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Price Discrimination in Practice:

The Market for Drugs in Egypt and the U.S.

by

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Abstract

This paper attempts to analyze the medical and economical reasons that cause a difference in the price elasticity of patients' demand to drugs between Egypt and the United States of America. The study was based on two medicines produced by Pfizer (Lipitor and Viagra), with both of them available in Egypt as well as the United States. The result of this study reflected that Egyptians are more sensitive to the changes in price relative to Americans for both Lipitor and Viagra because of different economical and medical factors.

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1   Introduction

Health represents the most essential and valuable asset for humans; as a result, this creates the curiosity to know how such vital asset could be affected by prices. When mentioning prices, it means drugs' prices when people become ill because some diseases would oblige people to purchase the drugs that cure their illness especially if such diseases are vital and without having certain drugs, they would not survive. So, this leads to extremely important questions, are the prices of the drugs, that cure vital diseases, affordable for all patients? Are pharmaceutical firms setting the prices of such medicines differently in developing world than developed one? If they are doing so, what are the main factors that affect their decision? Are all factors economical ones, medical or both? All of these questions are very important and must find convincing answers because here the asset is very precious for all humans.

There is a lot of literature that studied the price discrimination strategies used by firms in order to increase their profits. Other literature focused on the kind of discrimination that differentiates the developed world from the developing ones in different industries.

Studying price discrimination differences between the developed world and the developing one in the pharmaceutical industry has been conducted in several studies by taking a sample of countries from both worlds and calculating an average disease burden for each sample and then showing how pharmaceutical firms could discriminate among selected groups (Kremer 2002). The main problem with such methodology lies in the accuracy of the results as the use of averages might not reflect the true situation for each country. Consequently, it is beneficial to study such methodology on one country from each world to get more accurate results for the studied countries.

Thus, the main aim of this paper is analyzing the medical and economical reasons that cause a variance in the price elasticity of patients' demand to drugs between Egypt and the United States. The methodology used in this paper is calculating the relation between price elasticity of demand in America relative to Egypt in order to indicate which country is more elastic.

In order to investigate price discrimination in the pharmaceutical industry, this study has discussed the factors that are affecting the willingness and ability of customers

(patients) to buy drugs that affect their sensitivity to the changes in drugs' prices. These factors include general factors affecting the demand for medical care, such as income level, illness level, quality of medical care, and insurance (Phelps 2003).

This study has selected Pfizer, a pharmaceutical firm practicing price discrimination between Egypt's and America's market. The reason of selecting Pfizer is that it has monopoly over two drugs namely Lipitor and Viagra, since monopoly is one of the main conditions for any company to pursue price discrimination. Lipitor curing high cholesterol levels in blood and Viagra for the impotence (sexual inability in men). Consequently, specific factors that affect the demand for each drug have been introduced in this paper such as GDP per capita and public expenditure on education as a % of the GDP, in addition to other medical factors such as the prevalence of obesity and eating habits in analyzing Lipitor and the prevalence of both diabetes and depression for Viagra.

This paper will proceed as follows; *chapter two* includes the definition of price discrimination and its different types with focus on the pharmaceutical industry, in addition to, the analysis of the factors that are affecting the willingness and abilities of customers to purchase drugs which in returns affect the price elasticity of patients. *Chapter three* studies the relationship between the price elasticity of demand and the prices of the medicines, and explains the factors that are affecting the price elasticity of demand to certain drugs produced by Pfizer represented in Lipitor and Viagra. Finally, *chapter four* concludes.

2 Pricing Strategies in the Pharmaceutical Industry

Developing countries are facing many problems such as low levels of GDP, low Human Development Index (HDI), and poor R&D in their industries, in addition to others. All of these aspects resulted in higher sensitivity of demand to the price of goods and services in the developing world (price elasticity of demand) relative to the sensitivity of demand in the developed world.

On the other hand; there is positive side for being less developed country, which is that the price charged for such populations are less than the one charged for the populations in the developed countries since there is an inverse relationship between the price elasticity of demand and the price charged for the good or service. For the firms to achieve profits from both groups (the more and the less sensitive demanders), they are charging relatively higher prices for the less elastic consumers and lower prices for the more elastic consumers.

