

SUNY-Stony Brook. Economics Department
Economics 323: Fall 2011
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Midterm 2: November 22, 2011

Suggested Solutions

100 points were at stake, plus 7 in extra-credit. There are 5 parts.

1. True or False. Credit will only be given for justified answers. (15 points, 5+5+5)

a) Cross-sectional data gathers information on individuals across time. **True or False**

False, it gathers information about a set of individuals at a particular point in time

b) A risk-loving individual will always buy fairly priced insurance. **True or False**

False, a risk-lover is unlikely to buy much fairly priced insurance, he will either not insured fully or just do not buy any depending on his utility function.

c) Using the Ordinary Least Squares criterion to estimate the unknown parameters of a linear econometric model assures the best fit to the data of interest among the class of linear models. **True or False**

True, the OLS estimates guarantee us that is the best fit to the data

2. Joe Risk. (Please show all your work, unjustified answers, even if correct will not provide any credit) (13 points)

Joe's preferences can be represented by a utility function $U(w) = 2 \cdot \sqrt{w}$, where w represents wealth. He is faced with a gamble that provides 16 units of wealth with probability 0.25, and 36 units with probability 0.75. How much money for sure will give Joe the same utility as playing the lottery?

- a) 31
- b) 121
- c) 25
- d) 30.25
- e) None of the above

This was really similar to one of the exercises of the sample questions. The utility function shows risk aversion.

$$EU = 0.25 \cdot (2 \cdot \sqrt{16}) + 0.75 \cdot (2 \cdot \sqrt{36}) = 2 + 9 = 11$$

$$EMV = 0.25 \cdot 16 + 0.75 \cdot 36 = 31$$

But Joe is risk averse so $U(EMV) > EU$, $2 \cdot \sqrt{31} > 11$

This means a quantity for sure lower than the EMV can give Joe the same utility as playing the lottery, in fact it should be clear that $2 \cdot \sqrt{30.25} = 11$, or using the EU $(11/2)^2 = 30.25$, so the answer is d).

In either case you find x in $2 \cdot (\sqrt{x}) = 11$

3. Income and Education (25 points, + 7 extra credit)

Think of an economic model that tries to explain the differences in labor income across individuals in the United States with the data on those same individuals' education. We are fortunate enough to have access to data on more than 2,000 Americans age 18 to 65 in 1993.

- a) Write an econometric model reflecting the economic model suggested above. Explain. (I expect you to write an equation and explain it)

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

Where Y_i is income, X_i is education, the disturbances are represented by the u_i and

β_0 and β_1 are the parameters of the model. This means we will try to explain the different labor income among the US population with the variation in educational level.

- b) What sign do you expect on slope coefficient in the model you suggest in a)? Can you provide an interpretation for that slope coefficient?

We would expect a positive coefficient since we believe higher education leads to higher labor income in the U.S. population. The interpretation of the slope is that one more year of education (if X_i is in years, for example) results in a give increase in \$ terms of the labor income of the population.

c) After estimating the parameters of a simple regression model with education (in years) as the exogenous variable and labor income (in dollars per year) as the dependent variable the estimated β_1 is about 5,400. What does this number mean? Is it reasonable?

It means that one more year of education results, on average, in an increase in labor income of \$5,400. Seems reasonable, but hard to assess without further information on the data used to estimate the model.

d) Re-answer c) knowing that the mean labor income in the sample is around \$32,000.

Knowing the mean labor income in the sample helps to assess the magnitude of the slope coefficient, the \$5,400 corresponds to around 16.8% of the average in the sample, which is fairly sizable. The new interpretation of the slope coefficient would be that one more year of education results, on average, in an increase of almost 17% in yearly labor income.

e) Can you think of other variables that could belong in an economic model that tries to explain the variation in labor income among U.S. individuals?

Many variables could be suggested here, and we will show this in the next weeks: gender, marital status, race, wealth, some measures of ability, some measures of family characteristics, the region where the person works...

Extra Credit (7 points): Given your answer in e), what do you think would be the consequence if we tried to explain in the regression framework the labor income both with the education variable and the one(s) you suggested? What do you think would happen to β_1 ? (Hint: imagine one variable we add are the test scores for these individuals when they were 13 years old).

