

PRICES IN THE PHARMACEUTICAL INDUSTRY

by

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## PRICES IN THE PHARMACEUTICAL INDUSTRY

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## ABSTRACT

This paper looks at whether the actions, not the intentions, of pharmaceutical companies justify the prices they set.

## Intro

“It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest” –Adam Smith

The basic premise of capitalism is that we rely on greed rather than the goodwill of others to get products that we want. For example, shopkeepers do not put milk on their shelves because they are concerned about our families. Rather, they do it because they are concerned about their own families. However, if the only way they can raise funds to feed their children is by convincing us to purchase their products, then producers are forced to supply us with the things we want and need in this fashion. If they do not supply us with these products, then they have competitors who will. We rely on the shopkeeper’s self-interest to access milk and the shopkeeper relies on our self-interest to help provide for his or her family.

Likewise, we do not come to expect new drugs to fit our needs by the benevolence of pharmaceutical company decision makers. Rather, at least theoretically, pharmaceutical companies give us more drug options through their profit-focused interests and agendas. However, just as with the shopkeeper described above, their greed only gives us the drugs we need when the industry is competitive. Therefore, from an economic standpoint, it is pointless to question the motives of pharmaceutical executives. They do not need to be benevolent in order to supply us with the means to a healthy life as long as pharmaceuticals are forced to compete with each other. Only by examining the market structure of the industry can we determine whether pharmaceutical prices are exploiting consumers. In this paper, I will question whether the

actions, not the intentions, of pharmaceutical companies serve or obstruct the common good of consumers through pricing patterns. I will conclude that the industry is extremely non-competitive and that the necessary incentives for the invisible hand to operate properly do not exist. Producers regularly take advantage of consumers and very little of their revenue is truly channeled toward research, as they claim. This is most decidedly not what Adam Smith had in mind.

The paper will proceed as follows. First, I will discuss recent pricing controversies in the pharmaceutical industry. Next, I will explain basic economic theory regarding consumer and producer surplus and market structure. I will look in particular at the impact of shifts in supply and demand curves on the welfare of market participants. Then I will introduce issues specific to the pharmaceutical industry. Finally, this theoretical framework will be used to interpret recent events. Conclusions will follow.

### **Recent Pricing Controversies**

Pharmaceutical companies have caused controversies because of drug price increases that reduce much-needed access for consumers, raising the question of whether some take advantage of market power. Pharmaceutical prices impact everyone who produces, prescribes, consumes, and pays for pharmaceutical drugs, making their affordability an important and wide-reaching issue.

The misalignment of consumer and producer desires has manifested itself in recent controversies within the pharmaceutical industry. One of these controversies involved Martin

Shkreli who founded the company Turing Pharmaceuticals, which received widespread attention after a massive price hike of its products (Pollack 2015). In August 2015, Turing Pharmaceuticals acquired marketing rights to the drug Daraprim, a 62-year-old drug that patients use to treat toxoplasmosis, a parasite infection that can result in life threatening problems. The Food and Drug Administration (FDA) approved Daraprim in 1953. It was made by GlaxoSmithKline who sold the drug's United States marketing rights to CorePharma in 2010, which was bought by Impax Laboratories, who then sold Daraprim to Turing Pharmaceuticals in a \$55 million deal. Daraprim treats people with compromised immune systems including patients subject to AIDS and cancer.

Once Turing acquired Daraprim, it raised the drug's cost from \$13.50 a tablet to \$750 overnight (Pollack 2015). As criticism and accusations of greed began rolling in, Shkreli maintained the position that his company was not making unreasonable profits from the price hike and that the additional money it earned would be invested to research and develop more effective treatments for toxoplasmosis. Shkreli asserted that since Daraprim has a relatively small consumer base, the inflated price of the drug was more on par with other treatments for rare diseases, so criticism towards him was uncalled for. Part of the outrage towards Shkreli and Turing was due to the fact that Daraprim had already existed for 62 years and Turing Pharmaceuticals charged over 50 times the former price without improving the drug. One of the effects of the Daraprim price increase was that hospitals had a harder time accessing the drug so they had to use alternative treatment methods. While Turing's competitors could try to make copies of Daraprim since its patents have expired, it is difficult for them to do so because

distribution of the drug is tightly controlled, making it challenging for competitors to get samples.

