

Price Gouging

1. Describe in Supply and Demand terms the effects of catastrophic events such as hurricanes on the market for things like plywood, gasoline, water, ice, generators, and chain saws.
2. Define price gouging. This is a non-scientific term. Nonetheless, explain it in terms of S&D: How does price gouging vary with the slope of the supply curve?
3. Assume that supply is perfectly inelastic. Show the effects of anti-price-gouging laws.
4. Show that even with random allocation of the available supply among the excess demand that consumer surplus is higher under anti-price-gouging than with equilibrium price allocation. Explain the nature of this result.
5. Show that as supply becomes more elastic, there is some point where consumer surplus from market equilibrium pricing exceeds consumer surplus under anti-price-gouging.
6. What is the dead-weight loss of anti-price-gouging laws?

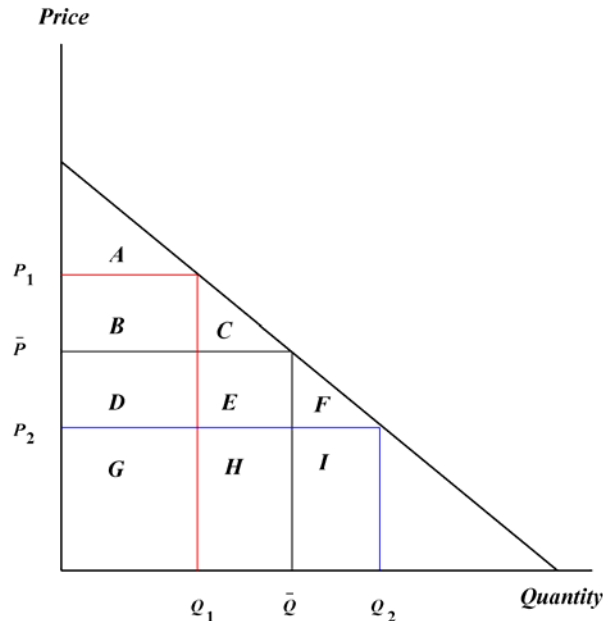
Price Stabilization¹

The issue of price stabilization is an old one in economics. Walter Oi and Paul Samuelson engaged in debate on this topic in the early 70s. In my reading of the exchanges, the result was never settled nor can I clearly identify the nature of the discord. (See discussion at end.) Donald McCloskey has a discussion of some of the issues in his intermediate price theory book. You should look at these sources for some background.

Let's make the problem simple. Assume linear demand. Let production vary symmetrically around some expected value. That is, the planned level of production is $E(Q) = \bar{Q}$. The actual harvest is not this, however, but rather a larger amount in bountiful years or a smaller amount in lean years. To further simplify the problem, let's only consider larger values in the amount of Q_2 and smaller values in the amount of Q_1 . Production bounces between these two values in a random fashion with each having a 50/50 chance each year. Our inquiry involves measuring the consumer and producer welfare across these states of nature.

With random fluctuation of output, consumers will pay P_1 in the lean state and P_2 in the times of bounty. With the concession that the area under the ordinary demand curve is not the true measure of consumer welfare, let's add up this area anyway, and average it over the two states of nature when produce and price fluctuate. The following graph pictures the situation:

¹ Samuelson, Paul A. "The Consumer Does Benefit From Feasible Price Stability" in *Quarterly Journal of Economics*." Vol 86. 1972. p476-493. Oi, Walter, Y. "The Consumer Does Benefit From Feasible Price Stability" in *Quarterly Journal of Economics*." Vol 86. 1972. p494-498. Samuelson, Paul A. "The Consumer Does Benefit From Feasible Price Stability--Rejoinder" in *Quarterly Journal of Economics*: Vol 86. 1972. p500-503. McClosky, D. *The Applied Theory of Price*. 2nd edition. 1985. section 10.2



In the lean years when price is high, consumers only enjoy the surplus designated by the area A . In the bountiful years when price is low consumers get the areas $A + B + C + D + E + F$. Now let's average over the two states of nature. Because the output fluctuations are symmetric around the projected harvest and because demand is linear, we know that areas B and D are equal. The same is true for areas C and F . Moreover, $C + F$ is equal to E . Therefore the average consumer surplus over the two states of nature is $A + B + 2C$.

Next consider what happens if price is stabilized at \bar{P} . In this case, consumer surplus is $A + B + C$ regardless of the state of nature, which is then the average.

The result is that consumers are on average better off by the amount C when prices are allowed to fluctuate randomly, at least based on this simple analysis. We will return to explore the assumptions that produce this result in a moment. But first let's look at the producer side of the ledger.

Producers are affected by random output swings as well as consumers, but for them when times are good they are bad. Bounty in harvest produces low prices. In years of good harvests, producers receive only the amounts $G + H + I$ in revenue. In bad times, price is high and producers receive the areas $B + D + G$ in revenue. Again, our assumptions of linear demand and symmetry in output fluctuation allow us to average the receipts of producers over these two states of nature. We know that H and I are equal as are B and D . Hence, the average revenue received by producers over the two states of nature is $D + G + H$.