This pricing strategy is called price discrimination. Such strategy is applicable in all industries even in the pharmaceutical industry. Therefore, populations in the developing countries are enjoying less prices of medical care relative to the ones charged in the developed world.

2.1 Price Discrimination in the Pharmaceutical Industry

First, price discrimination means selling the same product (or similar products) with different prices if there is no big difference in the cost of production. It is one of the pricing strategies that could be used by the pharmaceutical industry or by any other industry.

There are different types of price discrimination which are first, second, and third, as well as, inter-temporal price discrimination. Some are increasing the allocation of resources in comparison with the monopolistic pricing, others are neutral, beside others result in inefficiency (Scherer and Ross 1990: 508).

The first degree is also called "*perfect price discrimination*" because it charges each consumer his own price based on his reservation price (his willingness to pay), and this will maximize the profits of the monopolist (Edlin et al. 1998: 900).

Second degree price discrimination is discriminating based on the quantity bought where the higher the quantity, the lower the price. Third degree price discrimination refers to categorizing customers into different classes based on the difference in price elasticity of demand where the reasons behind the difference in price elasticity of demand are different tastes, income levels, or availability of substitutes. This could occur if and only if the firm was able to prevent the resale between groups. According to Kiser (1998: 1150), the heterogeneity in price sensitivity is affecting the firm's formation of prices.

Based on examining the literature on price discrimination in the pharmaceutical industry, it become evident that the price discrimination strategy is highly used. For example, Reekie (1978: 234) observed that U.S. doctors charged different fees for the same treatment based on their expectation of the payment ability of their patients. Also, the literature shows that second-degree price discrimination is the most common type of price discrimination used in practice when the main suppliers sell pharmacies their drugs and there is only a little practice of third-degree price discrimination between these kinds of buyers and sellers. However; third- degree price discrimination is highly used by the pharmaceutical firms when they sell their drugs to a wider scale represented in countries rather than small pharmacies. In this case, the pharmaceutical firm divides the market into groups, one includes developed countries and the other includes developing countries. The pharmaceutical firm then charges each group its own price based on the differences in demand elasticity, income levels, demographical factors, and other differences (more details are mentioned in the following sub-titles).

2.2   The Causes of Price Discrimination among Countries

Since prices and the production capacities of a firm are based on people's needs, and their willingness and ability to purchase a certain product, we have to analyze the factors that are affecting the willingness and abilities of customers which in return affect the price elasticity of demanders (patients). In spite of the negative effect of these

Figure 2.1: Income Effect on Demand of Medical Care

Price of medical care

Medical care

$D_{Income\ 2}$

$D_{Income\ 1}$
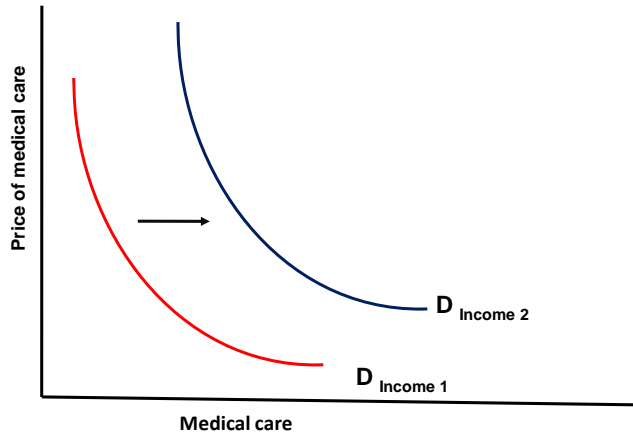
Source: Phelps, C. E. (2003:39)

factors on the consumers, such factors have their positive effect on populations represented in the low price of medical care relative to the prices charged in the developed world. These factors are represented below.