Another recent case of a price hike in the pharmaceutical industry was the EpiPen controversy. EpiPen is an epinephine auto injector manufactured by the company Mylan that is used to treat allergy reactions. The cost of an EpiPen increased from \$57 in 2007 to around \$500 in 2016. People were outraged at this price hike because consumers use the product in emergency situations and there are not any generic equivalents or direct competitive products that could replace EpiPen (Woodyard, Layton 2016). In early 2015, EpiPen had an 85% market share of epinephine prescriptions (Koons, Langreth 2015). After Mylan acquired the EpiPen from Merck HGaA in 2007, CEO Heather Bresch started a marketing campaign to raise awareness of the dangers of allergic reactions, especially for children. This advertising strategy greatly increased demand for EpiPens as many schools were required to have them as a cautionary measure for students in addition to consumers who needed them for allergic reactions. The costs of accessing EpiPen add up because it expires after a year which makes it an expensive form of treatment. While buyers of the product and the general public were upset over what they saw as an unethical price increase, Bresch defended the change in price, claiming that her company was not making outrageous profits. Just because pharmaceutical companies increase prices does not mean that consumers are harmed.

Marathon Pharmaceuticals is another company that faced criticism when they priced their muscular dystrophy drug at \$89,000 under the brand name Emflaza. Emflaza helps patients improve their muscle function. The drug is available outside the United States and consumers

have been importing it for as low as \$1,200 a year (Schencker 2017). Marathon now has exclusive rights to sell the drug in the United States after getting FDA approval. Jeffrey Aronin, Marathon CEO, claimed that the price was set at \$89,000 because of costs associated with bringing the drug to the market, conducting clinical trials, and funding future research. Another instance involved Valeant Pharmaceuticals International, which increased the price of their drugs Cuprimine and Syprine from \$500 to \$24,000. Valeant hoped that their program that covers the co-pay of privately insured patients would incentivize consumers to not complain about the price increases. Interestingly, the former CEO of Valeant, Michael Pearson, acknowledged that the free market system is not necessarily the most effective way to get drugs to the consumers who most need them (Peterson 2016).

These are just a few of the most extreme examples, but there are many others. The controversies fit a common pattern, however, wherein the company raises prices which it then justifies on the grounds that it helps the consumer since it will generate funds for research in the long run. This has been increasingly questioned in light of these pricing controversies. CEOs of pharmaceutical companies have been asked to defend outrageous price increases, and many have replied by saying that the profits are justified. Consumers are forced to adjust to these new higher prices, even though most of the drugs in question are not newly developed. However, as suggested at the outset of this paper, whether these CEOs are Ebenezer Scrooge or Florence Nightingale is really beside the point. The real question is whether or not the structure of the market creates the necessary incentives to force pharmaceutical companies to please customers.

## **Economic Theory**



## Pricing

Adam Smith did not simply argue for markets, but for markets with competition. Without the threat of another butcher, brewer, or baker taking away their market share, suppliers do not have reliable economic incentive for them to supply our dinner at a reasonable cost. Nor is there any guarantee that simply having a market system will create the necessary level of competition. The shopkeeper who puts milk on the shelves will only price a gallon at a reasonable price if there are other milk suppliers who are a threat to him by offering a lower price. When the shopkeeper has competition, he will give up higher profits to attain a share of the consumers who are in the market for milk. Therefore, consumers are better off when more competitors exist in the market.

What precisely are the impacts of price changes on the affected parties? Economists use the concepts of consumer and producer welfare to measure the effects. Though it is not without controversy, it may provide a useful framework for considering the controversies outlined above (Shaikh n.d.). Consider first the supply and demand structure. The supply curve shows the quantity of a particular good or service that suppliers are willing to produce at each price level. The higher the selling price, the higher the quantity they will want to supply. The demand curve shows the quantity of a good or service consumers are willing to consume at each price level. As the buying price decreases, the quantity demanded increases. Note that there is a critical difference between demand and quantity demanded and supply and quantity supplied. Supply and demand denote the functions, the entire set of points correlating prices with quantities. These points are a general representation of the behavior of producers (supply) and consumers (demand). Meanwhile a quantity supplied or quantity demanded indicates one particular point on

the relevant curve (as derived from a single price). Hence, a change in quantity demanded is a movement along a demand curve when a change in demand is a shift of the entire function.