Here I was hoping you would understand that by including variables which in turn could be correlated with the education variable one possible consequence is that the slope coefficient will be reduced in magnitude. For example, if we include in the equation a measure of ability, test scores, this could capture some measure of intelligence, which could be independent, in some sense, of the years of education. So if smarter people get more education, because they are smart, and they are also more likely to have higher salaries, and we do not include this in the equation we are

blaming years of education for something that is really not necessarily about education. This might sound tricky now, but the next weeks of work will hopefully help understand these points.

4. European Troubles. (22 points: 7+4+4+4+3)

Nothing comes free, and the great idea of creating a common European Currency (the Euro) has never looked more problematic since its inception earlier this century than these last few months. Just recently, the head of the British government (David Cameron), commenting on the problems of its neighboring country, Ireland, said that its main problem is that it cannot get out of the Euro. A number of European economies have suffered considerably through the economic crisis, and the very heterogeneity prevalent in the Union has left governments with few economic tools to use against the economic downturn. As we discussed in class a couple of weeks ago, a number of those troubled countries had to resort to issuing massive debt to support their expansion programs to jumpstart the economy, but they had to pay a price for it, as discussed in the article I reproduce in the last pages of the exam, which appeared in the Wall Street Journal (European Edition) on Wednesday, November 3rd, 2010. Please read the article, and then answer the questions below, taking into account what we have learned in class about decision making under uncertainty and insurance markets.

This exercise was rather simple. Everything could be extracted from the article quite easily. I wanted you to read this interesting piece, so I believe you did.

- a) Making some assumptions about the nature of competition in the insurance market for sovereign debt, can you assess the probabilities of default on the debt as of early November by the four countries highlighted in the WSJ article? Make sure to discuss and explain your answer.

As we have discussed many times if we assume a competitive market for insurance the probability of default is intimately linked to the price of insurance, so it is easy to see that the probabilities are just the results of dividing the cost of insuring the debt over the total insured, essentially 8.51% for Greece, 5.25% for Ireland, and so on.

- b) Given the numbers described in the article, by what percentage did that probability increase for the case of Ireland in just one day, the day before the article was published?

It increased by 5.4% (27,000/498,000) in one day, or 0.27 percentage points.

- c) In general, the interest rate at which a country is able to sell its government debt is considered a measure of the implied riskiness of the country as assessed by investors, because higher risk has to be rewarded with higher interest rates. What

is the interest rate paid by the German government on the debt it issues these days?

You can compute it from a couple of places in the text, but essentially is 2.47%

- d) Given that the GDP of Ireland is approximately 174 billion dollars, what is its outstanding government debt? Does it have more or less debt outstanding than Greece, given that the latter country has a GDP of around 322 billion dollars?

Simple calculations get you 55.68 billion, and 45.08 billion, and the comparison delivers the other answer.

- e) Interestingly, as investors require higher interest rates to compensate for the risk implied in the government bonds of certain countries, that higher burden on the public finances of those economies could increase in turn the probability of default. What is the likely sign of the correlation between the cost of insuring the debt of a country and the interest rate that country pays on its debt?

Higher interest rates are a reflection of risk, and that also translates into higher cost of insuring the debt, and therefore higher risk of default.

5. Kerry vs. Bush: Coming to a TV near you. (25 points) Notice that it has 6 parts.

Politicians have been using the mass-media extensively for campaigning for decades if not centuries. Due to the sometimes obscene amount of money spent in political campaigns, laws have been passed to prevent excessive spending especially by lobbying groups. In the last pages of the exam you can find an article from last Saturday's *New York Times* that suggests that some Liberal groups, trying to make John Kerry the next President of the United States, could have violated some of those laws. The main point of argument is regarding the numbers in the table in the article, which some Republicans suggest shows a clear correlation between Kerry's direct advertisement and that of liberal groups, suggesting they are coordinating to cover the whole day with advertisements in some selected markets and counterbalance Bush's ads.

- a) Just by looking at the table in the article, what do you conclude regarding when do Bush, Kerry, and the liberals groups advertise the most? What about the apparent peaks from 11 to 11:30pm?