2.2.1 Income Effect

According to Phelps (2003:39), people deal with health care as a normal good like any other sort of good or service. That is, the higher the income, the higher the desire of using such good is. Since people deal with their health as a normal good (when their income increases, they desire more health), therefore the demand curve for medical care will shift outward when income increases (holding everything else constant).

2.2.2 The Effect of Different Illness Levels

One of the most important factors that are affecting the demand of medical care is illness events where the sickest patients will demand more medical care, holding everything else constant. That is, sicker people are price inelastic relative to the more healthy patients. As shown in figure 2.2, whenever the illness event becomes more serious, the demand curve of medical care shifts outward and become steeper.

Figure 2.2: The Effect of Different Illness Levels on Demand of Medical Care.
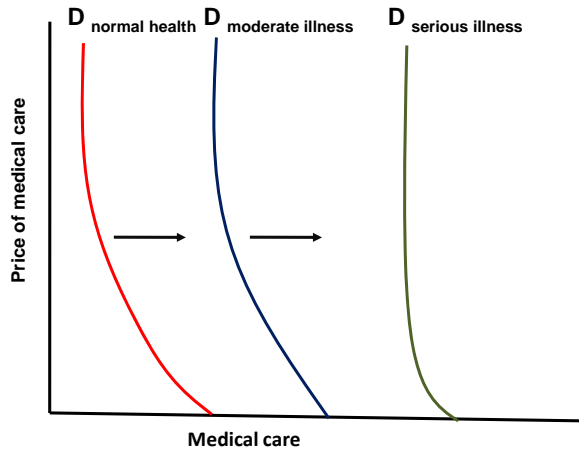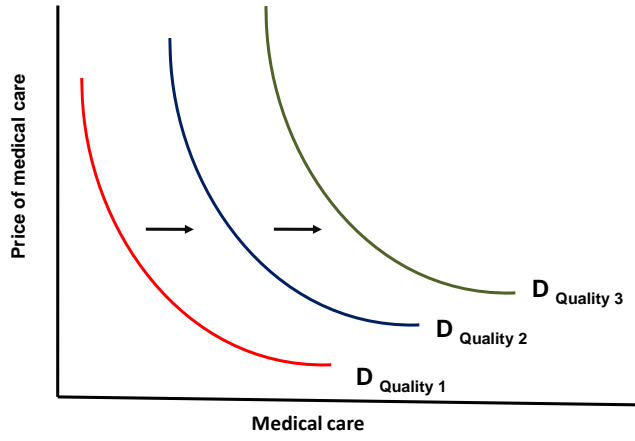

Source: Phelps, C. E. (2003:109)

2.2.3 The Insurance Effect on Medical Care Demand

Health insurance is one of the factors affecting the demand for medical care where it decreases the price paid by patients on their medical care. This health insurance has various forms. Some forms of insurance could be represented in deductibles, and copayments. Deductibles are a fixed amount paid in advance by the consumer on medical bills. On the other hand; copayments represent shared payments between the insurance company and the customer.

2.2.4 The Effect of Quality in the Demand of Care

The quality of medical care is judged according to different basis. One of them is the quality of the office visits to doctors since the patients are evaluating duration of time the doctor or the sub specialized doctor spends with his patients as a measure of the medical care quality. For the hospital, the quality of medical care could be based on the quality of food, the staff friendliness, in addition to other aspects. If the quality of the service is high, then this indicates high quality of medical care. Therefore, the higher the quality offered, the higher the patients' willingness to pay which is reflected by higher demand.

Figure 2.3: The Effect of Quality on Demand of Medical Care

Source: Phelps, C. E. (2003:128)

3   Application: The Price Discrimation Policy of Pfizer

In this chapter, the focus is studying the relationship between the price elasticity of demand and the prices of medicines in the U.S, and Egypt, as well as, the factors that are affecting the price elasticity of demand to certain drugs. As a result, such factors could affect the firms' decision of setting different prices to the populations.

Lipitor and Viagra have been chosen where they are produced by Pfizer which was a pioneer in introducing them to the industry. This insures that the study has chosen a case of monopoly to be able to study the theory of price discrimination since it is one of the conditions for price discrimination strategy. According to such facts, there is an assumption that Pfizer is practicing third degree price discrimination strategy among the U.S and Egypt.