Obviously then, price stability will benefit producers. If price is stabilized at \bar{P} , which is accomplished by buying up the excess $Q_2 - \bar{Q}$ in the bountiful years and transferring it to the lean years, the revenues of producers are always $D + G + H + E$. Hence, producers are benefited by price stability in the amount E .

The net effect of price stability across both producers and consumers is $E - C$ on average across the states of nature. Producers benefit exactly twice as much as consumers are harmed by stability. This analysis is summarized in the following table:

Consumer Surplus	<i>Fluctuating Prices</i>	<i>Price Stabilization</i>	<i>Net Gains/Losses from Price Stabilization</i>
<i>Good Year</i>	A+B+C+D+E+F	A+B+C	
<i>Bad Year</i>	A	A+B+C	
<i>Average</i>	$(2A+2B+4C)/2 = A+B+2C$	A+B+C	-C
<hr/>			
Producer Revenues			
<i>Good Year</i>	G+H+I	D+G+H+E	
<i>Bad Year</i>	B+D+G	D+G+H+E	
<i>Average</i>	$(2D+2G+2H)/2 = D+G+H$	D+G+H+E	+E
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Net Across Consumers and Producers:			+C
Notes: B=D; C=F=E/2; H=I			

There are some points of this analysis worth noting:

1. Price stability is net welfare improving. However, this does not mean that government intervention is required. The private market produces price stability in the form of speculative storage of output. When current harvests are plentiful but future harvests are uncertain, entrepreneurs buy up the current excess. These speculative purchases increase the price of current consumption and reduce current consumer surplus. These speculators hold the excess until the years of low yield and then dump their stockpiles on the market, lowering price in these times. Speculators stabilize price and, as a consequence, hurt consumers. McCloskey argues that this is why consumers hate speculators, an argument that I think is specious.

Speculators actually operate through the futures market. Rather than holding stockpiles of produce, speculators forecast future prices and quantities. They do this by offering contracts to buy and sell produce in the future at prices that are fixed now. This allows warehouse certainty in stockpiling the produce. In other words, the market has specialized the chores of forecasting and storing. This is the reason that futures markets exist. The net gain of one-half E in the graph is the social benefit of futures markets.

There is every reason to think that the private market has hope of omniscience in predicting future harvests and that government has none.

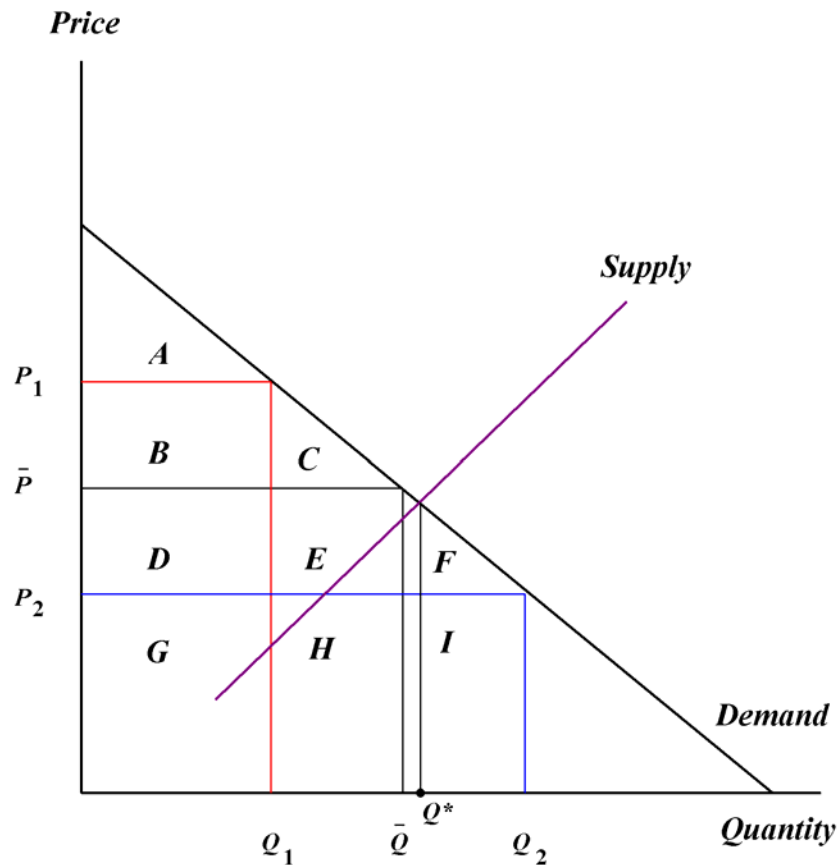
2. The steeper is the demand curve, the more valuable is the process of price stabilization. That is, as the demand curve becomes steeper, the area E is enlarged. Steep demand is characteristically inelastic demand. Hence, it is often said that agricultural markets are the focus of price stability (by both the private and public providers) because the demand for agricultural output is inelastic.