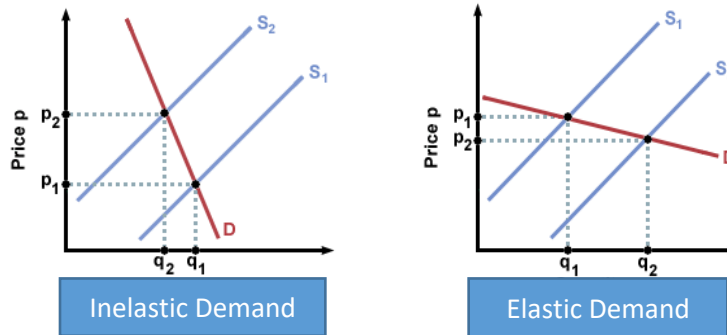
Factors that may cause the latter include changes in income, taste and preference, and expectations. For example, the demand curve will shift to the right when a study shows that a product is likely to provide health benefits. A change in the price of inputs or technology are factors that can cause a shift in the supply curve. As new technology improves the production process for a product, the supply curve shifts to the right. The equilibrium point is where the demand and supply curves intersect. It is the point at which the quantity supplied and quantity demanded are equal. The equilibrium price and quantity change when the curves shift. For example, when the supply curve shifts left and all else is held equal, the new equilibrium point will be at a higher price and a lower quantity. The further left the supply curve shifts, the further the equilibrium price rises and the quantity decreases.

Another factor that allows us to understand the workings of the market system is elasticity. The price elasticity of demand, for example, measures the responsiveness of a change in the quantity demanded of a product when its price changes. It is the percentage change in quantity demanded divided by the percentage change in price. Though this is necessarily a negative number, economists usually treat it as positive for convenience. Economists categorize elasticities as relatively elastic, unit elastic, or relatively inelastic. For the first to be true, the percentage change in quantity demanded must be greater than the percentage change in price. If a price to rise by 10%, then the demand for the product would be relatively elastic if it fell by more than 10%; it would be unit elastic if it fell by exactly 10%; and it would be relatively inelastic if

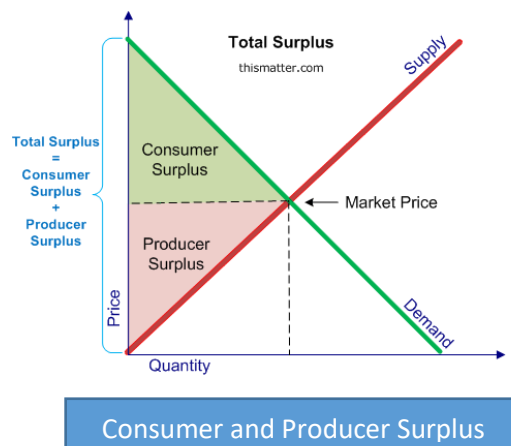
it fell by less than 10%. Competitive markets with many suppliers usually have more elastic curves for products. By contrast, a perfectly inelastic curve signals that there are no substitutes for that product. For example, if you go to the grocery store to buy soda and see that soda costs increased, you have the option of buying a different drink such as water or juice. The substantial number of alternative drink options suggests that the demand curve for soda is relatively elastic. One could expect quantity demanded to fall by a higher percentage than the increase in price. On the other hand, the more unique a good or service, the more inelastic the demand curve. In that case, the percentage decline in quantity demanded will be less than that of the price increase. Companies that sell goods with inelastic demand curves have the incentive to increase their prices by shifting their supply curve to the left since there is a lack of substitutes on the market. However, this shift would only be possible if they had few competitors (even a very unique good or service could be produced by hundreds of different firms). A horizontal line represents a perfectly elastic demand curve, and a vertical line represents a perfectly inelastic curve.

