P. Dadashova, V. Khobta

ANALYSIS OF ADVERTISEMENT FINANCIAL EFFICIENCY IN PHARMACEUTICAL SPHERE

This paper defines the main trends of pharmaceutical market development in Ukraine and presents the most common measures of the demand stimulation for pharmaceutical products, primarily advertisement. The scope of the investigation included the analysis of the impact of these measures on the companies' revenue from sales, with the use of the panel data model, and the group of products with the low income level without advertisement was defined. The respective group was additionally analyzed with the use of cluster analysis that allowed for conclusion on the most efficient demand stimulation instruments. The obtained results show that in order to perform an efficient advertisement campaign, it is necessary to analyze statistical data regarding separate products sales with the application of the methods presented in the paper.

Introduction and Research Problem. Stimulations of the demand have always belonged to the most important drivers of the pharmaceutical companies' net income. Despite the limitation concerning their performance from the governmental bodies, enterprises are able to use specific measures of the demand stimulation that are able to provide a high level of sales and income respectively. Nowadays, the most common among such measures are advertisement and price regulation.

Recent publications analysis. The question of the advertisement efficiency in a wide sense has always been in the focus of research. In this regard, it is possible to mention the works of Lavidge and Steiner (2000) and Pergelova, Prior, and Rialp (2009). Both approaches substantiate the importance of the quantitative analysis. At the same time, the analysis focuses on the wide modern possibilities of the advertisement through the Internet. The analysis of pharmaceutical products advertisement measures was performed by Schwartz et al. (2009), Gagnon and Lexchin (2008). The latter mentioned paper emphasizes the question of possible tradeoffs between the spendings on the promotion and increase of medical efficiency in the modern USA companies. With the performed analysis, it was proven that pharmaceutical companies spend almost twice as much on promotion as they do on R & D. These figures show that the modern pharmaceutical market is actually a marketing-driven industry. It can be discussed whether this trend coincides with the direct need for efficient medical care. But as a fact it should be taken into account and argued for the efficient marketing campaign as a part of the companies' policy. In Ukraine, the questions of the pharmaceutical companies' advertisement measures were also in focus of researchers (Shabelnyk, 2014).

Research goal and questions. The goal of this paper is to present the results of the economical mathematical modelling usage for the analysis of demand stimulation measures' of the financial efficiency for pharmaceutical companies.

To reach this goal, several tasks were performed, which included the analysis of the pharmaceutical market trends in Ukraine, specification of the panel data regression model of the demand stimulation measures impact on revenues from sales, separation of the group of pharmaceutical products most dependant on the advertisement with the following efficient advertising policy development and with the use of cluster analysis.

Main findings. Due to the general destabilization of the Ukrainian economy, the pharmaceutical marked has experienced rapid and sharp changes during the recent years. The investigation of these changes is important for the understanding of the conditions of the companies' advertisements strategies. Although the pharmaceutical market is one of the most powerful segments of the national economic complex and, therefore, is stated as one of the national security priorities, the general decrease of 2014 influenced it a lot. After the decline in the real national income per capita and average wage, the purchasing power decreased. The specificity of the market and high share of the first need products led to the fact that, in spite of this, the sales in UAH equivalent continued to grow. And since 2016 all the main indicators show a positive dynamics including
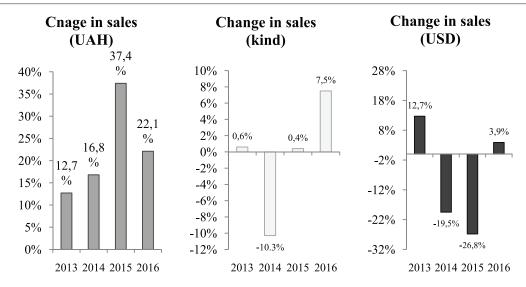
Fig. 1. Change in sales of pharmaceutical companies in Ukraine in UAH, kinds, and USD

the price stabilization. In 2016 not only the revenue of the market actors increased but also the absolute amounts of the production sold increased by 7.5 % compared to 0.4 % in 2015 (Fig. 1). Such dynamics can be a precondition of the pre-crisis sales level achievement in the short run perspective.
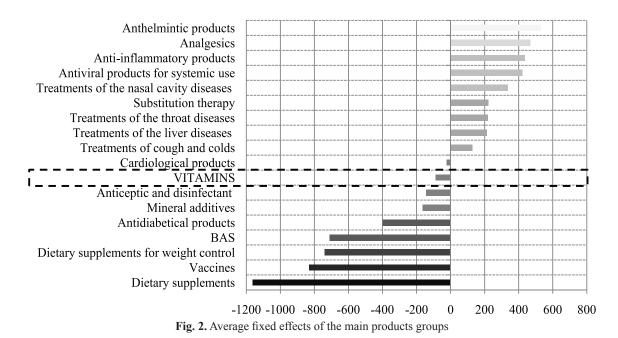
But for separate companies, a possibility to maintain a high level of sales depends not only on the market trends. It is also influenced by the ability to stimulate the demand on specific treatments with the use of the most popular measures, which are advertisement and price. Talking about the price as marketing instrument, it is necessary to mention that it is driven not only by the companies' decision but also by the costs of production, competitors' prices, and governmental regulation. Moreover, producers primarily regulate the wholesale prices, while the final decision regarding the retail prices is not always under their control. Hence, the prices can be both an effective and rather complex instrument to affect demand. Regarding the advertisement, it is necessary to separate its different types, such as on TV, through the Internet, radio, in print, as well as outdoor advertising and TV sponsorship. In order to estimate the efficiency of all mentioned demand