3.1   Market of Lipitor

Lipitor is a medicine that is used to cure high cholesterol level in the blood. It is a drug introduced by Pfizer and it is considered the best selling pharmaceutical drug that heals cholesterol all over the world. Its main target is reducing the blood cholesterol and as a result preventing heart attacks, cardiovascular events, and strokes (where the later diseases are caused by the elevated blood cholesterol). Beside its ability of reducing the LDL-C, it is able to raise the HDL-C[1] (Pfizer Ireland Pharmaceuticals 2009).

According to my research, I found that Pfizer is charging the Americans higher prices than the Egyptians where the price for one pill of Lipitor 10mg in the U.S. is $ 1.5 compared to only $1[2] in Egypt. For observing which country's patients is more elastic, the relation between price elasticity of demand in America relative to Egypt has been calculated using the prices set for each country as follows in equation 3.1. which is a condition for third-degree price discrimination :

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[1]   LDL-C is the bad cholesterol and HDL-C is the good cholesterol

[2]   In Egypt, the price of 7 pills is 40 L.E. which means that the price per pill is 5.7 L.E. Since we are measuring the prices in US $, therefore I converted the 5.7 L.E. into US $ using the exchange rate in 2006 5.725L.E/US$. This means that the price of one pill of Lipitor in Egypt equals 0.998 $\cong$ 1US$

$$(3.1) \qquad \frac{P_{U.S.}}{P_{Egy}} = \frac{1 + \dfrac{1}{\varepsilon_{Egy}}}{1 + \dfrac{1}{\varepsilon_{U.S.}}} \quad \Leftrightarrow \quad \frac{1.5}{1} = \frac{1 + \dfrac{1}{\varepsilon_{Egy}}}{1 + \dfrac{1}{\varepsilon_{U.S.}}}$$

Re-arranging the price of Viagra in the U.S. and Egypt, the relation between the price elasticities is as follows:

$$(3.2) \qquad \varepsilon_{Egy} = \frac{\varepsilon_{U.S.}}{0.5\,\varepsilon_{U.S.} + 1.5} \quad .$$

As it is observed in equation (3.2) which shows the relation between the price elasticity of Egyptian demand and the price elasticity of American demand on Lipitor, Egyptians are more sensitive to price than Americans. If we assumed that Americans' price elasticity is -1.5[3], the Egyptians' price elasticity will be -2. This shows that the price elasticity of American's demand is less than the price elasticity of the Egyptians. A visualization of equation 3.2 is provided in Figure 3.1.

Of course, there are many factors that must be taken into consideration which lead to this result, some are general factors that could be applicable for analyzing any good, while others are applicable only for medical goods, and others are specific for the patients who are demanding Lipitor. These factors could be: the difference in the GDP per capita, in the public expenditure on education as % of GDP, in the percentage of obesity patients between countries, as well as other factors.

One of these general factors is the GDP per capita[4]. According to the UNICEF, the GDP per capita of US and Egypt in 2006 are \$43,968 and \$4,953, respectively. This confirms that there is a negative relationship between the GDP per capita and the price elasticity of demand.

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[3] The negative sign is for the inverse relationship between the price and the quantity

[4] GDP per capita: It is the value of goods and services produced per person in the country.

Figure 3.1: The Ratio between the Price Elasticity of Demand for Americans and Egyptians for Lipitor

Another important factor that would affect the patients' sensitivity to drugs' prices is the public expenditure on education as % of GDP. According to UNESCO, the public expenditure on education as % of GDP in the United States and Egypt is 5.5 and 3.8, respectively. This factor is linked to the pharmaceutical industry as it indicates the patients' awareness of diseases and their seriousness on their health. Thus, the higher education level would lead to more awareness which as a result will be reflected on less sensitivity to changes in drugs' prices. With reference to UNESCO statistics, the higher the public expenditure on education is, the lower the price elasticity of demand will be.