Figure 1 shows examples of relatively inelastic and elastic demand curves (note that the specific measures of elasticity will vary along a straight-line demand curve; I do not explain this as it is not necessary to the argument). One thing that is obvious—and quite relevant in the case of pharmaceutical price increases—is the difference in impact on revenues of the same leftward supply shift. Revenue is quantity times price, which on each graph is initially  $p_1 \times q_1$ . After the shift, it is, of course,  $p_2 \times q_2$ . In both instances,  $p$  will have risen and  $q$  fallen. But in the graph on the left, there is a very large increase in price and a small decline in quantity demanded: the firm's revenue increases. Meanwhile, in the graph on the right the situation is reversed: the firm's revenue declines. I will return to this point later.

Figure 1

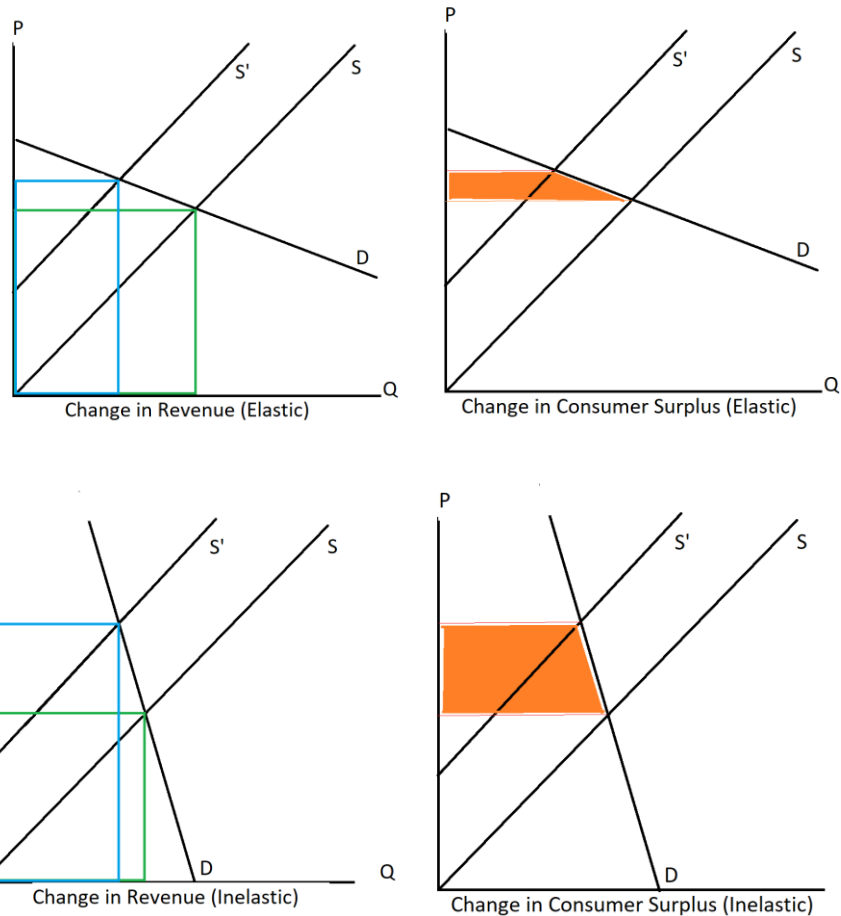


Now we look at welfare by focusing on consumer and producer surplus. Consumer surplus is the difference between what a consumer is willing to pay for a product and the market price for that product. For example, if Figure 2 \$100 for a football ticket but only had to pay \$70, the surplus is \$30. Utility from consuming a product as well as income influences a consumer's willingness to pay. Many products follow the rule of diminishing marginal utility in which the consumption of an additional unit of products brings less satisfaction and value. For example, consuming a third glass of milk will give you less satisfaction than the first or second glass. Graphically, total consumer surplus is the area to the left of the demand curve and above the market price as this area shows how much more some consumers would pay (it is assumed that the willingness to pay will vary from individual to individual). Producer surplus is the difference between the amount a producer receives for a good and the price they were willing to accept for it. For example, if Texas Christian University is willing to sell a football ticket at \$30 but receives \$70 for it, then TCU's producer surplus is \$40. The price suppliers are willing to accept depends on, among other things, costs of production. Graphically, producer surplus is the area to the left of the supply curve below the market price. Figure 2 illustrates both varieties of surplus.