3. There is an additional benefit of price stability that is somewhat more subtle than the gross gain of one-half E. In fact, the gain of one-half E is not really a net social benefit but rather an income transfer from consumers to producers. The transfer is efficient in the sense that the

gain to producers is E which only costs consumers half this much. However, it is still apparently just a transfer. The rub is that the apparent transfer is an indication of a true social gain.

Consider the supply curve implied by the market when output fluctuates randomly. Producers operating under a regime of fluctuating prices expend resources in order to supply the expected amount \bar{Q} . The supply price associated with this quantity is the per unit revenue necessary to cover these resource expenditures. We know that in the face of fluctuating prices, the producers *do not* receive \bar{P} . In fact, on average they receive the amount $[D + G + H] / \bar{Q}$, which is less than \bar{P} .

Put differently, when producers plan to bring the quantity \bar{Q} to market, they cannot expect to receive \bar{P} . Indeed, they rationally expect to receive an amount that is less. If they are willing to bring this quantity to market for a price less than \bar{P} , their supply curve must lie below this point. The supply curve is below \bar{P} at the quantity \bar{Q} . This phenomenon is drawn into the figure below. The distance below \bar{P} that the supply falls depends on the relation of the area E to the area D. E is the shortfall in revenue to the producers when price fluctuates.



The true net social gain from price stability is the expansion of output beyond \bar{Q} . The market equilibrium with price stability will occur at Q^* . The increased revenues to producers afforded by price stability allows them to increase production. The new market equilibrium is where the *price-stable* supply curve intersects demand. This results in a market equilibrium of Q^* and $Q^* - \bar{Q}$ is the net social gain from price stability.

Price stability will increase the revenues to producers and this will expand projected output. Price stability because it is net welfare improving will cause the market equilibrium output to expand. This growth in the market is an additional benefit to both producers and consumers.

Apples, Oranges, Raspberries, and Turnips:

The various exchanges between Paul Samuelson and Walter Oi on price stability leave us in a state of great consternation. In the large, I think that much of this is a problem of ill-defined questions, i.e., comparing apples to oranges. Here are some thoughts:

(1) Oi claims that price instability makes competitive firms more profitable. This proposition comes from a simple manipulation of the standard competitive model of identical firms with U-shaped average cost functions. In such a model, if demand fluctuates, as for instance, in the case of seasonal demand for electricity, the firms move up and down their marginal cost curves. Since the gap between MC and AC grows as price goes up, the firms make more money when price goes up than they lose when price goes down. However, these gains have to be competed away. So what is the point. Possibly, competitive firms would promote fluctuating prices as a matter of public policy, but this could only be true in the short run when their political sensitivities will be more well defined than predicted by the Oi model: In the short run, competitive firms will politic for higher, not lower prices.

Note that the Oi scenario is not the same as the scenario that we analyzed in the case of agricultural supply fluctuations. Oi is envisioning a constant, upward sloping short-run supply curve across which demand moves to create higher or lower prices. His argument won't hold for the case of vagaries of nature where the resource expenditure is sunk and output fluctuates ex-post in a way that affects the revenues to the firm. All of Oi's examples refer to demand fluctuations and all are short-run (or idiosyncratic) in nature: earthquakes, droughts, and war dominate his discussion. In each case, he does not focus on the firms whose output is devastated, but rather the firms that come in to fill the void. Nonetheless, I find Oi's discussion on this point to be well below his norm.

(2) Samuelson's discussion is virtually intractable to me. My intuitive appreciation of it is contained in his anti-Santa-Claus argument. Essentially, he seems to be using a general equilibrium analysis to claim that exogenous tinkering can't be good. That seems to make sense and none of Oi's arguments are persuasive in contradiction: If drought in India makes American wheat have a higher price, the world is worse off even if Am. farmers are better.

Sam says:

When a speculator unsuccessfully distorts the pattern of equilibrium to his own loss, all others in the market gain. But they generally gain less than he loses.

I can only suppose that this means that stabilizing speculation is good. However, I cannot make sense out of his paragraph that starts: "I should stress that price stability is not optimal..." The problem with this latter paragraph is that he seems to suggest that futures markets could be inefficient. I don't think that he means that, but I can't tell. I have no idea what "adaptive price flexibility" means.

Similarly, I really don't understand what he means when he says, "Under conditions of stable demand and supply...departures from price stability usually violate Pareto optimality." He says this in his parenthetical paragraph in response to Waugh. How can one have stable demand and supply and price instability at the same time?

(3) In conclusion, I think that what we show above is the following: In the face of stable demand and unstable supply, if consumers can be insulated from unstable supply, society moves closer to the Pareto optimality marginal conditions and welfare is improved. This is true even if consumers are potentially made worse off, though both consumers and producers may be made better off.

Note that the agricultural variation case is the flip side of the electricity demand fluctuation problem. By symmetrical argument, a technological breakthrough that allowed electric generation to be stored (as grain is stored), consumers would benefit while producers might be worse off. The net would be a gain overall.

Possibly this the best example of the Samuelson-Oi exchange. If so, Oi is wrong and Samuelson right.

Samuelson's simple model in his rejoinder is worthy of further, future development.