Problem Set 1: Fun with Supply and Demand! Economics 415

All problems are due in class next week. Be complete and succinct. Feel free to work together, but submit your own answers.

1. Briefly analyze in terms of supply and demand the effects upon the given market of the following events. Are these changes a shift in the demand curve, a shift in the supply curve, a movement along the demand curve, or a movement along the supply curve? (More than one will apply. Be sure you understand why.) Explain briefly. Draw a graph.

    a. 20,000 workers move from Michigan's Upper Peninsula to Wisconsin in order to take advantage of higher manufacturing wages in Wisconsin. (Discuss the effects in <u>both</u> labor markets, Michigan and Wisconsin. Think about *why* wages might initially be different in the two states. <u>Hint:</u> It is critically important that the migration is a response to a difference in wages.)

    b. The deployment of troops from a particular military base reduces the local population by 10% overnight; within days 100 local barbers go out of business. (Discuss the local market for barbers.)

    c. New regulations limit the amount of fish that can be caught off the coast of Maine, and 16 percent of professional fisherpersons wind up working in other industries.

2. Last year there were 5,000 paralegals working in Southeastern Wisconsin, and they earned an average wage of $15.50/hour. This year, there are 4,800 paralegals in the area with an average wage of $13.95/hour.

    a. Based on this information, what do you think has changed—supply or demand? Explain briefly, using a graph.

    b. Give a concrete explanation for why that may have happened, in terms of tangible changes in the world rather than economic jargon. (There are many possible answers.)

    c. Does this information allow you to calculate the elasticity of demand for paralegals, the elasticity of supply, both, or neither? Calculate all you can.

    d. Would you expect that the elasticity of supply is greater for paralegals or for patent lawyers? Why?

    e. Would you expect that the elasticity of demand for paralegals is greater or less than that for patent lawyers? Why?

3. (Substantially harder, but worthwhile.) Suppose that there are currently no income taxes, but a tax of $4/hour is under consideration. (Note that this is a little different from how income taxes usually work—it is a fixed dollar amount per hour rather than a percentage of wages. It will be easier to work with this specification.) As it is, employers hire 250 billion hours of labor services per year at an average wage of $15/hour, but if the tax passes employment will be reduced to 225 billion hours per year and wages BEFORE taxes are assessed will rise to $18/hour.

    a. If the tax passes, what will be the new wage net of the income tax?

    b. How much revenue will the tax generate for the government?

    c. Compute the elasticity of labor supply and labor demand. Sketch a graph to help you.

    d. Compute the deadweight loss due to the tax. [Hint: Assume that the supply and demand curves are straight lines. The formula for the area of a triangle is Area = 0.5 x (base) x (height).]

Problem Set 2: Labor Supply Economics 415

All problems are due in next week. Be complete and succinct. Feel free to work together, but submit your own answers. Part (e) of problem 2 is optional.

1. Discuss the effect of the following public policies on the supply of labor. If there is a difference, discuss how the effect varies over time (e.g., now versus in the future) or across different groups of people.

   a. Allowing a tax credit for childcare expenses.
   b. Providing Social Security benefits to retired women who worked outside the home for less than 10 years, with the size of the payment dependent on their husbands' earnings history. (In fact, they receive benefits equal to 50 percent of their husbands' Social Security benefit. When answering, you may ignore the fact that the government has to pay for these benefits.)
   c. Paying a $10,000 bonus to women who give birth to a third child. (Note: The Japanese government has recently instituted this policy—along with a series of other subsidies for child-rearing—in an effort to reverse the rapid decrease in fertility rates there.)
   d. (A bit tricky—think carefully!) Allowing taxpayers to deduct the expenses associated with relocating in order to work at a new job.

2. The volume of applications to graduate and professional degree programs (e.g. MA/Ph.D. programs, law schools, business schools, etc) is very sensitive to the state of the macro-economy. Many more people apply for admission into these programs during recessions than during economic booms.

