Vol. 9 No. 3, 2023
Baltic Journal of Economic Studies
DOI: https://doi.org/10.30525/2256-0742/2023-9-3-145-150

ANALYSIS OF TRENDS IN THE DEVELOPMENT OF THE PHARMACEUTICAL MARKET OF UKRAINE IN 2007–2021

Olga Mashchenko[1], Lyudmila Serhieieva[2], Ihor Shyshka[3]

Abstract. The *purpose of the paper* is to analyse the development trends in the retail market for pharmaceuticals in the national aspect for the period 2007–2021 and to identify changes in the trends caused by the COVID-19 pandemic. *Methodology*. The article analyses the main indicators of the development of the pharmaceutical market of Ukraine: sales volumes in the pharmacy network in value and physical terms for the period 2007–2021. Periods of growth at different speeds were identified (2007–2012; 2013–2015 and 2016–2019) using methods of regression analysis are used, namely: development of trend models with an assessment of their quality based on the calculation of the coefficient of determination R. *Results*. The paper conducts a trend analysis of the total monetary revenue in the pharmaceutical retail market of Ukraine; conducts an analysis of the volume of sales in kind and the dynamics of the average price per package; makes a forecast of the dynamics in the pharmaceutical retail market of Ukraine for 2020 and 2021. It also identifies changes in trends caused by the COVID-19 pandemic and offers measures for further development of the pharmaceutical market of Ukraine. Dynamics models were created for each period and a forecast for 2020–2021 was made on the basis of the model for the last period. The impact of the beginning of the COVID-19 pandemic was analysed, a decrease in sales volume in April 2020 was estimated (by 45.9% compared to the forecast), it was found that within 6 months the dynamics of the market recovered, which indicates the high adaptive properties of the system. *Practical implications.* A comparison of sales volume dynamics in Ukraine and the world for 15 years from 2007 to 2021 showed that sales volume in Ukraine is growing five times faster than in the world as a whole. This proves that in the pharmaceutical industry both manufacturers and pharmacy chains have been making excessive profits at the expense of consumers. *Value/originality.* Such a situation in the pharmaceutical industry requires the development of measures at the state level to curb the growth of prices and increase transparency in their formation.

Key words: pharmaceutical market, pharmaceutical industry, pharmacy chain, transparency, trend model.

JEL Classification: I11, C25

1. Introduction

The economic development of the healthcare sector is an important task of state economic management and requires thorough scientific research. The issue of the development of the strategy for the development of the health care sector of Ukraine is dedicated to the work of leading scientists, in particular, V. Ya. Naishtetik (Naishtetik, 2009), who offers economic ways of strategic development of the healthcare sector. The scientific researches of V. Bougrod and A. Dakal (Bougrod & Dakal, 2022) are aimed at a systematic study of the problems of the introduction of strategic in the health care system and the corresponding state policy, L. Stefanyshyn (Stefanyshyn, 2019) emphasizes the substantiation of theoretical provisions, the development of conceptual principles and practical recommendations for the formation of a system of strategic decisions at the microeconomic level of a health care institution. A. Rogovyi and L. Remniova (Rogovyi & Remniova, 2023) substantiated the theoretical principles of evaluation of the effectiveness of strategic management of the health care system.

An integral part of the healthcare sector is the pharmaceutical industry, which provides both the manufacture of medicines and their delivery and sale to the end user.

[1] Classic Private University, Ukraine *(corresponding author)*
E-mail: pokataeva.olga1978@gmail.com
ORCID: https://orcid.org/0000-0003-3897-6845
[2] Classic Private University, Ukraine
E-mail: lud.sergeeva@gmail.com
ORCID: https://orcid.org/0000-0003-3207-0698
[3] Classic Private University, Ukraine
E-mail: shyshka0908@gmail.com
ORCID: https://orcid.org/0009-0003-4365-8638

Justifying the choice of the strategy for the development of the pharmaceutical industry of Ukraine, O.V. Dorovskyi notes, in particular, that the threats to development are a significant share of imported medicines on the market and, in particular, the sharp increase in the cost of a standard package of medicines (Dorovskyi, 2014). The study by O. Pinyazhko et al. (Piniazhko, Zaliska, Ilyk & Stasiv, 2018) analyses the dynamics of drug sales in the short term (2015–2017). Against the background of positive price dynamics, one of the conclusions is the need to expand the list of medicines under the "Affordable Medicines" programme in order to reduce costs for patients.