Now consider the effect of differing elasticities on welfare. First off, I will restrict my attention to price elasticity of demand and consumer welfare as these issues will be the relevant to the pharmaceutical industry. Second, I will focus on the impact of leftward shifts in supply since this is how economists would represent the drug price increases discussed above. The question I want to answer here is: what is the impact of an identical leftward supply shift in a market with relatively elastic demand versus inelastic? Figure 3 illustrates the comparison. Each of the four markets shows the same leftward supply shift. On the top two, however, demand is elastic; on the bottom two it is inelastic. Note first that the change in revenue is just as described above. As suggested in the graph, a leftward shift in supply tends to yield an increase in revenue when demand is relatively inelastic. The information regarding consumer welfare is new. The orange area on each of the right-hand graphs is the decline in surplus that is bound to occur when price rises (because surplus is the difference between the market price, which is now higher, and what consumers are willing to pay, which has not changed). Not surprisingly, the decline is much greater when the price elasticity of demand is lower.

Figure 3



This difference suggests that in considering the effect of pharmaceutical industry price increases I need to consider the following three questions:

1. Is the demand for the drugs in question relatively elastic or inelastic?
2. Is the industry sufficiently competitive to prevent firms from shifting supply left of their own volition?
3. In either event, are the increased revenues truly invested in research so that any short-term loss of consumer welfare may be offset by long-term increases?

I examine these questions below.

## **Specifics in the Pharmaceutical Industry**

Adam Smith argues that consumers should not rely on the benevolence and goodwill of pharmaceutical companies to get drugs. However, consumers cannot reasonably rely on Martin Shkreli's self-interest to receive drugs at justifiable costs because current market conditions do not create the necessary incentives.

## **Supply**

I will now offer a more in-depth look at conditions in the pharmaceutical industry. Creating and getting a drug to the market are time-consuming and expensive processes that require many steps. The first step involves determining whether a disease has enough economic potential to justify beginning the extensive and expensive process of developing a new drug. Pharmaceutical companies act out of their own self-interest rather than benevolence because they are profit-maximizing institutions in a capitalist system. Once a company approves potential profitability, the research and development (R&D) phase begins. Basic research is the longest and most expensive of all the R&D phases. These include three phases of clinical trials that test the drug's safety. If a drug passes this stage, it moves on to the FDA approval process. Once approved, the drug moves to the market but is under a post market surveillance phase for 11-14 years during which the drug's effects are closely monitored. Many drugs do not make it to the market, so scientists constantly work on testing and discovering new potential drugs. In the clinical period that lasts 6 to 11 years, there is a 30% overall probability of success for phase I, 14% probability for phase II, and 9% probability for phase III. Typically, phase I gives the drug to volunteers without the disease to determine safe dosage levels and to study the side effects. Phase II tests the drug on patients with the disease. If the drug makes it to phase III, it is then

tested on a large number of patients and is further evaluated for safety and effectiveness by comparing groups of patients (Angell 2014). A drug going through the FDA approval process, which takes 0.6 to 2 years, only has an 8% overall probability of success. The unlikelihood of a drug ever making it to the market contributes to industry explanations of high pricing because companies need to take risk into account and invest accordingly. Generic drugs also need to get approved by the FDA, but the process is much simpler because manufacturers just need to demonstrate that the drug is equivalent to the brand-name drug it copies. They do not need to do any additional clinical trials to demonstrate safety and effectiveness because those have already been done for the equivalent brand name drug. The cost of production for pharmaceutical drugs involves high fixed costs because of a long and expensive R&D process and low marginal costs from a generally low costing production process.

Patents and brands play a large role in the market for pharmaceutical drugs (Puig-Junoy, 87-88, 2005). Drugs that are patented are given exclusive rights for production and marketing, which leads to a degree of monopoly power and barriers to entry for competitors. The FDA holds power in determining these patents and their lengths and effectively decides the level of competition within the industry before generic drugs enter the market. Eliminating or modifying patents to decrease their protective power would lead to increased competition and, *ceteris paribus*, lower prices. However, this would take away incentive for companies to invest in R&D because companies that did research would find that competing producers copied their innovations at lower prices with higher rates of return, which could decrease the overall rate of innovation. Another factor that affects the supply curve is the reputation of brand names. Brand names influence supply because they are associated with quality, confidence, prestige, and



reducing uncertainty about a product. For example, EpiPen is a brand name that people are familiar with because it is associated with providing quality treatment from allergic reactions. In 2014 EpiPen signed a deal with Walt Disney to stock theme parks and cruise ships with EpiPens, which is an example of a brand name appealing to customers (Koons, Langreth 2015).

