

This item was submitted to [Loughborough's Research Repository](#) by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

When demand rises, do prices rise too?

PLEASE CITE THE PUBLISHED VERSION

<https://www.hoddereducation.co.uk/Product/9781471857041>

PUBLISHER

© Hodder Education

VERSION

AM (Accepted Manuscript)

PUBLISHER STATEMENT

This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence. Full details of this licence are available at:
<https://creativecommons.org/licenses/by-nc-nd/4.0/>

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

Wilson, Chris M., and Luke Garrod. 2019. "When Demand Rises, Do Prices Rise Too?". figshare.
<https://hdl.handle.net/2134/23840>.

Demand rises, prices ... fall?!

Understanding how changes in demand affect market prices is fundamental within economics and yet, surprisingly, empirical evidence does not always support the standard theoretical predictions. Luke Garrod and Chris Wilson investigate and review some possible explanations.

One of the first lessons learned by economics students is that prices rise in response to an increase in demand. This intuitive prediction is confirmed for countless examples: football ticket prices are higher for more popular matches, share prices rise as investors hear positive news, house prices go up in areas that are more desirable, travelling by train costs more at peak rush hours, flowers are more expensive just before Mother's Day, and prices for accommodation and aeroplane flights are higher in the school holidays. Box 1 considers a more detailed case study on how sports events tend to increase prices.

Box 1: Case study – the price-increasing effects of sports events

Recent reports have suggested that the number of football fans planning to travel to Brazil to watch the 2014 World Cup has had a substantial effect on prices in the host country. For example, flying between venues may cost travellers up to ten times more than normal, staying in a hotel room in Rio during the tournament may be up to five times more expensive than usual, and even the prices at restaurants, bars, and car parks are expected to rise. Similarly, studies found that the increased demand for hotel rooms during the 2012 Olympics more than doubled the average nightly hotel rate in London. For more details, see <http://www.bbc.co.uk/news/business-17347107> and <http://www.bbc.co.uk/news/world-latin-america-24548751>.

These effects form a fundamental part of economists' understanding of markets and are easily understood within standard theoretical models. However, there are some important anomalies. Indeed, sometimes we observe that prices *fall* in response to a demand increase. For example, casual observation suggests that the prices of BBQ food, ice cream and suntan lotion often fall in the summer, DIY stores have discount sales on bank holiday weekends, and the price of alcohol and party food drop just before Christmas. Similar findings have been confirmed within academic research. For instance, Box 2 contains the details of a careful study where grocery items were more likely to be discounted in periods of higher seasonal demand. Similarly, other studies have suggested that 45% of products within department stores are cheaper before Christmas when product demand is high, rather than afterwards, and that the price of a book often tends to fall, rather than rise, after appearing on a bestseller list. (All academic references are included in our article's online appendix).

Box 2: Academic study – the price-decreasing effects of seasonal demand

Hosken and Reiffen (2004) use retail price data from 30 geographical areas in America from 1988-1997 to show that grocery products are often put on sale with a lower price during periods of increased seasonal demand. For instance, they demonstrate that hot dog prices are more likely to be discounted in the summer and that the prices of canned soup are more likely to be lowered in autumn and winter, even when production costs remain unchanged.

In this article, we briefly review the standard textbook view on how increases in demand affect market prices, before discussing various possible explanations for why, contrary to this view, prices may actually fall during periods of high demand.

1. Textbook view

For simplicity, we consider the effects of a demand increase within a simple model of supply and demand. However, similar effects often exist in other standard models where sellers have some market power, such as monopoly or oligopoly. As an exercise, Box 3 asks the reader to explore the monopoly case, with full answers available in our online appendix.

First, consider the market demand curve (D) in Figure 1. This illustrates the total number of units that buyers are willing to purchase for any given market price, holding all other factors constant, such as buyers' income, preferences and the prices of other goods. Alternatively, the demand curve can also be understood as describing the buyers' maximum willingness to pay for each unit, holding other factors constant. The demand curve is downward sloping in the vast majority of markets: buyers are willing to buy more units when the price is lower, or equivalently, buyers will place a lower value on each additional unit they consume.