One of the most remarkable indicators for the price elasticity of demand to Lipitor is the percentage of obesity in patients. According to Willey (2009), obesity and overweight are one of the main reasons that lead to high cholesterol levels in the blood. Therefore, obesity must be taken into consideration since it is affecting the elasticity of demand of Lipitor directly because Lipitor is targeting the reduction of blood cholesterol.

According to WHO (2009), the percentage of obese adults in the United States and Egypt in 2006, whose age are greater than or equal thirty-years old, are 33.90 and 30.30,

respectively. Of course, these percentages indicate why Americans are less sensitive to the changes in the price of Lipitor relative to the Egyptians, where in the U.S. the percentage of the adults facing an obesity problem are greater than the percentage of the adults who have faced the same illness in Egypt.

In addition, another essential factor that leads to lower price sensitivity of Americans' for Lipitor which is their eating habits. Their food trends in per capita consumption[5], represented in red meat, eggs, as well as, animal fat (like butter, beef tallow and lard) which are high-cholesterol and high-food categories (Ippolito and Mathios 1999:198).

Also, Americans are consuming large amounts of food obtained away from home. Such food contains high percentage of fats and low percentage of calcium and fiber relative to the home food (Lin, Guthrie and Frazao 1999: 214). As well, eating away from home leads people eating more and/or eating food contains high calories levels. This is considered an intensive dose of calories where each of these actions provides about 1.26% of total calories (Lin et al. 1999: 222).

This reflects the importance of the illness events and eating habits that could affect the sensitivity of populations to the price of medication where more serious illness events lead to less price elasticity of demand as it is observed in figure 3.1. Therefore, the price of Lipitor in the U.S. is higher than it in Egypt.

3.2   Market of Viagra

It is a medicine produced by Pfizer too. It is used to find a cure for a sexual dysfunction in men which is characterized by disability of maintaining an erection that is sufficient for satisfactory sexual performance (Wikipedia Contributors).

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[5] Per capita consumption is the division of the total food disappearance over the total population (Ippolito and Mathios 1999:197).

Figure 3.2: The Ratio between The Price Elasticity of Demand for Americans and Egyptians for Viagra
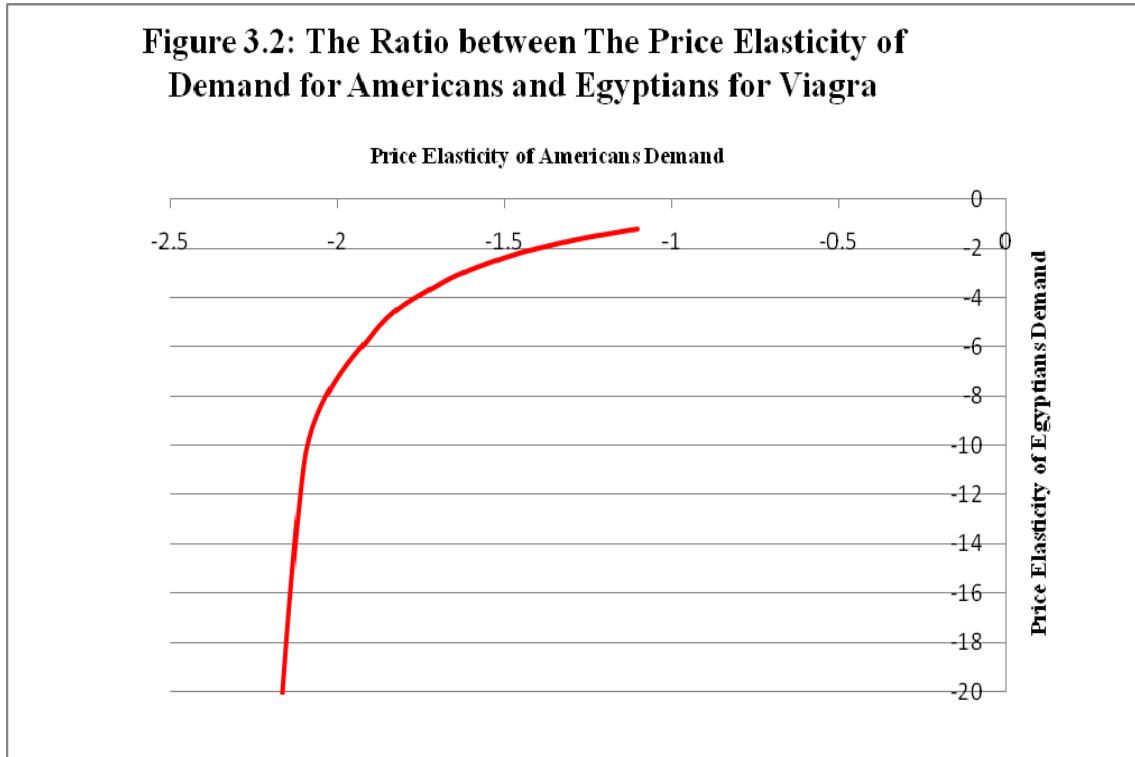
Pfizer is charging the Americans a higher price than the Egyptians, where the price for one pill 50mg of Viagra in the U.S. is $5.75 as opposed to $5[6] in Egypt. It is useful calculate the relation between price elasticity of demand in America relative to Egypt in order to indicate which country is more elastic (as observed for Lipitor). That will be performed using equation 3.1 which is a condition for third-degree price discrimination:

