

# PHARMACEUTICAL PRICE REGULATION IN THE THEORY OF REDISTRIBUTION SYSTEMS

[Farmaceutická cenová regulace v teorii redistribučních systémů]

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**Abstract:** Nowadays, a firm has to, not only, follow the outside environment and predominantly its field environment where it constantly maps customers' behaviour, but the firm has to also perceive the inside environment. Firm price making represents the key role. This paper describes pharmaceutical market and its rules of price making. As remedies should be available to anyone, it is obvious that the market is regulated by state. Products are divided into groups according to their prices. The groups are identified by the highest possible percentage of margin that can be made by a particular product. On the basis of publicly available data this paper analyses behaviour of producers and distributors and looks for similar characteristics of such behaviour. The goal of this article is to analyse current pharmaceutical market in relation with regulated prices and on this basis to describe optimal profit margin on this market. Today's economy results from more or less theoretical findings that cannot be fully compatible with economic reality. This situation is illustrated by game theory and consequently arising theory of redistribution systems. When creating theoretical visions, it is necessary to go basically from known patterns of real economy. This paper is also focused on practical usage of game theory and theory of redistribution systems on pharmaceutical market through research of redistribution of regulated margin between various subjects of supply chain.

**Keywords:** optimal profit margin, pharmaceutical market, profit margin, regulated margin, theory of redistribution systems.

**JEL classification:** D49, L50, M29

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## Introduction

Pricing and profit margin is one of the important parts in the business strategy creating. Therefore it is desirable to pay attention to the price issue. Fuchs (1999) generally says about prices that the importance of the prices is not tied to the price itself, but to consequences that the price has and its movement for behaviour of subjects in the economy and the economy itself.

The product price is an element of the marketing mix and a meaningful aspect of microeconomic equilibrium. Marketers need to be concerned with the fact whether the price information is clearly communicated to the consumers and whether consumers remember and use the price information as the marketers intended (Wiggins, Manes, 2009). "Pharmaceutical pricing behaviour has attracted scrutiny from both policy makers and academic economists" (Xia, 2005).

Product pricing and profit margins is influenced by many factors. This paper focuses on product pricing and profit margins on pharmaceutical market. The research shows that the pharmaceutical pricing is influenced by the statutory regulation of prices, so that space exploration is growing in importance.

The subject of this paper is to focus on one method of pricing by profit margins. Based on literature review, the main aim of this paper is to analyse and raise awareness of the regulated price in an environment of pharmaceutical products, the individual articles in trade and pharmacy chain and to determine an optimal profit margin on the pharmaceutical market. Another aim of this paper is to apply the basic principles of the theory of redistribution systems in relation to production and redistribution of profit margins on pharmaceutical market.

## **1 Formulation of the problem**

To determine the optimal profit margin, it is necessary to describe a concept of profit margin, find out what price policy and pricing strategies is that firms can take advantage of the market and what factors may influence the decision when selecting pricing strategy in connection with the determination of profit margins.

In general, profit margins can be defined as net profit expressed as a percentage of sales. In economic practice, the optimal setting of margins is not easy, but it is the formula of many unknowns. It should be noted that the price affects a number of factors, such as supply and demand, competition, the purchasing power of customers, the region, the season of sale, etc.

### **1.1 Regulated prices on pharmaceutical market**

“The pharmaceutical industry is one of the world’s most research-intensive industries, generating new drugs that satisfy vital consumer needs in health care by saving lives and significantly increasing quality of life. In the pharmaceutical industry, there are market imperfections on both the demand and supply sides. As a result, the pharmaceutical industry is among the most heavily regulated industries” (Aysegul, 2007).

Drugs and their prices and sales are regulated in the Czech Republic. The creations of maximum prices are regulated by the Ministry of Health of the Czech Republic (MHCZ) and the State Institute for Drug Control (SIDC).

The market for drugs and medicines are divided in terms of pricing into the three groups (SIDC, 2011):

- drugs and medicines fully covered by public health insurance,
- drugs and medicines partially covered by public health insurance,
- medicines and medicinal products fixed to medical prescription fully covered by the patient,
- OTC medicines.