Now consider the market supply curve (S) in Figure 1. This represents the total number of units that sellers are willing to supply for any given market price, holding all other factors constant, such as the sellers' production costs. In practice, supply curves are often horizontal or upwards sloping. The supply curve slopes upwards when unit production costs rise as quantity supplied increases, as is illustrated in Figure 1. This can happen due to the difficulties of obtaining more input resources or the extra effort needed to produce higher levels of output. Consequently, as the market price increases, sellers will be able to cover their costs on more and more units, and so they will be willing to increase the units they produce and sell.

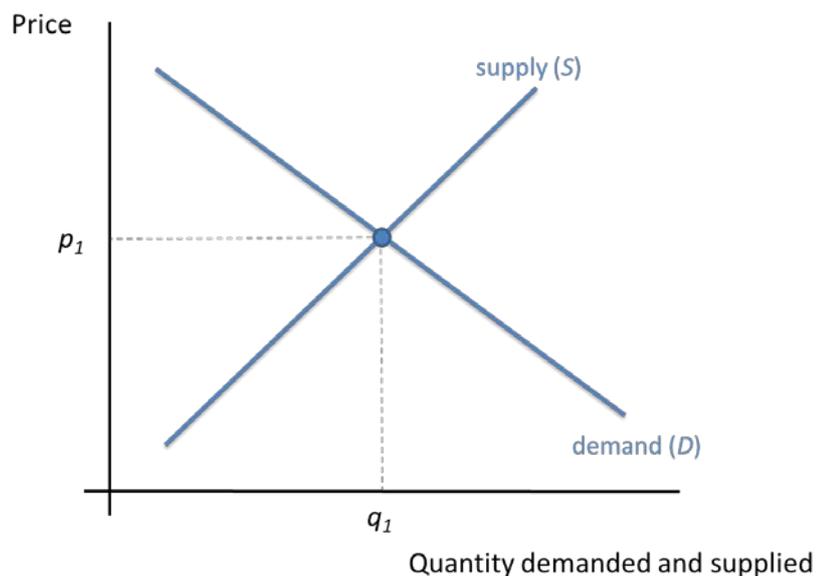


Figure 1: Market equilibrium

The market price is determined by the intersection of the market demand and supply curves, as denoted by p_1 in Figure 1. At this price, buyers wish to purchase the exact number of units that the sellers are willing to supply and there is no incentive for any agent to change their behaviour. The market is in equilibrium.

Now suppose that demand increases, as illustrated by the demand curve D' in Figure 2. For any given price, the total number of units that buyers are willing to purchase rises. An alternative interpretation is that buyers now have a higher maximum willing to pay for each unit than before.

Such an increase in demand can happen if buyers' incomes rise, their preferences for the good get stronger, or the prices of substitute goods increase. Given the supply curve is upward sloping, the market price now rises to p_2 . Buyers would like to purchase more units, but in order for sellers to produce more, the market price must increase to cover the sellers' higher production costs.

A related prediction can be gained for the other suggested case where unit production costs do not vary with the quantity produced, such that the supply curve is horizontal rather than upward sloping. In this case, following a demand increase, market output increases but the market price remains constant because sellers' unit production costs remain unchanged.

Therefore, under our assumptions, the textbook model of supply and demand predicts that the market price will either rise or remain unchanged after an increase in demand. It is incapable of explaining how prices can fall in response to a demand increase, when other factors remain constant.

Box 3: Monopoly Case Exercise: Use a related set of diagrams to show how prices tend to rise following an increase in demand within the textbook model of a monopoly market. Hint: Draw a demand curve with an associated marginal revenue curve, and an upwards sloping marginal cost curve. Find the market price by considering the intersection of marginal revenue and marginal cost. (Answers are in the online appendix.)