Pharmaceutical companies that manufacture brand name drugs spend a tremendous amount of money on lawyers to protect their exclusive marketing rights because of the high revenues they maintain without generic drugs as competition (Angell 2004).

## **Demand**

Unlike demand in most conventional markets that is characterized by a consumer's preference associated with a set amount of units bound by budget constraints, demand in the pharmaceutical market is determined by a multitude of factors including doctors' prescriptions habits for the product along with the patient's ability to follow through on taking the prescription. In addition to the unconventional market structure, need in the health sector can be very different from preferences and willingness to pay for a product. Demand for pharmaceutical drugs is correlated with demand for health. Drugs are usually demanded and consumed with complementary goods such as physician visits or hospital stays among other medical services. In some situations, drugs are a substitute good for these services. The end consumer of a drug is not the only party who decides the level of demand for drugs; demand is also determined by physicians, insurers, and pharmacists. Demand for drugs also depends on geographical location and ease of accessibility. In industrialized countries, there is a greater demand for drugs that address chronic diseases and diseases associated with lifestyle patterns rather than drugs that address communicable and perennial diseases. Because of this, many new drugs are aimed

towards people who depend on those drugs for the rest of their lives which will bring in consistent profits for pharmaceuticals.

Demand is also shaped by branding in the pharmaceutical industry. Brands create product differentiation through advertising and other forms of marketing, even when the products they are promoting are of identical nature and quality. Because there are so many segments in the pharmaceutical industry with various levels of regulation and market shares, price setting can be highly variable within the industry. While many generic and over the counter drugs are nearly identical and have competitive market characteristics, product differentiation still exists through advertising and marketing which makes the demand curve downward sloping (Schweitzer, 100, 1997). Different firms price identical products above their marginal cost if they can convince consumers that their brand is different and better than other available brands. This is where advertising to consumers comes into play. While brand name drugs hold their patents, “me-too” drugs are being created. Me-too drugs are generic drugs that are slightly different than brand name drugs that are protected by patents. Me-too drugs benefit consumers who do not respond well to brand name drugs by giving them more options. They also create competition in the pharmaceutical market which diminishes monopoly power.

The United States and New Zealand are the only countries that allow direct to consumer pharmaceutical advertising (DTCPA) that includes product claims. In the United States, DTCPA is regulated by the FDA and different types of advertisements have different standards of regulation. The advertising mainly occurs on television, magazines, and online. Some of the proposed benefits of DTCPA include informing consumers about drugs, promoting

communication with health care providers, and reducing the stigma that certain drugs have. Some of the criticisms include promoting drugs without fully knowing their effects, prescribing drugs unnecessarily, and misinforming consumers even with the intent to educate them. Another argument is that direct advertising sways consumers from buying cheaper alternatives that have the same effect. Often “me-too” drugs are advertised as the better choice even when they do not have a significant advantage over the existing drugs, which can be misleading. Overall, the exposure that consumers receive from advertisements can affect the demand side of drugs. Information about drugs that is communicated plays a significant role in perceived product differentiation, which affects both pharmaceutical companies as well as consumers of drugs.

The reason drug price increases have raised such controversy is because the demand for the drugs in question is relatively price inelastic. Were Bayer to raise the price of their aspirin, there are too many substitutes to make this an issue. They would lose market share but it would not create a controversy. But, in the cases of Daraprim and EpiPen, that was not the case. The demand curves for their products are very inelastic. This is a result of limited substitute drugs on the market due to the strict FDA approval process as well as the long and expensive development process of producing pharmaceutical drugs. Specialized drugs are inelastic and have fewer producers, meaning that—in answer to the second question posed at the end of the previous section-- those producers have greater market power than producers in a competitive market. When there is only one firm producing a drug, they gain monopoly power. This lets them set prices that consumers are forced to adhere to or simply live without the product. When people need a certain drug and there are either few or no other substitutes for it, they must resort to paying a price over that which would have prevailed in a truly competitive market.