In late 2021, the OECD (Organisation for Economic Co-operation and Development) conducted a study on the potential impact of greater price transparency on market dynamics (Barrenho & Lopert, 2022). The report emphasises the need for the international community to combine informational and organisational efforts to increase the transparency of pharmaceutical prices.

Atanu Saha and Heather Roberts analysed the dynamics of the market for originator and generic drugs and found both structural shifts, i.e., the growth of the share of generics in the pharmaceutical market, and an increase in the ratio of the price of generics to the price of originator drugs (Saha & Roberts, 2020).

Therefore, the question of analysing the dynamics of prices and sales volumes of medicines on the domestic market is an urgent scientific task.

2. Materials and Methods

The paper analyses the data on sales of medicines in the pharmacy network of Ukraine in monetary terms for the period 2007–2021 and in physical terms for the period 2013–2021 (Apteka weekly). Data on global sales volumes are shown in the table below.

To analyse the data, regression analysis methods are used, namely: development of trend models with an assessment of their quality based on the calculation of the R coefficient of determination.

The study was conducted on the basis of sales volume data in the pharmaceutical market of Ukraine for the period from 2007 to 2021. The data are presented in Figure 1.

3. Research Findings

The trend model is described by the equation $y = 58{,}26x - 634{,}50$. The interpretation of the model makes it possible to state that over 15 years the volume of sales has grown on average by 58.26 million hryvnias per month. Despite the sufficiently high quality of the model, which is confirmed by the value of the coefficient of determination $R^2 = 0{,}87$, Figure 1 shows that there were changes in the trend over fifteen years.

In the pharmacy network of Ukraine, the index of sales volume grew slowly in monetary terms in the period from 2007 to 2012, and its growth rate increased in 2013–2015, and the rapid growth of this index was observed in the period 2016–2019. Therefore, for a clearer presentation, a trend model is constructed for each period (Figures 2, 3, 4).

In 2020, there were shocking changes due to the start of the pandemic, so the period 2020–2021 is considered separately to assess both the impact of shocks and the ability of the system to recover.

Analysing the dynamics shown in Figure 2 (trend model is $y = 26{,}87x + 843{,}4$), t can be concluded that during this period the trend is quite stable, which is evidenced by the high quality of the model ($R^2 = 0{,}93$). The average monthly sales volume increased by almost 27 million UAH.

As can be seen from Figure 3, in the period 2013–2015 the trend has a larger angle of