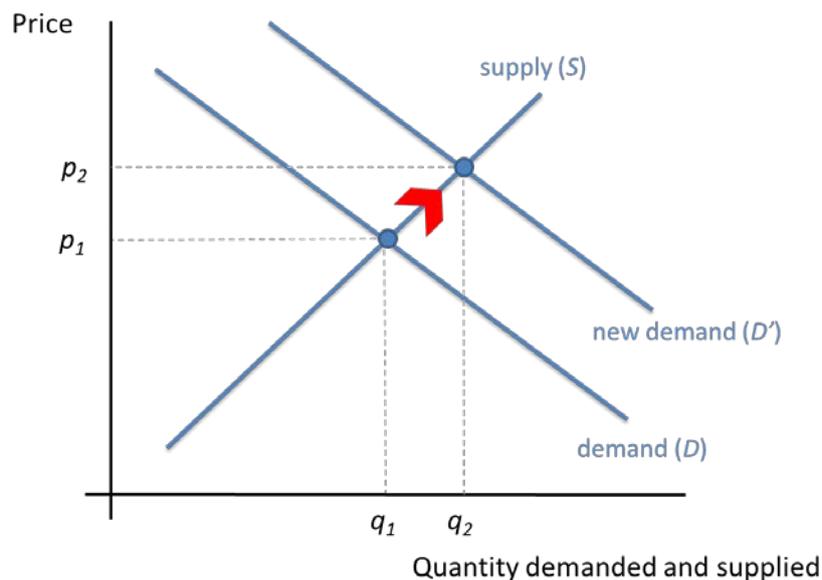


Figure 2: Increase in demand

2. Some possible explanations

Contrary to these theoretical predictions, the evidence in the introduction suggests that prices can sometimes fall in response to an increase in demand. There are a number of competing theories that attempt to explain this evidence. We now review the main explanations, which all result from the consideration of some important factor that is otherwise omitted from the simple textbook market model.

2.1 Downward sloping supply curves

Contrary to the outline of the textbook model, it is possible that a market supply curve can be downwards sloping such that unit production costs fall as output increases. This can occur, for instance, if a seller learns how to produce more efficiently as it produces more output. If so, it is easy to verify with a diagram, that the market equilibrium will have a *lower* market price after any increase in demand. However, such instances cannot be easily applied to the retail markets discussed within the evidence above, where if anything we would expect production costs to rise, rather than fall, with output. Moreover, academic research typically suggests that cost changes are not the primary cause for the observed pricing patterns.

2.2 Collusion and price wars

In some industries, it is possible that sellers cooperate and collude in a way that allows them to set a high price to increase their profits. The possibility of such an agreement is not considered within the simple market model. Within such a setting, each seller will be tempted to cheat on the agreement by undercutting the high price in order to capture a bigger share of the market in the short term. Therefore, to maintain the agreement, sellers must enter a price war in subsequent periods whenever they discover a rival has cheated. By reducing profits in the long term, such a price war would punish any seller that cheated and this threat thereby eliminates its incentives to cheat. However, in a period in which demand temporarily rises, there is a greater incentive to cheat because cheating will capture a bigger share of a larger market. Consequently, in a period of high demand, the incentives to cheat can become so strong that the collusive agreement temporarily breaks down and, consistent with the evidence, prices fall.

2.3 Consumer price comparisons

The standard textbook model assumes that buyers will purchase from the cheapest supplier. However, in practice, it takes time and effort for buyers to visit the stores or websites of all of the sellers in a market, and so some buyers may purchase from the first seller they come across who may not be the cheapest. As a consequence, a seller has some market power and may want to set a high price to target such buyers. Now, in periods of high demand, such as Bank holidays or in the run-up to Christmas, buyers can have a greater incentive to shop around for the cheapest deals, due to the increase in their planned expenditure. This increase in comparison-making makes sellers less likely to target those buyers who do not shop around and instead makes them want to reduce their prices to be the cheapest supplier. If this incentive to be the lowest-priced seller is large enough, it may offset the direct price-rising effects from the increase in demand, and result in falling prices.