$$(3.3) \qquad \frac{P_{U.S.}}{P_{Egy}} = \frac{1 + \dfrac{1}{\varepsilon_{Egy}}}{1 + \dfrac{1}{\varepsilon_{U.S.}}} \quad \Leftrightarrow \quad \frac{8.66}{5} = \frac{1 + \dfrac{1}{\varepsilon_{Egy}}}{1 + \dfrac{1}{\varepsilon_{U.S.}}}$$

Re-arranging the price of Viagra in the U.S. and Egypt, the relation between $\varepsilon_{U.s.} and \varepsilon_{Egy}$ is as follows:

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[6] In Egypt, the price of 10 pills is 40 L.E. which means that the price per pill is 13.5 L.E. Since we are measuring the prices in US $, therefore I converted the 5.7 L.E. into US $ using the exchange rate in 2006 5.725L.E/US$. This means that the price of one pill of Lipitor marketed in Egypt equals 2.36US$

$$(3.4) \qquad \varepsilon_{Egy} = \frac{5 \, \varepsilon_{U.S.}}{3.66 \, \varepsilon_{U.S.} + 8.66}$$

The results from the calculation show that the price elasticity of Americans' demand is less than the price elasticity of Egyptians' demand (figure 3.2).

Based on equation (3.4) which shows the relation between the price elasticity of Egyptians' demand and the price elasticity of Americans' demand on Viagra; it is evident that Egyptians are more sensitive to price than Americans. If we assumed the Americans' price elasticity is -1.5, the Egyptians' price elasticity will be -2.36.

This result is caused by many factors. Some has been already measured before for Lipitor such as the GDP per capita and the public expenditure on education as % of GDP. However; for more accuracy and valid analysis, some specific indicators must be taken into consideration for Viagra specifically. Since Viagra is used to find a cure for a sexual dysfunction in men, there are physical and psychological causes for such disease that must be considered. Physical factors could be diabetes, alcoholism, and others. However, the psychological factors could include stress, anxiety, and depression beside others (Medicine Net), especially that some reports have stated that Viagra is mostly used by those who have sexual disorders who are schizophrenic.

For the physical factors, this study will focus on diabetes since it is a common disease in Egypt and United States relative to the other physical factors. This is shown by many studies such as Perlman (2007) who showed that a high percentage of erectile dysfunction is caused by diabetes for 35% to 75% of men. For the diabetic patients, high blood sugar leads to damage in their blood vessels and nerve system which as a result affects sexual response negatively. This blood vessel damage hinders nitric oxide liberates. Low levels of nitric oxide leads to limitation of blood vessels which as a result leads to low blood flow to the penis. Of course, there must be some indicators for the low price elasticity of the Americans relative to the Egyptians. Average annual incidence rate of diagnosed diabetes patients among adults of United States between 2005 and 2007 was 9.1 (Kaiser Family Foundation), relative to 7.2%, the percentage of diabetes prevalence in Egypt in 2006 (WHO 2009). Therefore, such rates play a main role behind this difference in sensitivity to the price of Viagra and show why Americans

could be less sensitive to the changes of the price than Egyptians because the latter are facing lower diabetes than the Americans.

