

To Market, to Market: Blessed Are the Cheesemongers: I. Exchange

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December 9, 2009

Humans have, as Adam Smith wrote more than 200 years ago, a natural propensity to "truck, barter, and exchange"--to enter into reciprocal gift-exchange relationships with one another. These reciprocal relationships do three things: (i) they allow us to trade things that we value less or that are less useful to us but more useful to somebody else for things that we value more or find more useful; (ii) they make us view our fellows as friends and partners who are useful aids rather than obstacles to us, and (iii) they allow us to gain status and put others under obligation: I did something very valuable for you, now it is your turn to do something very valuable to me.

Let's move--as economists like to do--into a fictional toy economy with a fictional toy market to try to gain some intuition about these issues. Let's work through a stylized example that I call "Blessed Are the Cheesemongers..."

We have a crossroads. Five days a week, 8 hours a day, every 24 minutes a guy with a highly perishable cheese--a seller--and a guy who likes cheese--a buyer--come by, meet each other, try to bargain and then leave. Different sellers value the cheeses they have differently: for each there is a reservation value, a price above which he or she would rather eat the

cheese him or herself. Let's model these different valuations by saying that each potential cheese seller makes an independent draw of a random variable from a Gaussian normal distribution with a mean of 5 shekels and a variance of 1 shekel-squared, and that is his or her valuation.

What does this mean? If you have an Excel spreadsheet, it means that each arriving potential seller--which we can think of as belonging to a row in the Excel spreadsheet corresponding to the time he or she arrives at the crossroads--has a valuation that we can simulate by entering the formula

$$=5+NORMSINV(RAND())$$

into the appropriate cell on the spreadsheet, and then pressing return.

Similarly, each potential buyer has a reservation value--a price above which he or she would rather go without and spend his or her money on something else--which we similarly model by an an independent draw of a random variable from a Gaussian normal distribution with a mean of 5 shekels and a variance of 1 shekel-squared.

And in the same Excel spreadsheet, each arriving potential buyer--belonging to the same row in the Excel spreadsheet as the would-be seller who arrives at the crossroads at the same time--has a valuation that we can simulate by entering the formula:

$$=5+NORMSINV(RAND())$$

into the appropriate cell on the spreadsheet, and then pressing return.

As the two approach each other at the crossroads, each writes down a price--his or her willingness to pay or willingness to accept. They then reveal the prices that they wrote down simultaneously. If the potential buyer's willingness to pay bid is greater than the potential seller's willingness to accept offer, they strike a bargain: the price is midway between the bid and the offer; the buyer pays the seller the money; the seller gives the buyer the cheese, and they both walk away happily. if the

bid is less than the offer, the buyer keeps his or her money and the seller keeps his or her cheese.

It is plain that the revealed willingness to pay of the potential buyer may not be his or her true reservation value: pretend you don't want it very much and you may be able to buy it for a lower price. It is also plain that the revealed willingness to accept of the potential seller may not be his or her true reservation value: pretend that you are attached to what you have and you may be able to sell it for a higher price. So buyers and sellers need to come up with strategies: how do their revealed willingnesses relate to their true reservation values?

Let's simplify this already simple example further by saying that all potential buyers pick the same strategy: they pick a margin which is a single number which is a wedge between their true reservation value and their (lower) declared willingness to pay. Similarly, all potential sellers pick a strategy together: they, too, pick a margin which is a single number which is a wedge between their true reservation value and their (higher) declared willingness to accept.

What then happens in a typical week in this toy economy of— well, we cannot call it a market, but rather a world of decentralized matching and thus of trucking, bartering, and exchanging?

Let's assume that both sellers and buyers are following a +0.25 strategy: they insert a wedge of a quarter of a shekel between their true reservation value and their declared willingness to pay and to accept. And let's look at 9 AM on Monday morning by downloading the spreadsheet at < <http://delong.typepad.com/econ-1--to-market-to-market.1.xls>> and looking at row 11 (your numbers will be different: the spreadsheet is set to recalculate automatically, which means drawing a new set of random numbers):

	Time	Seller	Buyer	Deal?	Price?	Surplu	To Sell	To Buyer
Monday	9:00 AM	4.41	5.11	TRUE	4.76	0.7	0.35	0.35

Monday at 9 AM a potential seller with a reservation value of 4.41 shekels shows up at the crossroads. She offers to sell her cheese for $4.41 + 0.25 = 4.66$ shekels. She meets a potential buyer with a reservation value of 5.11 shekels who bids 4.86 shekels. They settle on a price of 4.76 shekels. They both walk away happy: the seller because she values the 4.86 shekels she now has as worth 0.35 shekels more than the cheese she had; the buyer because he values the cheese he now has as worth 0.35 shekels more than the 4.86 shekels that he used to have.

The spreadsheet reports an entire week as it marches down the rows and the cells in yellow from 9 AM Monday in row 11 to 4:36 PM Friday in row 120. The green cells k4 and k5 are variables you can change: they tell you what the strategies buyers and sellers pursue are—what the difference is between their true reservation values and the willingnesses to pay or to accept that they announce. Over to the right in cells r3 through r7 are summary statistics for that market week: the chance over that week's hundred meetings that a deal was made, and the average surplus (over all meetings: not just those resulting in a deal) to potential buyers, potential sellers, and to both added up.

In the run I just looked at, 31 of the 100 pairs who met each other at the crossroads that week were able to make a deal. (In 19 the seller's reservation price was lower than the buyer's, but no deal was made because each placed a wedge between their true reservation value and their expressed willingness.) Over the week, the 31 sellers who walked away with money walked away with money that they valued as worth 22 shekels more than the cheeses they had had. And the 31 buyers who walked away with cheeses walked away with goods that they valued as worth 22 shekels more than the money they had parted with to buy them. The possibility of exchange is thus valuable: the average price of a cheese is 5 shekels, and so there is a sense that the basic raw value of 100 cheeses is 500 shekels.

We have boosted that by more than 8%—44 shekels—just by giving the people who have the cheeses the opportunity to possibly trade with one other randomly-selected individual.

What happens in your spreadsheet during your week? What happens if you change the seller strategy (the number in spreadsheet cell k5)? What happens if you change the buyer strategy (the number in spreadsheet cell k4)?

December 9, 2009: 1317 words