2.4 Multiple product advertising

Finally, the standard textbook model may not explain the evidence because it assumes that sellers supply only one product. In many markets, however, sellers actually supply multiple products and, in order to persuade buyers to visit them rather than their rivals, sellers often engage in price advertising. In particular, rather than advertising all of its prices, a seller may focus on advertising only a few products with very low prices, sometimes below cost. Supermarkets often do this using television adverts or weekly leaflets. Moreover, in order to attract the biggest possible number of buyers to its store, a seller will choose to advertise and discount the products that are currently most popular. Hence, consistent with the evidence, if the demand for a product increases, such as alcohol before Christmas, then sellers will choose to promote this product by reducing its price and advertising it, rather than some other less popular good. Evidence supports this explanation for many cases, with high-demand items being more likely to put on sale and advertised.

In response to the empirical evidence, economists are still trying to develop better theories that help explain when and why prices will decrease in response to a rise in demand.

Review notes

1. Simple economic theories predict that prices tend to rise as a result of an increase in demand.
2. However, contrary to these predictions, there is evidence that prices can decrease after a demand rise.
3. Such evidence can be explained by theories that make more complex and realistic assumptions.
4. These explanations involve taking into account that sellers may act collusively, that buyers may need to shop around for deals or that sellers may offer multiple products.

Luke Garrod and Chris Wilson are both Lecturers at the School of Business and Economics, Loughborough University.

Online Appendix:

Section 1: Answers to Question Box 3 – Monopoly Case Exercise

To see how the theoretical predictions outlined in the main article can often be extended to the textbook monopoly case, consider Figure A1 below. Like in the supply and demand model, there is a market demand curve, labelled D . However, in this case, the market demand curve is also the monopolist's demand curve, since the monopolist is the only seller in the market. Since the demand curve is downward sloping, the monopolist must lower its price to sell another unit of output.

The marginal cost curve, labelled MC on Figure A1, shows how the monopolist's total costs change as it increases its output by one unit. Like in the supply and demand model, this is often horizontal or upwards sloping. In Figure A1, we allow it to be upwards sloping, signifying that the monopolist finds it increasingly costly to produce an extra unit of output.

To consider the monopolist's optimal choice of output, we also need to introduce the marginal revenue curve. The marginal revenue curve, labelled MR in Figure A1, shows how the monopolist's total revenue changes as it increases its output by one unit. There are two offsetting effects of selling another unit of output on the monopolist's total revenue. First, the monopolist increases its revenue by the price at which the extra unit is sold. Second, by reducing its price, the monopolist decreases the revenue it receives for all of the other units it sells. Due to this second effect, the marginal revenue curve is downward sloping and it lies below the demand curve, as illustrated on Figure A1.

To maximise its profits, the monopolist selects the output level where marginal revenue is equal to marginal cost. This is at q_1 in Figure A1, with a corresponding price equal to p_1 . To see why this output level maximises profits, consider whether a monopolist should produce and sell an extra unit of output if marginal revenue is not equal to marginal cost. If marginal revenue is greater than marginal cost, the monopolist should produce and sell an extra unit because this unit increases total revenue by more than it adds to total costs and thereby increases its profits. Similarly, if marginal revenue is less than marginal cost, the monopolist should not produce and sell a unit of output because producing and selling this unit would cost more than it would add to total revenue and thereby decreases its profits.

Now suppose an increase in demand shifts the demand curve to D' in Figure A1. This also shifts the marginal revenue curve to MR' because each extra unit of output can now be sold at a higher price, and allows each extra unit of output to add more to total revenue than it did before. The output level that now maximises profits, where marginal revenue, MR' equals marginal cost, MC is q_2 . This has a corresponding monopoly price, p_2 , which is higher than the original price, p_1 .

