Strawberry Futures (Dec. 2017 Class Exercise with suggested answers)

If there were a strawberry futures contract (I’m pretty sure there isn’t), please consider the following --

Best I can tell Strawberries are selling for a bit less than $2 a lb., so let’s use that as the spot price, and let’s make the contract 10,000 lbs. of grade A (whatever that is) strawberries. So the spot price of 10,000 lbs. of strawberries is $20,000.

Please consider the following: Assume the one-year risk-free rate is (a nice round) 2%, even though we know it’s actually lower than that. Please answer the following?

1. Can fresh strawberries be stored for one year (without freezing them?) yes**? No?**
2. $\_\_\_\_Under normal conditions, provide your best estimate of what you expect the futures price for delivery of fresh strawberries in one year to be if the spot price is $20,000 per 10,000 lbs. Ans. A reasonable guesstimate is slightly above today’s spot price if today’s spot market conditions aren’t unusual. (More on this later.)
3. If strawberries can NOT be frozen and stored, would there be an arbitrage relationship between the spot price and the futures price (one year out) of strawberries?
	1. Strong b. weak c**. no relationship** An arbitrage relationship would rely on the ability to do a “cash and carry” deal in which we buy the spot and short the futures contract, expecting to deliver the purchased strawberries into the short position in one year and collect the contractual price at which we went short. But a cash and carry deal is impossible because the sberries will become inedible within a week or two.

Continue to assume that strawberries cannot be frozen and stored and answer the following.

If the Chinese and Indian governments both announce that they will ban retail sales and sales at restaurants of strawberries anywhere within their borders starting in six months (though they won’t ban the production and export of strawberries),

1. What would happen to the spot price of strawberries as a result of the ban?

Up? Down? **Unchanged? There’s no reason to expect a significant change in the spot price as demand and supply in the spot market will be unlikely to be significantly affected in the short run.**

1. What would happen to the futures price of strawberries as a result of the ban? Up? **Down?** Unchanged? If the sberry bans in China and India are effective, then demand for sberries will fall, while supply in the short run will probably not adjust downward fast enough to keep prices from falling. Over time the falling prices would cause supply to shrink and the prices to eventually move back up. Futures prices with delivery dates after the ban goes into effect are likely to fall as market participants will take note of the expected decrease in demand due to the bans.

Now assume that there are no Chinese or Indians bans, but that instead scientists discover and announce tomorrow that strawberries contain ingredients that very significantly increase the healthiness of strawberry consumers. Assume that it takes six months for that information to be fully appreciated around the world by consumers.

1. What would happen to the spot price of strawberries as a result of the announcement?

Up? Down? Unchanged? Consumers who take note of the healthfulness of sberris will tend to increase demand for sberries, driving the price up (probably gradually given the assumption that information is acted upon slowly.

1. What would happen to the futures price of strawberries as a result of the announce? **Up?** Down? Unchanged?

The futures prices would immediately rise for all delivery dates, with the price increases highest for delivery dates of six months or more. Speculators would expect that as consumers become aware of the healthfulness of sberries, they would increase demand for them, and the full appreciation of the healthfulness of sberries in six months suggests that futures prices would be highest for delivery dates of six months or later. It would take only a small number of speculators with significant financial wherewithal to move futures prices very quickly.

1. Would there be a difference in the changes in spot and futures prices? Spot prices would be expected to gradually increase over the next six months, and futures prices would reflect those expectations. A graph of likely futures prices over the next year would appear approximately as follows. $3.00 The $3.00 price in six months is a guess. It could

$2.00 be higher or lower based on consumer reactions

 Now 6 mos. 12 mos.

According to how fast new supplies of sberries can be generated, we might find that prices would start falling after several months, though it would probably be many months (or years) before prices would drop back to $2.00.

1. For this question, relax the assumption that strawberries cannot be frozen and stored. If they can be frozen and stored, do you figure that changes in the likely equilibrium spot and futures prices you estimated in questions 6-8 will be different? If Sberries can be frozen and stored, then it’s likely that some of the sberry crop produced in the near term will be frozen and stored in hopes of generating a substantial return by selling after the full appreciation of the healthfulness of sberries is realized by consumers. This would have the effect of decreasing the near-term supply of sberries for immediate consumption as sberries are frozen. Spot prices will likely rise immediately, and the increased supply of frozen sberries will moderate the increase in spot prices in the future. Thus the spot price in six months will likely be lower than $3.00 due to the arbitrage associated with freezing and storing sberries for future consumption. If frozen sberries are perfect substitutes for fresh sberries and can be stored at zero cost (they’re not and they can’t) then the price relationship between spot sberry and sberry futures prices would approximate an arbitrage relationship where the differences between spot and futures prices would be explained by the risk-free rate. Given that storage is costly, the differences in spot and futures prices are likely to be wider than the arbitrage relationship implied from the following formula: Futures price = (1 + risk-free rate) x spot price
2. Finally, please consider why you might expect a commodity that is not storable to have more or less variable spot market prices. More? **Less?**  No effect? Storability tends to moderate the differences between spot and futures prices, and, as per the explanation from question 9, results in less movement in futures prices than when storage is not possible.
3. What are the implications of your answer to (10) for the “margin” requirement for storable vs. non-storable commodities? For which do you expect it should be higher? Other things equal, with less volatility in prices, easily storable commodities should be assigned lower margin requirement than commodities that are expensive or impossible to store.