EpiPen falls into the category of products that have greater market power because of lack of competition. People were outraged when Mylan raised the price of EpiPens but, due to its inelastic demand, consumers had no choice but to pay or leave the market entirely. Another example is the drug Daraprim manufactured by Turing Pharmaceuticals. Daraprim is used to treat an infection that can lead to life-threatening problems, meaning that consumers have a relatively inelastic demand curve. Turing Pharmaceuticals effectively shifted Daraprim's supply curve to the left which manifested itself in a pricing increase as well as consumer surplus decreasing. As they had hoped, Turing's revenue significantly increased because of Daraprim's inelastic demand.

## **R&D**

The following questions were posed above:

1. Is the demand for the drugs in question relatively elastic or inelastic?
2. Is the industry sufficiently competitive to prevent firms from being able to shift supply left of their own volition?
3. In either event, are the increased revenues truly invested in research so that any short-term loss of consumer welfare may be offset by long-term increases?

It has already been established that the demand curve is inelastic and firms have a great deal of market power. The remaining question regards how the pharmaceutical companies use their revenues. They claim that it is in pursuit of research that will later reduce prices and add new and innovative drugs to their product line. It is indeed true that medical research is a time consuming,

expensive, and multi-step process, so the money for production needs to be raised somewhere. Because basic scientific research is considered a public good, government agencies contribute grants funded by taxpayers towards certain research. However, more specialized research is left to private, profit-maximizing pharmaceutical companies who fund R&D partially through their own revenue and partially through investors among other resources. The pharmaceutical industry heavily relies on the government, universities, and small bio-tech companies for innovation in the R&D process (Angell 2014) Pharmaceutical companies often justify the high selling costs of their products because of high R&D costs. Some reports indicate that the pharmaceutical industry does invest a large portion of their earnings in research and development. In 2015, R&D spending made up 19.8% of total revenues on average.<sup>5</sup> This ratio has slowly been increasing. The percentage is so high compared to other industries because medicine is constantly evolving and drugs are changing as technology and demand from consumers change. R&D costs include acquiring equipment and scientists with adequate training to research new medicine and often outsourcing research to smaller specialized firms. Profits from sales largely affect a drug company's propensity to invest in R&D from their own revenue because "higher drug prices tend to increase firms' cash flow, and internally generated cash is a relatively inexpensive source of investment capital" (Research and Development in the Pharmaceutical Industry, 10, 2006).

Since price levels are an indication of a company's profit expectations, higher prices incentivize completing existing research quickly and starting new research. Government intervention and regulation in drug pricing is a concern because R&D will be cut when prices fall and profits are reduced as a result. Large expenditures on R&D in addition to compensating investors who are stakeholders in the process contribute to high drug prices. Drug companies

highly price their products to incentivize investors to invest in them because the probability of a drug making it to the market is low so they need to hedge against the risk of failure. To raise money for research, companies often need to generate funds internally, which means a portion of their revenue goes towards R&D. Marginal costs also play an important role in setting prices because costs incurred during the R&D phase are considered sunk costs once the later stages of drug production begin. Sunk costs are costs that have already incurred and should not be considered when making decisions for the future because they cannot be recovered.

Image 4

World's largest pharmaceutical firms					
Company	Total revenue (\$bn)	R&D spend (\$bn)	Sales and marketing spend (\$bn)	Profit (\$bn)	Profit margin (%)
Johnson & Johnson (US)	71.3	8.2	17.5	13.8	19
Novartis (Swiss)	58.8	9.9	14.6	9.2	16
Pfizer (US)	51.6	6.6	11.4	22.0	43
Hoffmann-La Roche (Swiss)	50.3	9.3	9.0	12.0	24
Sanofi (France)	44.4	6.3	9.1	8.5	11
Merck (US)	44.0	7.5	9.5	4.4	10
GSK (UK)	41.4	5.3	9.9	8.5	21
AstraZeneca (UK)	25.7	4.3	7.3	2.6	10
Eli Lilly (US)	23.1	5.5	5.7	4.7	20
AbbVie (US)	18.8	2.9	4.3	4.1	22