The first three groups are fixed to medical prescription but there are drugs that a patient may receive both with prescription and purchased freely. Price regulation is applicable to any medicines or food for special medical purposes; they are fully or partially covered by public health insurance.

The basis for determining the price of a medicinal product is cost price. The subject of price regulation is cost prices and production costs for business performance. For products that are fixed to this price control the regulation of maximum price is determined. This means

any medicine cannot be sold at a price higher than the officially fixed maximum price but the pharmacy at its discretion may reduce the maximum price. (Pharmacy Napravil, 2011)

“The aim of regulation and also the main problem is to determine a reasonable level of profit for businesses, ensuring a sufficient quality of service provided to customers at cost-effective, encourage future investment, to provide resources for rehabilitation of networks and further enhance the effectiveness for customers.” (Sedláček, Valouch, 2009)

“The regulation of the pharmaceutical market is currently the responsibility of individual countries. However, it is believed that, in the future, regulations will be harmonised throughout the whole EU area. Regulatory strategies are generally well known, however, in order to facilitate the harmonisation process, it is necessary for stakeholders to understand the various levels and degrees of institutional involvement and responsibilities in different countries.” (Davidová et al., 2008)

The EU countries closely regulate pharmaceutical prices, whereas the US does not. According to Golec and Vernon (2010), the surveys show that the EU firms reach lower profit, earn lower stock returns and spend less on R&D in pharmaceutical market with strict price regulation than the US firms without any regulations. Given the EU’s restrictive price regulations, one would expect the EU firms to be more negatively affected by price regulation than the US firms because proportionately more of their revenue is likely to come from the EU. This survey illustrates impact on whole pharmaceutical market.

Another article shows efficiency of price regulation on economics and various tools of price regulation in the EU countries. “In sum, the regulation of pharmaceutical prices exerts a negative influence on allocation of firm resources towards R&D activities.” (Golec, Vernon, HUGHEN, 2006)

Price regulators must choose medications that can be paid from funds which are available for the public sector. Drugs are divided into groups, such flu medications, high blood pressure medications, diabetes, etc. We can find fully paid medicaments in each of these groups and we can also find at drugs with greater or lesser surcharge.

Introduced margin is divided among all levels of the trading system. In most cases, the manufacturer or importer, wholesaler - distributor of pharmaceuticals and retailers – pharmacy are involved to final production of profit margin. The maximum price or mark-up may not be exceeded. Maximum mark-up pricing by zones are shown in the following table according to the Ministry of Health of the Czech Republic (2011) The table 1 shows that the medicines at lower price levels may reach a percentage of higher margin, which decreases with increasing price.

**Table 1:** Regulated profit margin for pharmaceutical products

Production zone	Cost price from	Cost price to	Profit Margin
1	0.00	150.00	36 %
2	150.01	300.00	33 %
3	300.01	500.00	24 %
4	500.01	1,000.00	20 %
5	1,000.00	2,500.00	17 %
6	2,500.01	5,000.00	14%
7	5,000.01	10,000.00	6 %
8	10,000.01	and more	5 %

Source: Personal research according to the Ministry of Health of the Czech Republic (2011)

## **1.2 Pricing policy of pharmacies**

Due to the fact that the prices of medicines are intended by laws and regulations only to maximum prices of drugs, the pricing and the amount of margin issues are involved by business entities, which are allowed to move within that price range. The core is designed only to set a maximum price, which shall not be exceeding over the percentage amount of margins.

On the Czech pharmaceutical market, there are three business levels:

- the manufacturer or importer,
- wholesaler and distributor of pharmaceuticals,
- the end-consumer sales - pharmacy.

In terms of business strategy, each participating business entity can move within the set margins up to maximum regulated prices. This means that the price of products offered to the distributors and pharmacies may also vary. In the Czech Republic there are currently operating four large distribution companies with drugs:

- Phoenix,
- GEHE,
- Alians UniChem,
- Pharmos.