Regarding psychological factors, the study focused on the depression as one of the mental diseases that could lead to sexual dysfunction in men. According to Zemishlany and Weizman (2008: 94), harshness of depression and anxiety is reflected in libido loss. Furthermore, the majority of the patients suffering from depression face a problem of a reduction in sexual interest. Therefore, depression is an additional factor must be taken into consideration for studying the market of Viagra.

As it is observed for diabetes as one of the physical factors that is affecting the difference in the price elasticity for demanding Viagra, it must be observed for depression, too as a psychological factor. According to a study by National Institute of Mental health (2010), around 14.8 million Americans are having depressive disorder.

On the other hand, only 1.2 million Egyptians are suffering from depression according to the study of Abdel-Salam (2009). Such studies reflect why Egyptians are more sensitive to the changes in the price of Viagra than Americans, because they are suffering lower depression rates than Americans, leading to as a result lower sexual dysfunction in Egypt relative to the U.S.

Last but not least, the relation between the price elasticity of demand for Americans and Egyptians for Lipitor and Viagra cannot be ignored where it proves the importance of illness event in the pricing and consumption decisions. Earlier in this study, it was indicated that at a given price elasticity of Americans' demand, the price elasticity of Egyptians' demand is much higher for both drugs. However; Figure 3.3, in addition, observes that the curve of Lipitor (the red curve) is much steeper than the curve of the Viagra (the blue curve) because the prices charged for Lipitor are low relative to the prices of Viagra in both countries. This shows that the seriousness of the illness play a crucial role in the price charged for the drug, as well as the price elasticity of demand for the drug.

This is because patients suffering from the high cholesterol level in their blood are considering Lipitor as a fundamental drug because high levels of cholesterol leads to a

high probability of heart attack and stroke. On the other hand, patients who are sexually dysfunction can survive without Viagra because if their sexual problem has not been solved, this will not lead to any vital disease. That is why the price charged for Lipitor is less than the one charged for Viagra.

Figure 3.3: The Ratio between the Price Elasticity of Demand for Americans and Egyptians for Lipitor and Viagra

Therefore, pharmaceutical firms must take the illness events into consideration when setting the price for their drugs because these different illnesses affect the sensitivity of the patients to the changes in the price. As mentioned before, the more serious disease, the less the price elasticity of drugs' demand. This is not the only factor but the most important one among the others.

4   Conclusion

The main aim of this paper is studying the price discrimination in the pharmaceutical industry; therefore, there was a focus on analyzing the medical and economical reasons that cause a variance in the price elasticity of patients' demand to drugs between Egypt and United States of America specifically.

First, there was a brief explanation of price discrimination and its different degrees, in addition to the focus on the pharmaceutical industry. Then, there was focus on analyzing the main factors that could lead to a variance among the patients' sensitivity to changes in drugs' prices, which leads to the usage of price discrimination strategy by pharmaceutical firms. Second, such phenomena on two drugs produced by Pfizer, which are Lipitor and Viagra, have been empirically studied.

Under the assumption that Pfizer is discriminating between the U.S. and Egypt where it charges Egyptians lower price than Americans for both drugs, results of the study showed that Egyptians are more price elastic for demanding both drugs than Americans. This could be attributed to different reasons such as higher GDP per capita, more public expenditure on education as % of GDP, higher obesity level, higher prevalence of diabetes and depression in the U.S. relative to Egypt.

Finally, pharmaceutical firms must take the seriousness of illness events into consideration when setting the price for their drugs because different illnesses affect the sensitivity of the patients to the changes in the price. Such illnesses are the most crucial factor in the field of pharmaceuticals specifically.

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