at that graph:

- The inflation rate has been in the 1-2 percent range for over 20 years, since the mid-1990s. (That, by the way, is what we call “price stability.”)
- The inflation rate in the 1970s and early 1980s was unusually high – unusual relative to the first half of the 1960s (and, what you can’t see there, the 1950s as well), and relative to the post-1990 period.
- Inflation hit a peak of about 10 percent (“double digits”—1 in the tens place, and 0 in the ones place) in the mid-1970s and again in the early 1980s
- There’s no obvious pattern connecting rises or falls in inflation with recessions (the gray bars are recessions). Sometimes inflation falls in recession, sometimes it rises.

5. Essay: Asymmetric Information (3 points total)

Asymmetric information problems beset many important markets. Some markets are plagued by problems of adverse selection; others by moral hazard. In the absence of a remedy, markets characterized by asymmetric information will fail. The classic reference is "The Market for Lemons," by Berkeley Professor and Nobel Laureate George Akerlof, Quarterly Journal of Economics (August 1970), <http://www.jstor.org/stable/1879431>.

Write a one-page essay in which you address these points:

- Give an example of a good or service whose market is disrupted by asymmetric information problems. Your example can be from any time period (current or historical) and any location. What is the product? What is the nature of the asymmetric information? In this particular example, what does it mean to say "the market will fail"?
- Continuing with your example, what remedies are in place to address the issues of asymmetric information in this market? How do those remedies address the market failure?
- Conclude with a normative assessment: do you think it is good to have those remedies in place? Why or why not? Remember that with any normative question, you must begin by stating a goal, then answering the question (yes, no, good, bad), then defending your answer with reference to your goal and the positive analysis you've conducted of the market.

There are many ways you could have gone with this essay, so we can't provide you with "this is what you should have written."

Guidelines:

a. *Did you follow the specifications? One-page essay? Max of 400 words? 1" margins? Double-spaced? 10 or 11 or 12 pt font? Your name and date & word count in the top right corner? Your essay stapled at the back of your problem set? Attached your "works cited" list (either at the end of page 1 or on a separate page)? Submitted both via bCourses & in hard copy?*

If so, you remained eligible for full credit. If not, you lost 1 point right off the top.

b. *Did you address the prompt?*

You needed to come up with an example of a product whose market is disrupted by either adverse selection or moral hazard. You needed to answer the questions in each bullet of the prompt. And you needed to conclude with a normative assessment. We didn't care one way or the other whether you argued it was good or bad to have those remedies in place; we cared that you know that to answer a normative question you must first state a goal, then in light of the goal you can assess good or bad, and then you can defend your assessment with reference to the goal and whether the policy achieves the goal (that last part, then, is positive, not normative analysis).

For instance, you could have written about labor markets. One problem is how employers decide who to hire. They face problems of adverse selection – they don't know the true quality of the people who are applying for the job. Employers try to screen potential employees by looking at resumes and sorting into "reject" and "interview" piles based on resumes. So here the adverse selection problem is that employers don't know the true quality of workers, and the remedy they use is to screen based on information on a resume.

But an issue with resumes is that employers attribute labor market characteristics to applicants based on info on the resume, which may or may not be accurate predictors of the relevant labor market characteristics. A famous article in economics is entitled "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." (Bertrand & Mullainathan, American Economic Review, 2004). The answer to their question in the title: apparently yes. In Bertrand & Mullainathan's field experiment, the "white" names received 50 percent more callbacks for interviews. (How famous is this article? According to google scholar, the article has been cited over 3,000 times in other papers or books). <https://www.aeaweb.org/articles.php?doi=10.1257/0002828042002561>. In recognition of this problem, in Fall 2015, new policies were introduced in the UK under which names will be stripped off of resumes & college applications: <http://www.buzzfeed.com/rossalynwarren/job-and-university-applications-will-hide-names-to-prevent-r-ig74BDmW7>

The problems with this particular screening remedy extend beyond names, of course. Not all graduates of any particular institution are the same, but employers may assume that all applicants from UCB are prima facie better qualified than any applicant from CSU-LB. Not all economics majors are the same, but employers may assume that all applicants with economics majors have stronger analytical skills than any applicant with a <I'll let you fill in the blank> major.

Be sure you also read the B&G solutions to the questions about asymmetric information

Interested in issues of asymmetric information? Take Econ 119 or Econ 138 after completing the prerequisites.