   a. Suggest an explanation for the increased interest in graduate/professional school during recessions.
   b. What does that increased interest suggest about the relative sizes of the income and substitution effects of changes in wages over the business cycle?
   c. Other studies have shown that the labor supply of the male college graduates is "backward-bending"—specifically, those who earn higher wages prefer to work fewer hours. Explain why this might appear inconsistent with the observation about the increased interest in graduate/professional programs during recessions.
   d. Under the U.S. government's method of counting persons, a person who is a student and does not work is considered out of the labor force. Conceptually, persons who are out of the labor force are supposed to be unwilling to work regardless of the wage offered to them.
      i.) Based on the observation above (that graduate/professional school enrollments increase during recessions), do you think that graduate students are really unwilling to work regardless of the wages that might be offered to them?
      ii.) Explain why it would be at least somewhat misleading to count graduate/professional students as either employed or unemployed.
      iii.) If you were particularly interested in the labor market for young college graduates, what category would you put them in—one of those above or something else? Why? (There is no "right" answer to this, but the question will help you understand the choices faced by people who collect and analyze employment data.)
   e. (Optional, but a challenge!) Let's see if we can resolve the paradox identified in part (c.):
      i.) Which will be more affected by a recession: an individual's current wage or his/her lifetime earnings?
      ii.) Suppose instead that you were comparing a number of college graduates (same age, same amount of experience) who earned different wage rates this year. Would you expect the correlation between an individual's current wage and lifetime earnings *when compared against his/her peers* to be fairly strong or fairly weak?
      iii.) Use your answers to above along with your knowledge of income and substitution effects to resolve the paradox described in part (c.).

Problem Set 3: Human Capital Economics 415

All problems are due in class next week. Be complete and succinct. Feel free to work together, but submit your own answers.

1. Identify the flaw in the following argument: "Companies that offer free lunches to their workers find that worker productivity (output/hour) is 10 percent higher. Clearly eating a free lunch improves morale and makes workers work harder." If two companies were identical apart from the fact that one offered free lunches, which company would attract more capable workers?

2. (You will want to use a spreadsheet for this problem—for example, Microsoft Excel.) Doug is a recent high school graduate considering three careers that involve flowing water. He can begin work immediately at the municipal Water Department, which would pay him (in real terms) $30,000 each year for the next 45 years. A second choice is to spend five years in college, with an annual tuition of $25,000 per year, and become a civil engineer; this would allow him to earn $55,000 per year for the 40 years after he graduates. The final option is to get the same civil engineering degree (just as before), spend the following 5 years getting a Ph.D. in hydrology (with no tuition and a $15,000 annual fellowship), and then work for 35 years as a groundwater specialist who earns $75,000 per year.

   a. If the interest rate were 7 percent, which option would Doug choose? Use a spreadsheet program (your choice—Excel, QuatroPro, whatever) to perform your calculations, and attach the output of that exercise. The top line of your output should look like the following. Remember to start in Year 0 (i.e., the first payments are made and/or received immediately, not one year from today) and end in Year 44.

Year	Option 1 Earnings	Option 1 Present Value	Option 2 Earnings	Option 2 Present Value	Option 3 Earnings	Option 3 Present Value

   b. Would Doug change his mind if a new act of Congress limited fellowships for graduate students to $9000 per year?

   c. How would that decision change if the interest rate rose to 8 percent? (Use the original $15,000 fellowship value here.) Write at least 2 or 3 sentences to explain why the change in Doug's decision makes intuitive sense from a financial point of view. Mention what else Doug might do with the money he had saved for tuition payments.

3. A major league baseball player is trying to decide whether to sign a contract with the Chicago Cubs or the Milwaukee Brewers. (No, you don't need to know anything about baseball to answer this question.) This player does not care which team he plays for, merely how much money he will earn. In the terms in which such contracts are usually discussed in the news media, the Brewers are offering more money, $10 million over two years versus the Cubs' offer of $8 million over two years. However, we know that this is not a good way to discuss the value of contracts because it depends on *when* the money is to be paid. In fact, the Cubs' offer includes more money "up front" than does the Brewers' offer. The Cubs' offer includes a $2 million signing bonus (paid today), $3 million paid at the end of the current season (consider it to be one year from today), and $3 million paid at the end of the next season. Meanwhile, the Brewers offer a $1 million signing bonus now, $2 million at the end of the next season, $3 million at the end of the following season (so three years from now), plus a deferred payment of $4 million dollars 10 years from now.
   a. Compute the present value of both contracts if the interest rate is 5 percent. Which team makes the better offer?
   b. What if the interest rate were 10 percent?

Problem Set 4: Labor Demand Economics 415

All problems are due in class next week. Be complete and succinct. Feel free to work together, but submit your own answers.

1. Recall that the Law of Demand states that demand curves are always downward-sloping. That is, people want to buy more of some good when its price is lower.

   a. Why is a firm's short-run demand for labor downward-sloping?

   b. Is the firm's long-run demand for labor necessarily downward-sloping? Explain, using the substitution and scale effects.