Before 2000 there were around 20 distribution companies operating on the market but due to strong competitive pressure only 4 strongest of them maintained. They chose effective tactics such as unbeatable low margins, enabling them to gain a competitive advantage. It depends on the conditions under which a wholesaler buys from the manufacturers and consequently the conditions provided to pharmacies. The Czech Republic has developed four market-sized companies owning tens to hundreds of pharmacies (as network of pharmacies). Therefore they are able to achieve the lower pharmaceutical price thanks to high-volume orders. Quantitative margin means that taking a number of items as a bonus, you can get more units for free - such as 10 + 1, etc. Other business tactics are actions of wholesalers, who supply over a period of a select group of products with so-called zero margins. It must be noted that this price advantage usually involves producers and also importers. Cheaper wholesale conditions are reflected in retail prices.

The best known and largest pharmacies are:

- Dr. Max,
- Lloyds,
- Pharmaland.

We first named Dr. Max, which currently has the largest network of pharmacies, exceeding the number 170, is known for its pricing policy. They are reaching benefits not only to wholesalers, as well as manufacturers due to purchasing and selling large quantities of goods. Subsequently, they offer goods to its customers at lower prices, require less additional payments for prescription drugs and give to its customers and consumers cards entitling them to additional benefits for future purchases. This amount of benefits can reach higher number of returning customers and ensure an increasing customer base.

In order to increase sales outside the favorable margins, they get bonuses from manufacturers and others, such as the so-called rack-payment, it means placing their products in a more advantageous position in the pharmacy and offering them to their preferred customers. For

example we can mention some of the major players in the pharmaceutical market: Bayer, Pfizer, Zentiva, etc. It can be said that the large chain of pharmacies use similar strategy like supermarkets that are able to dictate conditions.

The most of Czech pharmacies can reach their profit margin to the maximum allowable margin but do not do it. Lower profit margin than maximum allowable margin can be very effective tool of competing struggle. Here is the question why the final link in supply chain does not make use of this option. There are other factors that have effect such as competitive pressures, operating expenses and seasonal fluctuations.

“In real conditions in the markets of imperfect competition, unequal status of participants cannot be achieved and some of them can get a premium (monopoly) position that allows them to gain the whole range of industries.” (Sedláček, Valouch, 2009)

“In some cases, the output of services may be not enough capital intensive that its bid may respond to changes in demand very quickly and conditions for providing services to the market are imperfect competition (its production more or less affects the price of the product). It is expected that the benefits in introduction of the new demanded products will be eliminated especially for this type of economic activity by the emergence of competitors.” (Paseková, 2005)

## 2 Solving of the problem

Solving of the problem is based on a case study, where, for illustration, three medicines were chosen to illustrate the regularity of competition on pharmaceutical market. The case study mainly consists of general and internal information and acknowledgement about Czech pharmaceutical market. Table no. 2 shows the progress from producer to end consumer. The manufacturer in this case Bayer and the wholesalers represents one of the largest distributors of pharmaceuticals Phoenix.

Drugs get to the end consumer through pharmacies. For this purpose, there were chosen Dr. Max from companies showing the largest drugstore chain. For the research we chose one of the first pharmacies on the Internet called Lékárna.cz. Then there was selected Lékárna U Orla from the medium-sized city such as a representative of the average normal pharmacy. Numbers in the table confirm the fact about the distribution of medicines on Czech market. Final prices at pharmacies reveal that the lowest profit margin is set by Lékárna.cz. Arguably, it can compete with low cost through lower costs of its operations and sales.

**Table 2:** Price comparison for selected products in different pharmacies

Type of Company	Name of Company	Aspirin C 10 tbl.	Bepanthen 100g	Rennie 48 tbl.
Producer	Bayer	69,- CZK	201.30 CZK	59.80 CZK
Wholesaler	Phoenix	79,80 CZK	233,- CZK	69.20 CZK
Drugstore chain	Dr. Max	99,- CZK	269,- CZK	79,- CZK
Internet Pharmacy	Lékárna.cz	96,- CZK	260,- CZK	75,- CZK
Common Pharmacy	U Orla	103,- CZK	299,- CZK	86,- CZK

