

Homework 1

Due Thursday 10/12/2017 IN LECTURE. Please type your final answers. You can attach handwritten work showing how you got to your solutions and any graphs you choose to include, but your final solutions are expected to be typed.

Q1. Cost Minimization and Price Setting You have been tasked with helping a startup pesto company, the Communist Man of Pesto, determine their optimal production speed and end product pricing. The company is run by two grad students, Ali and Rich, with too much time on their hands. Ali and Rich sell their pesto in packs of three jars, which they call the Communist Party Pack. Currently, they are able to produce 20 packs per hour with only the two of them working, but they are interested in determining if they could reduce their average variable costs by hiring some workers and producing at a faster rate. The following table represents their anticipated labor costs:

Option	Quantity Range (packs/hr)	Total Labor Cost (\$/hr)
1	1-20	30
2	21-40	50
3	41-60	70
4	61-80	110
5	81-100	125

The ingredient costs, r , are given in the following table:

Ingredient	Cost (\$/"unit")
Basil	\$2.50/lbs
Garlic	\$0.05/clove
Olive Oil	\$8.00/liter
Walnuts	\$7.50/lbs
Secret Spices	\$0.50/tbs
Labels	\$0.15/jar
Jars	\$0.50/jar
Party Package	\$0.25/pack

One jar of pesto requires 0.125 pounds of basil, 3 cloves of garlic, 40 milliliters of olive oil (there are 1,000 milliliters in a liter), 0.05 pounds of walnuts, and 2 tablespoons of secret spices. Assume that the facility's total utility bill, u , is \$20/hr, answer the following questions:

1. Determine the average variable cost for each production option (1-5) for the Communist Man of Pesto. Find the optimal speed at which Ali and Rich should produce pesto (in packs/hr).
2. Now, assume that the Communist Man of Pesto is operational for 20 hours per week. Ali and Rich are considering offering a bicycle pesto delivery service called the pesto peddlers. This service would deliver fresh packs of pesto to the doors of subscribers every other week. If Ali and Rich want to produce at the optimal speed found in (1), what is the maximum number of pesto subscriptions they should agree to (number of packs per two weeks)?
3. Rich and Ali did not heed your advice and chose to sign up for 2,800 subscriptions. At what speed and for how many hours should they operate to fulfill all of their subscriptions?

4. Using the optimal production speed from (1), at what price should Ali and Rich sell their Communist Party Packs to ensure they break even, i.e. profits=0 (in \$/pack)?
5. Ali and Rich have decided that the Communist Man of Pesto should in fact be a Capitalist company. They would like to achieve a profit margin of 45%. At what price should they sell their pesto (in \$/pack)?
6. **Bonus:** What is your willingness to pay for this jar of pesto:



Q2. Trade Suppose that the U.S. and Mexico have the following supply and demand curves for sugar (prices in \$1,000's and quantities in million lbs.):

	U.S.	Mexico
Demand	$P_{US}^d = 100 - 0.5Q_{US}$	$P_M^d = 60 - Q_M$
Supply	$P_{US}^s = 20 + 1.5Q_{US}$	$P_M^s = 10 + Q_M$

Given the above supply and demand curves for the two countries, answer the following questions:

1. Find the equilibrium price and quantity in the two countries under autarky.
2. Find the equilibrium prices and quantities in the two countries under free trade, but assuming a transportation cost from Mexico to the U.S. of \$2,000 per million lbs. Please show your work and define any necessary equations that you use to solve this (e.g. ID and ES).
3. Using a graph or equations, demonstrate what happens to the equilibrium prices and quantities after the U.S. imposes a tariff of \$10,000 per million lb. on sugar imports from Mexico. Who wins and who loses from this policy?
4. Similarly, using a graph or equations, demonstrate what happens to the equilibrium prices and quantities after the U.S. imposes a quota on sugar imports from Mexico such that the U.S. will import no more than 40 million lbs of sugar from Mexico. Who wins and who loses from this policy?
5. How does the quota compare to the tariff? Are the winners and losers the same? Is one policy better or worse?

Q3. Case Studies: Please answer the following questions on the Niman Ranch Case Study (link in syllabus):

1. Explain the price floor mechanism that Niman Ranch uses for purchasing hogs. Do you think this is a smart business choice?
2. What were Niman Ranch's profit margins in 1999?
3. What short and long run solutions can you recommend to Niman Ranch to increase the company profits? Do you think Niman Ranch would follow this advice? Why or why not?
4. Niman Ranch today: Look at the company's website, find some news articles (google things!), and give me two paragraphs about what the company looks like now. Have they moved in the direction you recommended in the previous question? Do they continue to serve the market for natural meat products?