Dr. Barry Haworth
University of Louisville
Department of Economics
Economics 201

Price Ceilings

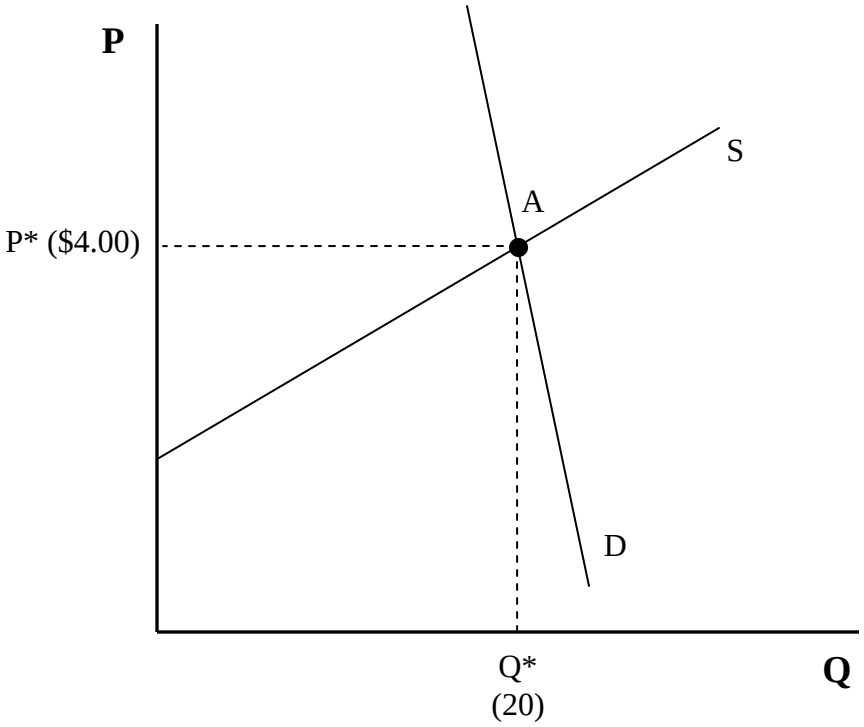
As we discussed when introducing the demand and supply model, price operates as a driving force which directs demanders and suppliers to a point we call equilibrium. If the price is too high (relative to what would be an equilibrium), then there will be pressure on the price to fall. Similarly, when the price is too low (again, relative to what would be an equilibrium), there is pressure on the price to rise. What happens, however, if prices are not fully able to adjust? E.g., during the holidays, some toy stores may not want to take a chance of angering consumers by raising the price of a popular toy that experiences a sudden and sharp increase in demand. Similarly, in order to reduce employee turnover, some firms may choose to pay a wage that is higher than what we assume is the equilibrium wage.

In other situations, outside forces like government may intervene within the market. E.g., we know that the supposed role of government is to operate on behalf of society. Suppose that in a small college town, we observe a large migration of students into town every August. Students need places to live, and after a year in the dorms, often decide to find an apartment. What effect does a large influx of students into town, where many are seeking apartments, have on the rental apartment market? The resulting increase in demand will raise rents within the town. This obviously affects all renters, including the rent paid by year-round (non-college) residents. It's possible that, in order to protect local residents from these annual surges in rent, that local government will impose a rent control that keeps rents from rising above a certain amount. We call this particular type of price control a price ceiling. If the government sought to impose a price control that keeps price from falling below a certain amount, then we'd have a price floor. The purpose of this handout is to ask how imposing a price ceiling will affect a market, and the extension of this analysis – to show how price floors affect a market – is left to the reader.

How a Price Ceiling directly affects a market

First, we want to define what's meant by a direct effect. Prices act as an incentive to buy and sell, but more importantly, when the price is such that the quantity demanded and quantity supplied are equal to one another, we know we've achieved an equilibrium. If prices cannot adjust and our market is unable to reach a point of equilibrium, then the quantity demanded is not equal to the quantity supplied and we have a shortage or surplus. We refer to this shortage or surplus as being the direct effect of whatever prevented the price from adjusting. I.e., the direct effect of prices being unable to locate at a point of equilibrium is a shortage or surplus.