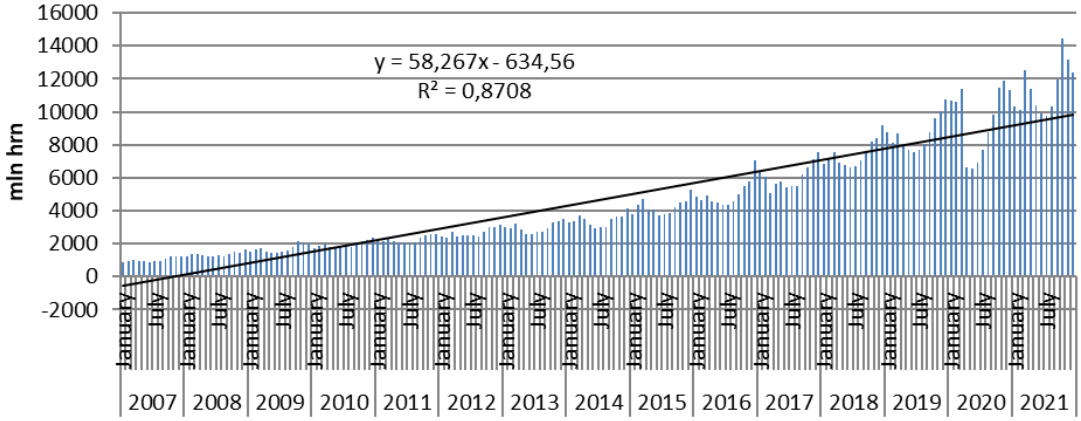

Figure 1. Sales in the Ukrainian pharmacy network in 2007–2021

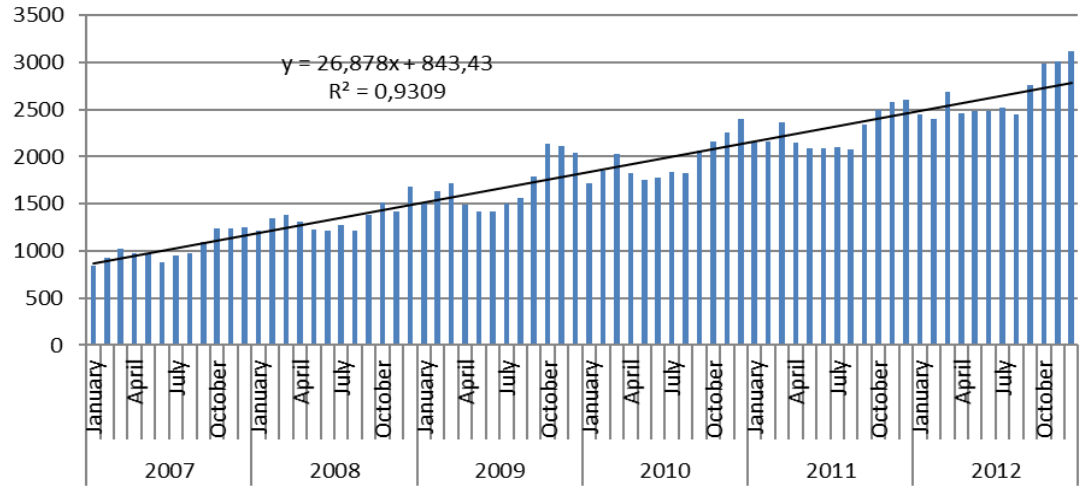

Figure 2. Sales in the Ukrainian pharmacy network in 2007–2012

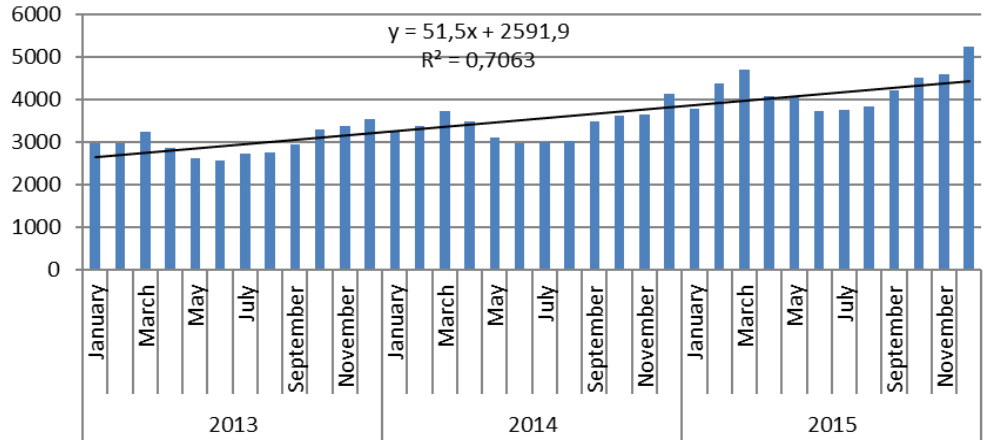

Figure 3. Sales in the Ukrainian pharmacy network in 2013–2015

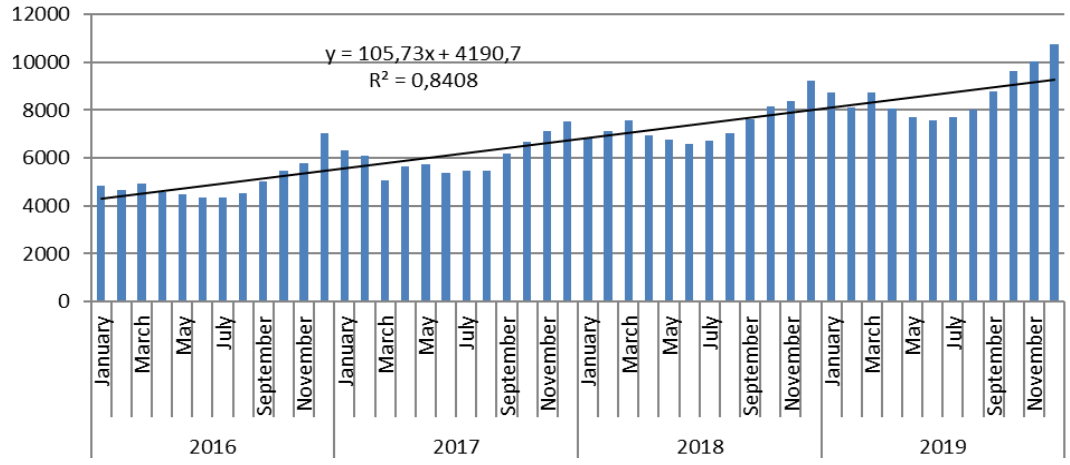

Figure 4. Sales in the Ukrainian pharmacy network in 2016–2019

inclination, i.e., the monthly sales volume increased by 51.54 million UAH, which is almost twice as much as the data of the previous six years.

Since the growth rate has accelerated in the four years from 2016 to 2019, it is necessary to build a trend model for this period (Figure 4). According to the data presented in Figure 4, the total volume of sales will grow by 105.7 million UAH per month.

For forecasting purposes, it is therefore more appropriate to use data from the last four years. The model shown in Figure 4 can thus be used to produce a trend forecast for 2020–2021.

Table 1
Summary of Trend Models

Observation period	Number of periods	Equation	R^2
01.2007-12.2021	180	$y = 58{,}26x - 634{,}5$	0,870
01.2007-12.2012	72	$y = 26{,}87x + 843{,}4$	0,930
01.2013-12.2015	36	$y = 51{,}50x + 2591{,}0$	0,706
01.2016-12.2019	48	$y = 105{,}7x + 4190{,}0$	0,840

Source: compiled by the authors

Summarised results for the trend models are presented in Table 1.

The forecast is based on the latest model for the years 2020–2021. By comparing the forecast with the data for this period, it is possible to assess the impact of the onset of the pandemic and the time needed to regain momentum (Figure 5).

It should be noted that every year, due to the influence of seasonal fluctuations between April and August, actual observations deviate from the trend forecast, but while in 2016–2019 this deviation in April did not exceed 4.5%, in 2020 it was 45.9%, meaning that the shock from the start of the pandemic and quarantine restrictions exceeded the influence of seasonal fluctuations by more than 10 times. However, the system proved to be quite adaptive. In September, six months later, the dynamics resumed.

In the preliminary analysis, trend models were constructed to confirm the rapid growth in the volume of pharmaceutical sales. The question then arises as to whether this growth is related to an increase in physical sales volumes or only to an increase in prices. To answer this question, consider the dynamics of sales volumes in physical terms (Figure 6).

As can be seen from Figure 6, there is no increase in sales. A minimum in sales volumes is observed in July 2014, which may be related to the temporary occupation of the Crimean peninsula and the beginning of anti-terrorist operations. There is also a decrease in physical sales at the beginning of the pandemic.