stimulation instruments, it is necessary to use economical modelling. The proposed approach is the panel data regression model which is built on retail company data regarding a wide range of pharmaceutical products (more than 1800 names) during 2011–2014. The generalized specification of the model can be presented through the equation:

$$Revenue_t = \beta_0 + \beta_1 Price_{t-1} + \beta_2 Press_{t-1} + \\ + \beta_3 Outdoor_{t-1} + \beta_4 Radio_{t-1} + \beta_5 TV\_s_{t-1} + \\ + \beta_6 TV_{t-1} + \beta_7 Internet_{t-1} + \varepsilon_t$$

where *Revenue* – amount of revenue from product sales, thousand UAH; *t* – period number; *Price* – product price, UAH; *Press* – amount of money spent on advertisement in press, thousand UAH; *Outdoor* – amount of money spent on outdoor advertisement, thousand UAH; *Radio* – amount of money spent on advertisement on radio, thousand UAH; *TV_s* – amount of money spent on TV sponsorship advertisement, thousand UAH; *TV* – amount of money spent on advertisement on TV, thousand UAH; *Internet* – amount of money spent on advertisement through Internet, thousand UAH; $\beta_0, \beta_1, ..., \beta_7$ – model coefficients which are presented in table 1 together with other modeling results.

Table 1. **Evaluation of the factors impact of the revenue from drug sales**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
β_0	502628.70	8.704441	57.74394	0.0000
$Price_{t-1}$	3851834.00	0.212026	18.16684	0.0000
$Press_{t-1}$	1.15	0.000110	10.39936	0.0000
$Outdoor_{t-1}$	2.80	0.000203	13.79897	0.0000
$Radio_{t-1}$	4.21	0.000204	2.390163	0.0168
TV_s_{t-1}	0.49	0.000166	11.99874	0.0000
TV_{t-1}	1.01	0.000013	79.87029	0.0000
$Internet_{t-1}$	2.00	0.000530	7.932568	0.0000

Fig. 2. Average fixed effects of the main products groups

89 % of the revenue change can be explained by the mentioned factors. As it can be proven by the estimation, all variables have a direct impact on the amount of revenues from the sales of each product. But the price makes the most significant impact on the revenue; its growth per 1 UAH changes revenues up to 3.9 thousands UAH. The most significant effect on the sales is from the advertisement on the radio and with the use of outdoor sources, which change the revenue by 4.2 and 2.8 UAH respectively per one additionally invested UAH. The same effects from other types of advertisement are as follow: 2 UAH – the Internet; 1.15 UAH – TV; 0.48 UAH – TV sponsorship.

As the model was built on the basis of all the types of pharmaceutical products, its results are generalized for the market: all the treatments and

companies. Such a generalization is important for the main trends evaluation and investigation. At the same time, for the detailed analysis it is possible to look more precisely at each group of products. For this purpose, the fixed effect for each product revenues estimated by the panel model was used that is presented in Fig. 2. These effects show a relative position of the product in respect to the revenue it can gain without any stimulation policies. According to the results, the product group that shows the worse effects comparing to others is vitamins. This conclusion is expected due to the features of this product. They cannot be directly classified as treatment, and, therefore cannot be named the first need goods. That is why the advertisement is so important for their realization. The same dependence on different advertisements
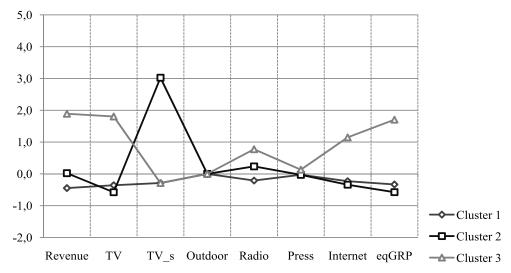

Fig. 3. Cluster means for the vitamins, where *eqGRP* – gross rating point which show the size of the advertisement campaign

was determined for dietary supplements, dietary supplements for weight control, bioactive supplements, and mineral additives, which are not intended directly for the diseases treatment, and, hence, their realization is primarily marketing-driven. As such, a significant dependence of the sales was found out for these groups of products; a detailed analysis of advertisement influence will be made for one of them: vitamins.