As we said initially, a price ceiling is a government-imposed regulation that establishes a maximum price within a market. The idea is that you can charge any price you want below the maximum, but cannot set prices above that maximum (i.e. prices cannot adjust to an equilibrium that would otherwise be above the maximum allowable price). Let's consider an example where a price ceiling is imposed on a specific market. Our market will be the market for regular unleaded gasoline (87 octane) sold in the city of Louisville. We'll assume that this market can be described by the demand and supply model in the graph below (note the steep slope of demand implies something about how people respond to changes in the price of regular unleaded gas during this period):



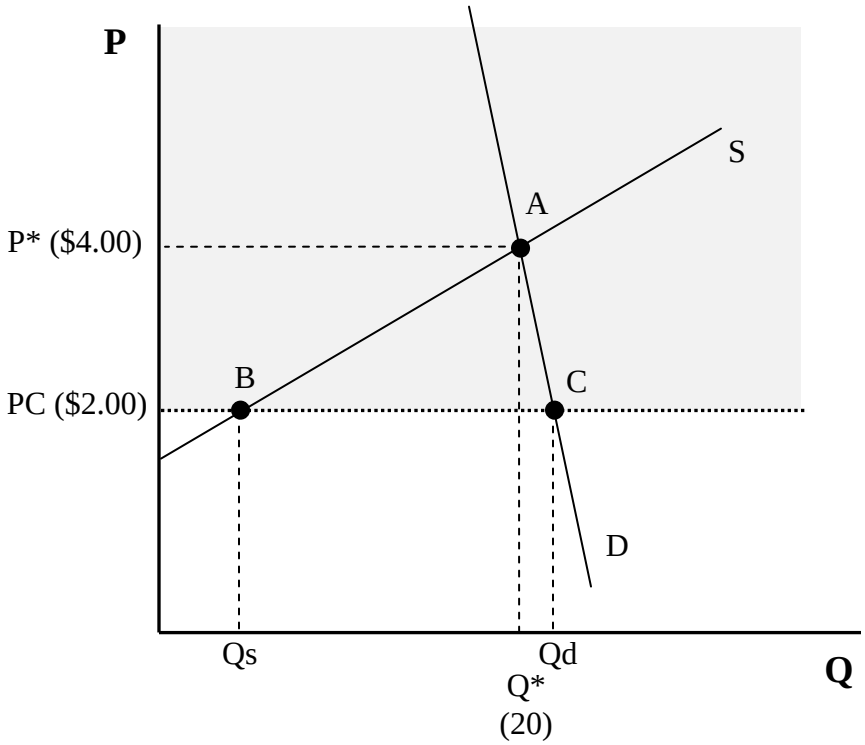
In this setting, our equilibrium is located at pt A and involves selling Q* units of regular unleaded gasoline in Louisville at a price of P*. We'll assume that Q* is 20 units (where each units is one hundred thousand gallons) and P* is a price of $4.00 per gallon.

Let's assume that local residents lobby city government, complaining about high gas prices during Derby Week that seem to continue into the Summer (e.g. as people come to Louisville to visit Churchill Downs, attend local conventions, etc.). Just as students moving back into a college town will increase the demand for apartments, lots of people coming to Louisville for Derby Week (and beyond) should lead to higher gas prices. While some residents can beat the initial price increase (e.g. we know that when consumers expect the future price to increase, their current demand for that good will increase – i.e. before the price increase), they eventually pay

more for regular unleaded gas in Louisville, because you can only go so long before having to fill up your gas tank. Perhaps local residents might claim that higher prices for regular unleaded gas hurts middle and lower income individuals much like a regressive tax hurts lower income people more than higher income people. Maybe gas station owners add to this litany of complaints by claiming that consumers tend to avoid Louisville gas stations (which they claim hurts Louisville gas station owners) to avoid our high gas prices and buy their gas in southern Indiana (where a lower price could result from a lower State gas tax). If none of that seems to sway local officials, we'll assume that local residents eventually trot in a bunch of kids with very sad faces, and make this an "it's all about the kids" issue, an approach that usually has a crippling effect on most government officials (although we could probably think of a few who'd be unaffected, haha).