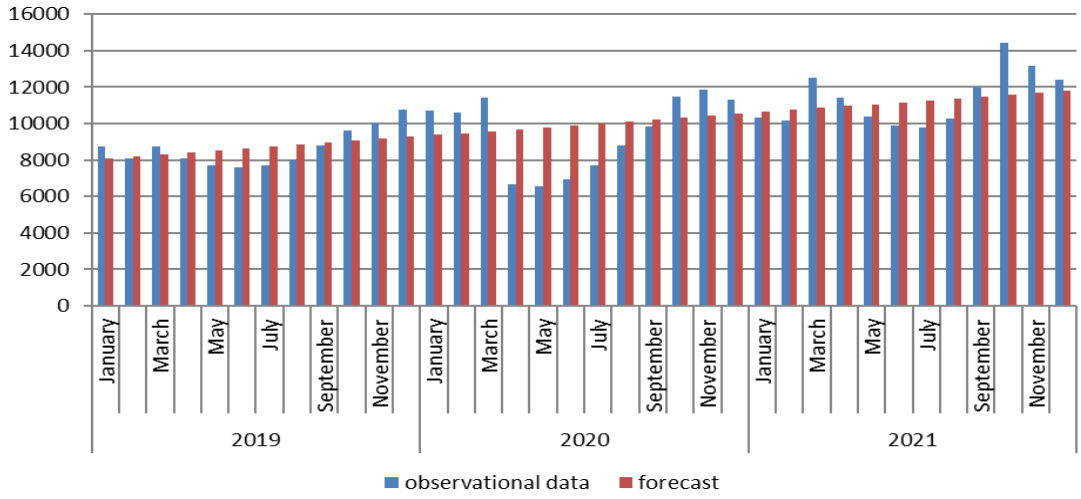

Figure 5. Comparison of sales in the pharmacy network of Ukraine for the period 2019–2021 with forecast values

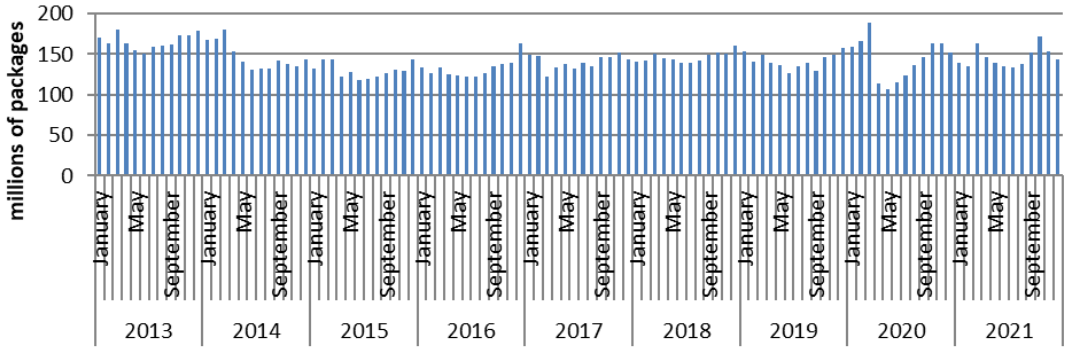

Figure 6. Sales in the pharmacy network of Ukraine in physical terms in 2013–2021

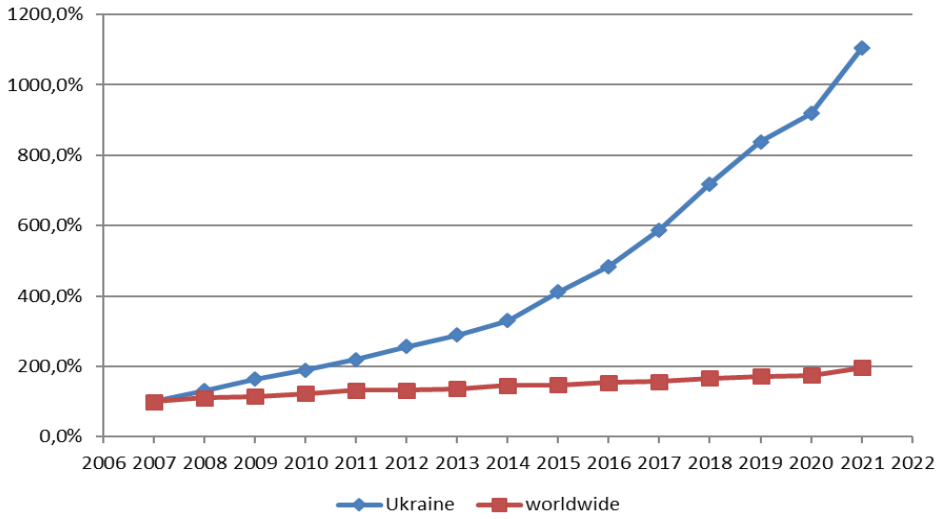

Figure 7. Sales in the pharmacy network in Ukraine and worldwide as a percentage of 2007

To answer the question of whether the trend of rising packaging prices is typical for the pharmaceutical industry globally or is it a feature of the Ukrainian economy, it is worth comparing the growth rates of annual sales data for the period from 007 to 2021. The base year was 2007. The result is shown in Figure 7.