2. Most industrial farms hire migrant workers, so the market for such workers is reasonably taken to be perfectly competitive. Suppose that all farms individually have a short-run elasticity of labor demand of –0.5. In other words, if the wages of migrant workers in a local labor market rose by 10% (say, because many of those workers decided to work at a recently-opened nearby factory), the farms in the area would want to hire 5% fewer workers. Nevertheless, it is true that if the wages of migrant workers rose by 10% *everywhere*, employment of migrant workers would fall by *less* than 5 percent in the short run.

   a. Explain why the reduction in employment would be less than 5 percent in the latter case. (Hint: Read pp. 141—143 of your textbook carefully (pp. 140-142 if you have the old edition).)

   b. In light of the short-run elasticity of demand for migrant workers, how easy do you think it would be for the industrial farms to replace the workers' efforts by using the existing stock of farm machinery more intensely?

   c. If the nationwide 10% wage increase were permanent, would the employment of migrant workers fall more in the short run or in the long run? Why?

3. The HRB Corporation is the world's only manufacturer of air filters for Zamboni engines. Last year, HRB charged $20 per filter and sold 1 million of them, and it paid all of its production workers $10 per hour. This year, something happened at HRB headquarters (not announced to the public) that caused HRB to lower its price to $18 per filter. (HRB is still a profit-maximizing company.) This enabled HRB to sell 1.2 million filters. Its workers all continue to earn $10 per hour.

   a. What is the elasticity of demand for Zamboni air filters?

   b. How much additional revenue does HRB earn if it sells one more air filter this year? How much additional revenue would HRB have earned if it sold one more air filter last year?

   c. How much are HRB's employees paid relative to the value they create? (That is, what is the ratio of the wage to the value of the worker's marginal product (price x MP_L)?)

   d. What was the workers' marginal product last year? What is it this year?

   e. Suppose you are considering only two explanations for the increase in HRB's output: (1) HRB invested in better equipment and kept the same number of workers, or (2) HRB hired more workers to use its existing equipment. Given your observations above, which makes more sense? Why?

Problem Set 5: Personnel Economics Economics 415

All problems are due at the next class meeting. Be complete and succinct. Feel free to work together, but submit your own answers.

1. In class we discussed several compensation schemes that employers may use to motivate workers.

    a. "Pay for performance" schemes may take several forms. One is a piece rate scheme, in which there is an explicit mathematical formula that translates workers' output into pay. (For example, a worker might be paid $5 per unit of out put he or she produces.) A second scheme awards workers a year-end bonus that depends on their annual performance review. Question: All else equal, would Caucasian or African-American workers have a stronger preference for the piece rate relative to the bonus system? Why?

    b. Women are more likely than men to hold jobs that pay workers a piece rate, but less likely to hold jobs that promise workers raises if they perform well. Why might that be? (Hint: This is not about discrimination.)

    c. Why might it be more problematic to use a piece rate scheme to motivate a sales representative who sells computers than one who sells furniture?

    d. Briefly explain how job- or industry-specific human capital (or occupational licensing, for that matter) can make employees more diligent in their jobs, even if employers do not pay efficiency wages designed to elicit greater honesty.

2. One type of benefits we discussed involved giving workers discounts on the firm's products. We noted that this type of system could reduce the firm's costs by reducing some marketing expenses.

    a. Explain why offering such discounts (as opposed to increasing workers' cash wages by an equivalent amount) can also help to attract a more knowledgeable or enthusiastic sales staff.

    b. Very few firms pay workers *entirely* in the form of merchandise discounts (or even just in the form of merchandise itself). Why not? Explain in terms of the cost the firm must pay in order to attract workers.

    c. (This is related to part (b).) Many high-ranking executives receive part of their pay in shares of the firm's stock, supposedly to motivate them to work to increase the firm's stock price. In order to ensure the executives remain motivated, their contracts usually prohibit them from selling those shares for a long period of time. Question: Explain how the restriction on stock sales may force the firm to pay the executive more than it would if it simply paid the executive in cash.

Problem Set 6 (optional) Economics 415

All problems are due at the next class meeting. Be complete and succinct. Feel free to work together, but submit your own answers.

1. One criticism of the theory of compensating differentials is that workers who earn high (cash) salaries generally receive better benefits and working conditions than workers who earn low salaries.

    a. Does this fact necessarily disprove the theory of compensating differentials? Why or why not?

    b. Does the positive correlation between salaries and benefits/working conditions necessarily mean that inequality in total compensation is greater than inequality in cash salaries?

2. The poverty rate among families headed by a married couple fell between 1980 and 1995, from 6.2% to 5.6 percent. The poverty rate also fell over that period for families headed by a single parent (the only other category of families), from 28.9% to 28.4%. Nevertheless, the poverty rate among all U.S. families *increased* from 10.3% in 1980 to 10.8% in 1995.[1]

    a. How can this be?!? That is, how can the aggregate poverty rate rise when the poverty rate fell for each type of family? (Hint: This kind of result is sometimes called *Simpson's paradox*.)