One way or another, we'll assume local residents are successful in getting the Louisville city government to impose a price ceiling of $2 on regular unleaded gas within Louisville (below, this is given as PC). Demanders and suppliers can buy and sell regular unleaded gas within Louisville at any price they want, but only as long as that price is below the $2 ceiling.

We can illustrate this ceiling on the previous graph as follows:



Note what we said above. Regular unleaded gas can be bought and sold in Louisville at any price, but only as long as that price is $2 or less. This creates an area on the graph where the price cannot legally exist, an area we've shaded in on the graph above. As long as demanders

and suppliers can get to the equilibrium price (i.e. as long as the equilibrium price exists below the shaded area), this market will operate at a point where the quantity demanded and quantity supplied are equal to one another (i.e. Q*).

In this situation, however, the price cannot legally rise above $2. Our former equilibrium price of $4 would not be a legal price, and therefore cannot be charged. We know, due to market forces, that we'll end up at a price that falls closest to $4 without breaking this law, and obviously, that would be the price ceiling price of $2.

When the market must operate at the price ceiling price of $2, the quantity of regular unleaded gas supplied in this market will not be equal to the quantity demanded. Those two values are provided on our graph as Qs and Qd (respectively). Given what we know about the demand and supply curves, about how these curves reveal to us the manner in which suppliers and demanders respond (in terms of quantity supplied and quantity demanded) to different prices, we know that if the price decreases, we'll get a new quantity supplied at pt B (where the $2 price hits the Supply curve) and a new quantity demanded at pt C (where the $2 price hits the Demand curve). I.e., suppliers will respond by selling fewer units (Qs is now to the left of Q*, therefore lower) and demanders will respond by wanting to buy more units (Qd is now to the right of Q*, therefore greater). The result is that Qd > Qs, which means we have a shortage of regular unleaded gas during the period where this price ceiling is being imposed. Put another way, the direct effect of this price ceiling is to cause a shortage.

Note that if the demand within Louisville for regular unleaded gas was to significantly decrease (or supply of regular unleaded gas sold in Louisville was to significantly increase), and the equilibrium price fell below the $2 price ceiling, then the market would return to an equilibrium point and there would be no shortage since Qd would once again be equal to Qs.

How a Price Ceiling indirectly affects a market

When prices change, demanders and suppliers respond to that price change by changing their behavior. In the context of a price ceiling that prevents the market from charging an equilibrium price, the direct effect of that behavioral change is a shortage, but what effect does the shortage have on decisionmaking within this market? We refer to these effects as indirect effects, and we'll consider just two of many possible indirect effects that could arise in this setting.

When the price ceiling is imposed and gas stations begin running out of regular unleaded gasoline, we may find some consumers turning to higher octane gasoline, a good whose price is not being regulated by this price ceiling. We may also find consumers driving out to areas where the price ceiling does not apply (e.g. counties outside of Louisville, like Oldham or Bullitt County, or perhaps southern Indiana) and buying their gas in those areas. Each of these results represent an increase in the demand for a substitute good, something that would not otherwise

occur if it were not for the shortage created by the price ceiling. We would refer to this increase in the demand for substitutes an indirect effect of the price ceiling.

As their sales fall, we would also assume that Louisville area gas stations may begin experiencing losses. In turn, this would create an incentive for at least some firms to eventually leave the Louisville market (perhaps move their business to an area not affected by the price ceiling). Of course, the process of exiting a market can be fairly lengthy, because exiting firms must first liquidate their assets, pay off creditors, etc. At a very basic level, this implies that exiting a market is more of a long run decision than a short run decision, but either way, the exit of firms from this market is another possible indirect effect from this price ceiling. Note, however, that when gas stations do begin to exit, this decrease in the number of suppliers will cause the supply curve in this market to shift left, and if the supply curve for regular unleaded gasoline in Louisville shifts left, then the shortage would actually worsen.