Over 15 years, the volume of pharmaceutical sales in the world has increased almost twice, and in Ukraine it has increased 11 times. Thus, the volume of sales in Ukraine is growing 5 times faster than in the world, which indicates that the pharmaceutical industry, both manufacturers and pharmacy chains, are making excessive profits at the expense of consumers.

4. Conclusions

1. Over 12 years, from 2007 to the end of 2018, there has been an increase in sales in the Ukrainian pharmacy network.

2. Growth is occurring at different rates, so it is proposed to distinguish three periods: 2007–2012; 2013–2015; and 2016–2019.

3. The highest growth rates are observed in the latter period, so it is proposed to use a model based on 2016–2019 data for the forecast.

4. Due to the impact of the pandemic, there was a significant decline in sales in April 2020 (by 45.9% compared to the forecast), but the dynamics recovered within 6 months, which indicates the high adaptive properties of the system.

5. In terms of sales volume in physical terms, there was no growth in 2013–2015, with slow growth in 2016–2018, but the level of early 2014 was not reached by the end of 2018.

6. Comparing the dynamics of sales volumes in Ukraine with those in the world for 15 years from 2007 to 2021 shows that sales volumes in Ukraine grow 5 times faster than in the world, which proves that in the pharmaceutical industry both manufacturers and pharmacy chains have received excessive profits at the expense of consumers. Such a situation requires the development of measures at the state level to curb price growth and increase transparency in its formation.

References:

Naishtetik, V. Ya. (2009). *Economic problems and the concept of health care development in Ukraine*. Donetsk: O. Yu. Zaslavskyi. ISBN 978-617-7001-18-7

Bugro, V. I., & Dhakal, A. V. (2022). Strategic management in the sphere of health care of Ukraine. *Scientific perspectives. Series: Public administration,* vol. 3(21), pp. 10–21. DOI: https://doi.org/10.52058/2708-7530-2022-3(21)-10-21

Stefanyshyn, L. S. (2019). Theoretical and methodological foundations of strategic management of a health care facility. *Market infrastructure. Economy and management of the national economy,* vol. 30, pp. 77–83. Available at: http://www.market-infr.od.ua/journals/2019/30_2019_ukr/14.pdf

Rogovyi, A., & Remniova, L. (2023). Conceptual principles of strategic management in the field of health care. *Polissya Scientific Bulletin*, vol. 2 (25), pp. 20–32. DOI: https://doi.org/10.25140/2410-9576-2022-2(25)-20-32

Dorovskyi, O. V. (2014). *Development strategy of the pharmaceutical industry of Ukraine*. Kharkiv: INZHEK.

Piniazhko, O., Zaliska, O., Ilyk, R., & Stasiv, Kh.-O. (2018). Pharmaceutical system in Ukraine: implementation of external reference pricing, reimbursement programs and health technology assessment. *PHARMACIA*, vol. 65, 2, pp. 28–39.

Barrenho, E., & Lopert, R. (2022). Exploring the consequences of greater price transparency on the dynamics of pharmaceutical markets. *OECD Health Working Papers*, vol. 146. DOI: https://doi.org/10.1787/c9250e17-en

Atanu, Saha & Heather, Roberts (2020). Pharmaceutical industry's changing market dynamics. *International Journal of the Economics of Business*, vol. 27, issue 2, pp. 159–175. DOI: https://doi.org/10.1080/13571516.2020.1752044

Revenue of the worldwide pharmaceutical market from 2001 to 2022. Available at: https://www.statista.com/statistics/263102/pharmaceutical-market-worldwide-revenue-since-2001/

Received on: 30th of June, 2023
Accepted on: 08th of August, 2023
Published on: 25th of August, 2023