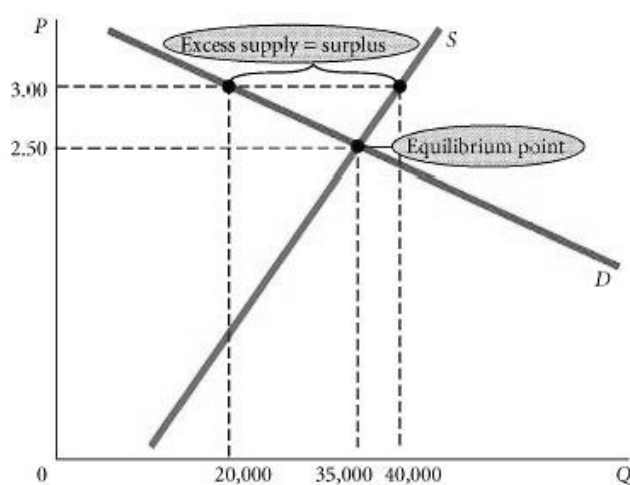
Source: Personal research

## 2.1 Searching for market equilibrium

We are looking for determining the optimum profit margins. We assumed the following graphic representation (figure 1) of the market towards equilibrium. The graphical representation shows that the optimal price of the final product is not at the level of 3.00 CZK, the price with a maximum profit margin, but 2.50 CZK, the price below the maximum profit margins. To change the market equilibrium, we need the factors that lead to changes in supply and demand.

This is the pharmaceutical market, affecting in particular the strong competitive pressure. Market equilibrium and hence the optimal profit margin for the pharmaceutical market is situated below the maximum limit for the profit margin.

**Figure 1:** Achieving of Market Equilibrium



Source: Pearson Education. *Market Equilibrium Demand, Supply and Market Equilibrium*. 2010. [quot. 2011-04-29]. Available from: [http://wps.prenhall.com/bp\\_casefair\\_econf\\_7e/30/7931/2030537.cw/index.html](http://wps.prenhall.com/bp_casefair_econf_7e/30/7931/2030537.cw/index.html).

## 3 Using the theory of redistribution systems

According to Valenčík the redistribution systems are defined as a “system in which there exists a redistribution of wages and output of particular participants of the system. As a typical cause of redistribution, the creation of fusion inside various systems including firms, organizations or institutions are taken” (Budinský, Valenčík, 2009)

The theory (Renesch, Valenčík, 2010; Valenčík, 2008) is based on the simplification of taking the form of elemental distribution system, including a limited number of three players in the system. The performances of players are divided in the ratio 6:4:2, all coalitions are possible and equal, all players are informed about what their performance is and the greater redistribution than paid for the performance, the less efficiency of the entire system.

Let's take a pharmaceutical market. Concerning the theory of redistribution system, it is consequently obvious that the above mentioned simplifications crash in this marketplace. On the basis of principles of pharmaceutical market many players are present and aggregate into various fusions. The performance of the players cannot be unambiguously divided into a special rate. The participants of the market do not have perfect information. It is also possible to disprove that the bigger difference in result redistribution is in rate wage. From the viewpoint of game theory and redistribution theory it is interesting to analyse the particular market participants including producers, distributors and a final part of the supply chain –

pharmacies. Therefore, it refers to a complex redistribution system where the participants can create new market regulation as well as refuse them.

There is a strong competition pressure on the pharmaceutical market, which creates interesting situations in light of game theory. The particular participants of a game compete not only among themselves but mainly by means of their negotiating power to other participants of the provider-consumer chain. When analysing the pharmacies situation, it is visible that the pharmacies form nets by means of changing present game regulations, for example Dr. Max, L'loyds or Pharmaland. By means of their competition instruments they create the fusion groups - thanks to these groups they create the basis for a complex redistribution system. For example Dr. Max disposes of 170 pharmacies in the Czech marketplace. It means this net gains a very strong position namely towards the producers and distributors within the framework of the whole economic game. Thanks to this fact this net can dictate prices of medicals to other participants of the trade chain. Then the net can negotiate very advantageous contraction conditions.