In order to make more detailed conclusions regarding the mentioned group of products – vitamins, the cluster analysis was performed. As the price level in many situations can depend not only on the producer decisions but also on competitors, retailers, and government, it is necessary to pay attention to the advertisement that currently is an unlimitedly available instrument of additional demand attraction. The cluster analysis results are presented in Fig. 3.

From the cluster analysis it is possible to make a conclusion that the representatives of the 3rd cluster are the most efficient in their performance. This group of the products has the highest amount of revenue. Moreover, it is possible to see which instruments in this regard are the drivers of such a result.

As it can be seen from the graph, the higher gross rating point (*eqGRP*) leads to the higher revenues. For the 3rd cluster, this high rating was reached with the use of TV primarily, the Internet and radio advertisement. Rather controversial are results of the 2nd cluster. A huge amount of investment into the TV sponsorship does not give an appropriate amount of brand recognition according to the GRP. But their level of revenues can be explained by the comparatively lower price level. The average price for products of this cluster is 60 UAH, while, for example, for the 3rd cluster the average price is 100 UAH. That is why these drugs can be afforded even by the consumers with a low income and purchasing power. That allows for the conclusion that a low price is able to provide the demand for the products and growth in revenue. At the same time, this strategy is much less efficient comparing to a wide advertisement campaign which gives a higher income for vitamin producers.

The next important step in the interpretation of the cluster analysis results is the investigation of the advertisement sources usage. The products of the 3rd cluster show that the most efficient for them are TV, the Internet, and radio advertisement. It is possible to notice that products in the 1st cluster spend more on the Internet and TV advertisement and, as a result, have a higher GPR than the products of the 2nd cluster.

It can be useful to look precisely at the radio advertisement, as the 3rd cluster vitamins use it comparatively more often than TV sponsorship or outdoor advertisement, for example. At the same time, the fact that this direction of demand stimulation is less effective can be shown by the difference between the 1st and 2nd clusters. The products of the 2nd cluster spend more on radio advertisement, but at the same time this does not compensate for their lower spendings on the other types of advertisement, and, therefore, these products show lower GRP and revenues. Hence, this type of advertisement loses its attractiveness for producers.

Outdoor advertisement and press are rarely used by the vitamin producers nowadays. The inefficiency of the TV sponsorship is also proven by the analysis of the 2nd cluster products that have low GRP despite its usage.

Conclusion. As a result of the performed research, first of all, the main trends of the Ukrainian pharmaceutical market were characterized, which allowed for the conclusion that it experienced restoration after the crisis period. With the growth of the general purchasing power, the possibilities of revenue increase arise for the producers. Therefore, the issue of the most efficient demand stimulation measures becomes more topical. To investigate the impact of different instruments of the demand, the panel data linear regression model was used. As it was shown, the price influenced the revenue. Due to the low elasticity of medical production as a first need goods to the change in price, the price increase leads to a higher revenue. But producers can be limited in their ability to control prices due to the legislation, the cost of materials, and competitors' actions. Therefore, the impact of different advertisement measures was estimated. For the pharmaceutical market as a whole, the most efficient are the spendings on the radio, outdoor, and the Internet advertisement. As these general conclusions can vary across product groups, the vitamins were investigated separately as a class with the comparatively low level of revenue without an additional demand stimulation. For this purpose, the cluster analysis was used. After this precise analysis, the previous conclusions can be supplemented with the fact that for the vitamins the most efficient are the Internet and TV advertisement. Moreover, the performed research showed the advantages of the economics modelling techniques for the determination of the efficient advertisement types for different products.

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Дадашова П. А., Хобта В. Ю.

АНАЛІЗ ФІНАНСОВОЇ ЕФЕКТИВНОСТІ РЕКЛАМНИХ ЗАХОДІВ У ФАРМАЦЕВТИЧНІЙ СФЕРІ

У статті визначено основні тенденції розвитку фармацевтичного ринку України, а також виокремлено найпоширеніші заходи стимулювання попиту на фармацевтичну продукцію, до яких насамперед належить реклама. У процесі дослідження було проаналізовано вплив цих факторів на виручку підприємства від реалізації на основі моделі панельних даних та виокремлено групу препаратів із незначним рівнем доходів без застосування рекламних заходів. Відповідну групу було додатково проаналізовано за допомогою кластерного аналізу, що дало змогу визначити найефективніші заходи стимулювання попиту. Отримані результати демонструють, що для проведення ефективної рекламної кампанії необхідно ґрунтовно аналізувати статистичні дані щодо реалізації окремих груп препаратів, для чого можуть бути використані представлені в роботі методи.

Ключові слова: фармацевтична продукція, рекламні заходи, моделі панельних даних, кластерний аналіз.