Just by inspection of the NY Times article one would think most of the action is in the morning and up to 6pm. The peaks from 11 to 11:30 could be linked to the news that most channels show at that time.

- b) The Table as it is presented could be judged as not very helpful, and could potentially obscure what is really going on. We need to construct a per hour measure of advertisements. For example, for the column corresponding to Bush we can assume that whenever more than one hour is added-up, we will say each hour had the same number of ads, allowing for some rounding. Doing the same for the rest of the columns the table looks like what I replicate in the next page. Now does your answer to a) changes with this new version of the table?

This looks kind of different. Most of the action seems to be concentrated in a few hours in the afternoon, from say 4pm to around 8pm, and then a peak just before midnight. Looking at a *per hour* measure seems to be more informative.

- c) Do you see any of the patterns suggested by the Republicans between the advertisement strategy by Kerry and the Liberal groups? Can you suggest statistical measures we could use to check this relationship?

There seems to be some correlation in the sense that when Kerry's ads are up so are the ones from the liberal groups, and it is definitely the case that when you add Kerry to the liberal groups the levels are very similar to those of Bush. We can use several measures to check the relationship between the number of ads of Kerry and the liberal groups, for example, the covariance, or the correlation coefficient.

- d) The covariance between the number of ads during the different hours of the day by Kerry and the Liberal Groups is 6995, and the standard deviation of the number of ads by Kerry and the Liberal is 50 and 164, respectively. Compute the correlation coefficient between these two sets of data. What do you conclude regarding the accusation that they coordinate well? What about the accusation that the Liberals seem to advertise during times of the day that the Kerry campaign advertises less? (For the last question, think of the number of ads per hours as percentages of the total ads of each group).

Correlation coefficient comes up to be around 0.85, just use the formula we used in class and the notes that computes the ratio of the covariance over the product of standard deviations. This level of correlation seems to indicate a positive relationship and highly correlated. The first accusation seems to be somewhat supported by the data. The second one is rather weak, even if we think in terms of percentages. The only action happens after 8pm, where somehow Kerry's campaign ads go down dramatically as a percentage of total ads by the campaign, but the liberal groups go down much less.

	BUSH	KERRY(a)	Moveon+MediaF(b)	TOTAL(a+b)
5-6am	376	127	322	449
6-7am	376	127	322	449
7-8am	376	127	322	449
8-9am	377	128	322	450
9-10am	171	41	87	128
10-11am	171	41	87	128
11-noon	171	41	87	128
noon-1pm	171	41	87	128
1-2pm	171	41	87	128
2-3pm	171	41	87	128
3-4pm	175	42	92	134
4-5pm	507	119	425	544
5-6pm	508	119	426	545
6-7pm	663	163	366	529
7-8pm	793	104	486	490
8-9pm	178	14	133	147
9-10pm	178	14	133	147
10-11pm	180	14	133	147
11-12am	572	145	643	788
12-1am	141	40	178	218
1-2am	141	40	178	218
Total	6567	1569	5003	6472

e) The correlation coefficient between the ads by the Bush Campaign and the Liberal Groups is actually 0.895. What do you conclude from this? Do you think this case could be brought in front of the Federal Election Commission?

There seems to be even more coordination with the Bush campaign than with the Kerry campaign, and there is nothing illegal there, it looks like there is a lot of monitoring and a lot of doing the same things as the competitors. This can hardly be brought in front of a commission, correlation does not imply coordination.

f) If you do not make any modifications to the table in the N.Y. Times article and compute the correlation coefficient between the ads by the Liberals and Kerry you get 0.915. What does that tell you about the informative content of the table provided? Can you argue in favor of the way they present the data?

The Table they present leads us to believe there is even more correlation, and this can be misleading, also it is unclear in that as we mention in a) and b) a quick

reader would think most of the ads happen early in the day. Someone could argue that by consolidating several periods of the day in natural ways depending on audiences and types of program could provide some idea of the way certain periods of the day receive more attention than other. In any case, a newspaper like the NY Times might want to be careful when providing these types of tables, maybe a clarification could have helped the reader.