Finally, if Figure A1 were redrawn with a horizontal marginal cost curve, it can be verified that the monopolist would also raise its price above p_1 following an increase in demand.

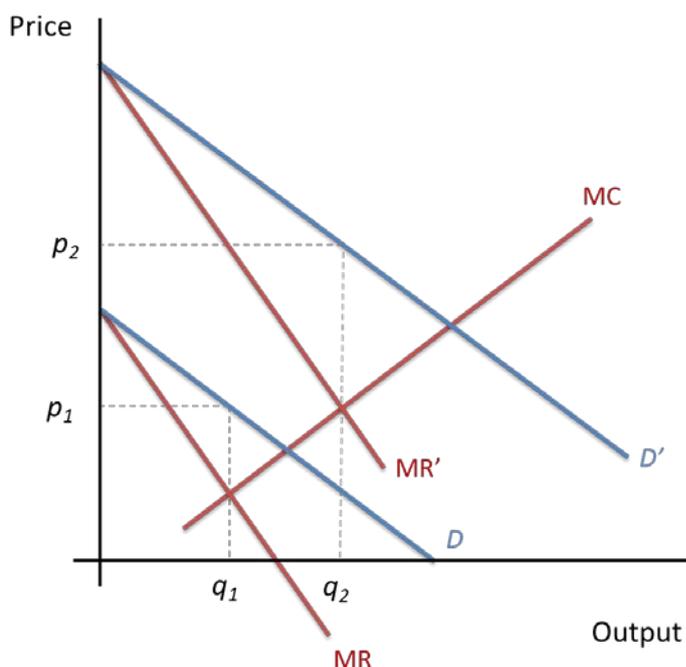


Figure A1: Increase in demand for a monopolist

Section 2: Academic References

The ideas for this article were drawn from the following academic research papers:

Chevalier J.A., Kashyap A.K., and Rossi P.E. (2003) "Why Don't Prices Rise During Periods of Peak Demand? Evidence from Scanner Data" *American Economic Review*, vol.93, p.15-37

DeGraba P. (2006) "The Loss Leader is a Turkey: Targeted Discounts from Multi-Product Competitors" *International Journal of Industrial Organization*, vol.24, p.613-628

Hosken D. and Reiffen D. (2004b) "How Retailers Determine Which Products Should Go on Sale: Evidence from Store Level Data" *Journal of Consumer Policy*, vol. 27, p.141-177

Hosken D. and Reiffen D. (2007) "Pricing Behaviour of Multiproduct Retailers" *B.E. Journal of Theoretical Economics*, vol.7, p.1-43

Lal R. and Matutes C. (1994) "Retail Pricing and Advertising Strategies" *Journal of Business*, vol. 67, p.345-370

Li X., Gu B. and Liu H. (2013) "Price Dispersion and Loss-Leader Pricing: Evidence from the Online Book Industry" *Management Science*, vol. 59, p.1290-1308

MacDonald J.M. (2000) "Demand, Information and Competition: Why Do Food Prices Fall at Seasonal Demand Peaks?" *Journal of Industrial Economics*, vol. 48, p.27-45

Rotemberg J.J. and Saloner G. (1986) "A Supergame-Theoretic Model of Price Wars During Booms" *American Economic Review*, vol. 76, p.390-407

Warner E.J. and Barsky R.B. (1995) "The Timing and Magnitude of Retail Store Markdowns: Evidence from Weekends and Holidays" *Quarterly Journal of Economics*, vol.110, p.321-53

Lan, Lloyd, Morgan (2014) "Supermarket Promotions and Food Prices"

"Countercyclical pricing: A consumer heterogeneity explanation"

By: Guler, Ali Umut; Misra, Kanishka; Vilcassim, Naufel

ECONOMICS LETTERS Volume: 122 Issue: 2 Pages: 343-347 Published: FEB 2014

Armstrong and Chen (2012) "Discount Pricing" See <http://www.economics.ox.ac.uk/Department-of-Economics-Discussion-Paper-Series/discount-pricing>