    Over the same period, the poverty rate for individuals (as opposed to families) also rose, from 13.0% to 13.8%. As above, the poverty rate for individuals fell in all three categories: single persons (from 22.9% to 20.9%), individuals living in families headed by a married couple (from 7.4% to 7.2%), and individuals living in single-parent families (from 36.7% to 36.5%).

    b. What can you infer from the fact that the poverty rate for *individuals* living in married couple families is higher than the poverty rate for married couple families? (The same is obviously true for single-parent families as well, for the same reason.)

    c. The Bush Administration has proposed policies that encourage marriage among low-income individuals, as a means of fighting poverty.

        i. In light of the facts presented above, is it possible that such policies might reduce the aggregate poverty rate?

        ii. On the other hand, how might one argue that the proposed policies might not reduce the aggregate poverty rate? (Hint: Recall our discussion of selection bias.)

[1] Dalaker, Joseph, U.S. Census Bureau, Current Population Reports, Series P60-214, *Poverty in the United States: 2000*, U.S. Government Printing Office, Washington, D.C., September 2001. Figures come from Tables A-1 and A-3.

Problem Set 7: Labor Unions Economics 415

All problems are due at the next class meeting. Be complete and succinct. Feel free to work together, but submit your own answers.

1. As we noted in class, most members of labor unions work in the public sector, industries that are regulated, or industries in which production is concentrated into a few firms. This problem is designed to help you understand some of the factors behind the relatively small role played by labor unions in other industries.

   a. Consider a perfectly competitive industry with many firms that produce the same product. Recall that each firm in a perfectly competitive industry faces a flat (horizontal) demand for its product. That is, if the firm were to raise its price it would not be able to sell any of its output.

      i. If one of those firms becomes unionized and wages consequently rise, what effect does the wage increase have on the firm's marginal cost curve? What will happen to the amount of output the firm wishes to produce?

      ii. What effect would unionization have on the amount of labor the firm uses in the short run and in the long run?

   b. Now say some firm produces a good at multiple plants, some of which are unionized and some of which are not. If demand for that firm's product rose, would the firm increase production more at the unionized plants or the non-union plants? Why?

   c. "Right to work" laws in several states (mostly in the South and the Rocky Mountain regions) make it more difficult to organize labor unions there. Explain how the existence of these laws can make it difficult to organize unions in <u>other</u> regions of the country as well.

2. In the retail trade industry, unionized workers earn 19.0% more than non-unionized workers do. As you learned in class, this does not necessarily mean that non-union workers who gained union membership would receive raises of (on average) 19%, nor does it mean that the existence of the union increased the wages of workers who were able to join the union by 19%.

   a. As we noted in class, many unions prefer to grant union membership to workers with a significant amount of work experience in the industry. In light of that fact alone, is the 19% difference between union and non-union wages an overestimate or an underestimate of the value of belonging to a labor union? (Other factors might also affect that comparison, but ignore them for this part of the question.)

   b. Define the "spillover" and "threat" effects. If the spillover effect were larger in magnitude than the threat effect, would the existence of unions raise or lower the earnings of non-union workers? Would the 19% difference between union and non-union wages overestimate or underestimate the value of belonging to a labor union? (Again, ignore other factors for this part.)

   c. Briefly explain how the "product market" effect may operate in this industry. If the product market effect were large, would that suggest that the 19% wage difference is an underestimate or an overestimate of the amount by which unions increase workers' wages? (Ignore other factors again here.)

Problem Set 8: Discrimination Economics 415

All problems are due at the next class meeting. Be complete and succinct. Feel free to work together, but submit your own answers. *Note: This assignment might take a little longer than the others, but past students have asked for more practice on such questions. The last question is provided for "extra practice" and is thus optional.*

1. It is a well-known fact that recent immigrants earn relatively low wages. However, their wages rise during their time in their new country. After about 15 years in the U.S., immigrants' wages are comparable to those of native workers living in the same area—and after that, their wages actually exceed those of natives by about 3 percent.[1] This finding is all the more remarkable in light of the fact that natives have on average one more year of schooling than immigrants do.