The chart in Image 4 shows data from 2014 that highlights the top ten pharmaceuticals with the highest revenues (Anderson 2014). Pharmaceuticals are dependent on employee sponsored insurance and state-run programs for a lot of its revenue, which means companies push consumers to switch to “new,” exclusively patented drugs so they can maintain their profits despite the drugs being nearly identical (Angell 2004). These companies profit more from clever marketing than from the innovation of drugs. Focusing on just the US firms, we find that the

percentages of R&D spent out of total revenues are 11.5%, 12.8%, 17%, 23.8%, and 15.4%. The respective percentages for sales and marketing spent out of total revenues are 24.5%, 22.1%, 21.6%, 24.7%, and 22.9% which are all higher than the percentage of spending on R&D. This shows how misleading it is when pharmaceutical companies claim prices are so high because of what they are spending on R&D. Considering the fact that many of these large firms are not making most of their profits from drugs that are newly developed and rather on existing drugs they acquired the right to sell, it is not surprising that more is being spent on sales and marketing to convince consumers to buy their products. Additionally, the profit margins for firms in the pharmaceutical industry is higher than those of other industries. The average profit margin for the five U.S. firms in this list is 22.8% and Merck has the highest margin at 43%. Despite these high margins, firms continue to raise prices to increase profits while keeping spending on R&D relatively low.

Another issue with pharmaceutical companies' claims about R&D is their lack of transparency about what they are actually spending it on. (Lyman 2016) When companies refer to their R&D costs they may also include other costs such as marketing to inflate the number. In reality, pharmaceuticals are not doing what they claim to be doing when it comes to investing in R&D. The pharmaceutical industry as a whole is far from the market structure that Adam Smith described. While the industry is unique in many respects, the fact remains that the butcher, brewer, and baker will take advantage of consumers in the absence of sufficient competition. Despite their protests to the contrary, this appears to be what Martin Shkreli and other executives have done by increasing prices for existing drugs.

## Conclusion

The recent pricing controversies and distortion about R&D spending are an indication that policy changes must be made. In order to create the environment Adam Smith suggested, the pharmaceutical industry needs a reasonable amount of competition so consumers are not taken advantage of by companies that shift their supply curve leftwards, forcing them to adjust to higher prices. One approach could be to reduce the patent period during which a company has exclusive rights to sell a drug. A study published by the Journal of the American Medical Association showed that brand name drugs with exclusive patents account for approximately 72% of drug spending despite only being about 10% of all dispensed prescriptions. The study also found that new drugs have a median of 12.5 years of exclusive market access. Current law states that the FDA can give a new chemically based drug a patent period of 5-7 years without competition from generic drugs, and the number of years increases as drug complexity increases. (Kodjak, 2016) This time frame when a drug is under an exclusive patent is when drug prices typically increase due to lack of competition and firms have the most power to shift their supply curves to the left. Reducing this period of monopoly power would mean that generic and me-too drugs can get on the market more quickly and drive prices down, giving consumers more affordable options. Consumers should also become better informed about the drugs they are consuming. Direct to consumer advertising can mislead consumers by selectively informing them which can contribute to the inelasticity of demand for many drugs. Another method of price reduction that the Journal of the American Medical Association study concluded is for government programs such as Medicare to refuse to cover some of the drugs which would place downward pressure on prices, since the Medicare program buys about one-third of prescription drugs sold in the United States. (Kodjak, 2016) Policies to encourage competition and better



inform buyers would keep drug prices more affordable and help avoid controversies over outrageous price hikes.

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## **Images**

Image 1:

<http://img.sparknotes.com/figures/5/5259b727009a2736d6ad639bab3494ff/shiftgas.gif>

<http://img.sparknotes.com/figures/5/5259b727009a2736d6ad639bab3494ff/shifte.gif>

Image 2:

<http://thismatter.com/economics/images/total-surplus.gif>

Image 4:

Anderson, R. (2014) Pharmaceutical Industry Gets High on Fat Profits. *BBC*. Retrieved from <http://www.bbc.com/news/business-28212223>