The result is that the chain pharmacies obtain dominant market positions and the other regulator pharmacies go bankrupt or are bought and overtaken. Distributors must either offer a special discount or lower their margin contrary to regular pharmacies. Therefore, a coalition group was formed. It creates an own price and the margins create regulations of the whole game.

A very similar and interesting situation is in the case of distribution firms. Thanks to very strong competition pressures a very limited number of these firms were naturally selected. These firms have very limited possibilities, especially concerning their own profit margin. The situation is further complicated by the fact that pharmacies may order goods directly from the producer. In the mentioned system there also exist online pharmacies. These pharmacies enter and significantly influence the game. Considering that most of the online pharmacies are owned by a chain or regular pharmacies, and then the described game strengthens in its importance. From the above mentioned it is clear that the main problem in pharmaceutical market consists in the regulated margin making process. Thanks to competition environment in this market and possibility to negotiate, it is possible to use some components from the theory of redistribution system. Data indicate only now that the particular parts of the trade chain watch the others and consequently create the condition for redistribution of profit margin. It is visible from table 3.

The subjects are divided into two basic groups, distributors and sellers. First, it is necessary to explain the term trade margin. Generally, it refers to a difference between the purchasing and selling price of the sold goods. In accounting the trade margin is counted as the difference between the final account state 604 - revenues from goods and final account state 504 – sold good. Trade margin does not mean profit. The pharmacy covers further costs out of the trade profit such as wages, premises lease, necessary services etc. This marker will not show whether the firm is profitable or not. It only shows the difference between sold and purchased goods, which is sufficient for the comparison.

**Table 3:** Comparison of margin

		Margin - single years				
Link/Year	Subject	2009	2008	2007	2006	Average margin
<b>Distributor</b>	<b>Phoenix</b>	3,63 %	3,59 %	3,70 %	3,55 %	3,62 %
	<b>Gehe Pharma Praha</b>	4,19 %	4,30 %	4,22 %	4,32 %	4,26 %
	<b>Pharmos</b>	2,62 %	2,58 %	2,99 %	3,13 %	2,83 %
<b>Seller</b>	<b>Lékárny Lloyds</b>	22,62 %	23,01 %	21,32 %	20,30 %	21,81 %
	<b>Česká lékárna</b>	20,81 %	21,51 %	19,18 %	0,00 %	20,50 %
	<b>Europharm</b>	20,31 %	20,12 %	19,40 %	0,00 %	19,94 %
	<b>Pears health cyber</b>	16,57 %	14,25 %	18,56 %	19,56 %	17,23 %

Source: Personal research according to justice.cz

From the average margin it is obvious that the trade margin of all subjects, of pharmacies as well as of distributors, deteriorate small volatility. It is evident that trade margins of Česká Lékárna and Europharm are almost equal. These pharmacies likely use the same price policy. They opted out the “middle direction” in the way not to discourage customers by their prices even by too low prices or too high prices.

It is expectable that people will tend to leave classical stone pharmacies due to lower margins in effect in lower prices. The chain pharmacies will reach higher turnover and bigger volume sales. Logically, their position in the market will strengthen and it will be very interesting to follow what the position of this marker towards distributors will be. We can also assume that the stronger pharmacies will press on producers, possibly on distributors to make further and further compromises and steps back when negotiating the price. This price setting is a “game” between distributors and pharmacies.

### Conclusion

The contribution of the work lies in the analysis and deduction of profit margins in the pharmacy. It also lies in factors that affects profit margins and the final price and in the optimal profit margins in the specific sector and justification of the actual situation in the price issues. Pricing of medicines and drugs is a complicated and sensitive issue of each developed country; it fits into the overall health system. All this is accompanied by the development of more effective new drugs, whose prices have also a rising trend.

The mentioned statement about the pharmaceutical market confirmed that the inter-organizational migration leads to the situation that most powerful players are concentrated on systems with the highest growth dynamics. Then they significantly contribute to this dynamics. Further, there will be much higher concentration of powerful players in the sphere related to performance. We can see a gradual decline in the so-called weaker pharmacies and the rise of a few belonging to the strongest, with the most progressive marketing and pricing strategies. Game theory and redistribution systems provide a possible basis for the development of methods of analysis in this area.

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