   In empirical studies of discrimination, it is common to argue that discrimination is at work when one group appears to have more skills (or at least as much skill) as another, yet receives a lower wage. Given the facts above, one might then conclude that employers discriminate against native workers and in favor of immigrants. Doesn't that seem hard to believe?

   a. Suppose you performed an Oaxaca decomposition on the 3 percent difference in wages between native-born and immigrant men with more than 15 years of experience. Would the decomposition find that the difference in wages attributable to discrimination against natives (rather than differences in education) is less than 0 percent (negative), between 0 and 3 percent, exactly 3 percent, or greater than 3 percent?
   b. Can you think of any explanations other than discrimination for the wage differential?

2. [This is a question from a past exam.] In all of the following circumstances, workers from different groups experience different labor market outcomes. For each of the following, explain whether treating different groups differently gives the employer a competitive advantage or a competitive disadvantage. If there is a term for a type of discrimination and/or wage differential, use it.

   a. Movie studios pay higher salaries than they otherwise would to actors who are unknown to the public at large but are well-liked and respected by more famous actors.
   b. Professional athletes are especially likely to receive their highest wage offer from a team located in a city where they grew up or went to college because they are more popular with local fans.
   c. A male executive hires only male secretaries because his wife would feel threatened if his secretary were female.
   d. McKinsey & Co., perhaps the world's most prestigious management consulting firm, recruits employees from only about 10-20 universities in the world because its experience is that students from those schools more often make better employees than students from other schools.

3. [Another old exam question.] You have been assigned to investigate a claim of industry-wide discrimination against medical doctors who are atheists. Their average weekly wage of $3800 is substantially less than the $4200 average weekly wage among all other doctors. However, as shown below, they differ from other doctors in some notable respects—they are less likely to specialize, more likely to live in the South (where wages are generally lower), and more likely to live in urban areas.

	Other doctors	Atheist doctors
Fraction who specialize	0.20	0.15
Fraction who live in the South	0.20	0.40
Fraction who practice in urban areas	0.40	0.50

   Econometric studies indicate that the wages earned by members of the two groups are determined by:

   Weekly wage (All Others) = 3460 + 2200 (if a specialist) – 500 (if in the South) + 1000 (if in an urban area)
   Weekly wage (Atheists) = 3310 + 2000 (if a specialist) – 400 (if in the South) + 700 (if in an urban area)

   a. Perform an Oaxaca decomposition on the difference in the wages earned by the two groups. Briefly describe what each component represents.
   b. Under the usual interpretation, how much does discrimination affect atheists' wages?
   c. Critique the traditional interpretation. Is there any reason to think that discrimination could have a larger effect than that? Could its effect be smaller? Explain thoroughly.

[1] Barry R. Chiswick, "The Effect of Americanization on the Earnings of Foreign Born Men," *Journal of Political Economy* 85(5), Oct. 1978.

4. (Note: This question is optional. It is an opportunity for more practice with Oaxaca decompositions, but you do not have to do it if you don't want to.) It is well known that disabled workers earn less than other workers. In the year 2001, men who claimed to be at least partially disabled (in the Panel Study on Income Dynamics (PSID)) earned an average hourly wage of $19.75, which is about 10% less than the average hourly wage of $21.89 reported by other men. However, it is also observed that disabled men have slightly less education and are less likely to be married—both of which are usually associated with lower wages. (You probably aren't surprised to hear that education raises wages. Marriage does as well, especially for men.) Here are the data:

	Disabled men	Other men
Fraction of sample	9.4 %	90.6 %
Average Hourly wage ($/hour)	19.75	21.89
Average Education (years)	13.06	13.33
Fraction Married	0.72	0.76

In addition, there is evidence that these characteristics affect wages differently for the two groups. Among self-reported disabled men, the wage relationship (in the PSID data) is

Hourly Wage = -27.50 + 3.47 * Education + 2.68 * Married,

where "Education" is the years of education a person has and "Married" equals 1 if the person is married and 0 otherwise. Among other men, the wage relationship is

Hourly Wage = -28.09 + 3.55 * Education + 3.48 * Married.

a. Use this information to conduct an Oaxaca decomposition of the difference in wages between the two groups. (It might be useful, though not necessary, to make the computations in a small spreadsheet.) What percentage of the $2.14/hour difference in wages is attributed to differences in the observed characteristics between the groups? What percentage is attributed to differences in the returns to those characteristics? According to this decomposition, how large is the unexplained difference between the two groups?
b. Which accounts for the largest share of the wage gap: differences in amounts of education, differences in the returns to education, differences in marital status, differences in the way that marital status translates into wages, or the unexplained portion of the gap?
c. Using the traditional interpretation of the Oaxaca decomposition, what percentage of the wage gap between the groups would be attributed to discrimination?
d. Is it reasonable to conclude that differences in the returns to marital status represent a form of discrimination by employers against disabled men? Why or why not? Suggest an alternative explanation.