

# **THE ANALYSIS OF THE CORRELATION BETWEEN FINANCIAL AUTONOMY AND FINANCIAL EQUILIBRIUM OF THE PHARMACEUTICAL COMPANIES LISTED ON THE BUCHAREST STOCK EXCHANGE**

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*ABSTRACT: In the last years, the phenomena of instability and economic uncertainty have occurred more and more frequently in a society undergoing major changes. This aspect has been particularly prominent since 2008. With the advent of the economic and financial crisis, unexpected phenomena occurring within organizations have strengthened the idea of a more detailed analysis of the financial position so as to be able to determine the actual financial strategies needed by the companies within the analyzed industry. The aim of this article is to highlight the importance of balance and financial autonomy in the economic entities belonging to the pharmaceutical industry and listed on the Bucharest Stock Exchange. Our research is based on an analysis in time of the indicators of balance and financial stability over a period of six years, from 2008 until 2013, in order to draw a correlation between these two types of indicators with the help of Pearson's correlation coefficient.*

*Keywords: economic and financial crisis, financial position, balance, financial autonomy, Pearson's correlation coefficient*

*JEL Codes: G19, G39*

## **1. Introduction**

One of the few industries that, from a holistic perspective, are regarded as a real impetus for the global economy is the pharmaceutical industry. The drug market as a whole is one of the most successful and most balanced markets in the world ([www.lawg.ro](http://www.lawg.ro)).

Stability and financial autonomy can be considered key elements in the development of economic entities and of the society in general. To highlight the existence of a balance and financial autonomy, it is imperative to study the balance sheets of the analyzed company. Balance is the main tool needed in any economic and financial analysis, based on which certain indicators can be determined; thus, remedial decisions on short, medium and long term can be made in order to make it easier to detect and solve inconsistencies within the organization (N. Balteş ed. 2013).

Highlighting liquidity and solvency trends is a long studied and researched process within organizations (Berman J. K. & Knight, 2011), since, once these indicators have been determined, managerial and financial decisions with a strong impact on the future of businesses can be made. In a rapidly changing society facing an economic and financial crisis that leaves a deep imprint on national and international companies, the analysis of balance and financial stability is a prerequisite in adopting financial strategies within economic entities.

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## 2. Literature review

One of the most recent international approaches to balance and financial stability is detailed in the paper published in 2012, *Analysis for Financial Management*, written by a distinguished professor at the University of Washington, Robert Higgins. In this work, the rates of liquidity and financial stability are included in a comprehensive study on the main financial analysis indicators used by companies.

Furthermore, in their work, *Analiza economico-financiară a firmei (2014) [The Economic and Financial Analysis of a Company]*, Vasile Robu, Ion Anghel and Elena Șerban offer a more nuanced approach to liquidity, which consists, on the one hand, in the ability of an asset to be converted into cash, and, on the other hand, in the company's ability to meet its short-term payment obligations on due date. Developing this argument also requires determining solvency, which involves the ability of the economic entity to pay its medium-term and long-term debts. For the company considered to be solvable, it is imperative that there should be a positive value of the ability to pay debts; that is, the availability of liquid funds should be higher than the monetary obligations (N. Balteș & G. Minculete, 2013).

In her book, *Analiză și diagnostic financiar-conabil [Financial and Accounting Analysis and Diagnosis]*, Silvia Petrescu favours another approach to the development of this argument. Starting from the analysis of solvency and rates that are typical of this indicator, she also focuses on the financial leverage, which reflects the effect that borrowing has on the return on equity. In addition to the literature presented above, we have resorted to many other specialist articles in this paper, a fact that emphasizes the importance of this topic of debate.

## 3. Research methodology

To highlight the link between liquidity and solvency in the pharmaceutical industry, we used the Pearson correlation coefficient, which helped us to determine the size of the change in a variable, as a result of changes in another variable, regardless of the units used to measure them (I. Cătoiș ed., 2009). After presenting and analyzing the key balance and financial autonomy indicators for the pharmaceutical companies listed on the Bucharest Stock Exchange, we will determine the arithmetic mean of the general liquidity and solvency required to demonstrate the existence of a strong correlation between these variables.

The correlation coefficient can take values between -1 and +1. Between -1 and 0, the relationship between the two variables is indirect, and the closer the coefficient is to -1, the stronger this relationship becomes. Between 0 and 1, the relationship between the two variables is direct, and the closer the coefficient is to +1, the stronger the relationship (E. Lilea, 2006).

The formula for determining the correlation coefficient is the following:

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$$

Where:

r – correlation coefficient;

n – number of years;

x – independent variable;

y - dependent variable.

Based on this formula, we will determine whether there is any correlation between the balance and financial autonomy indicators within the companies listed on the Bucharest Stock Exchange.

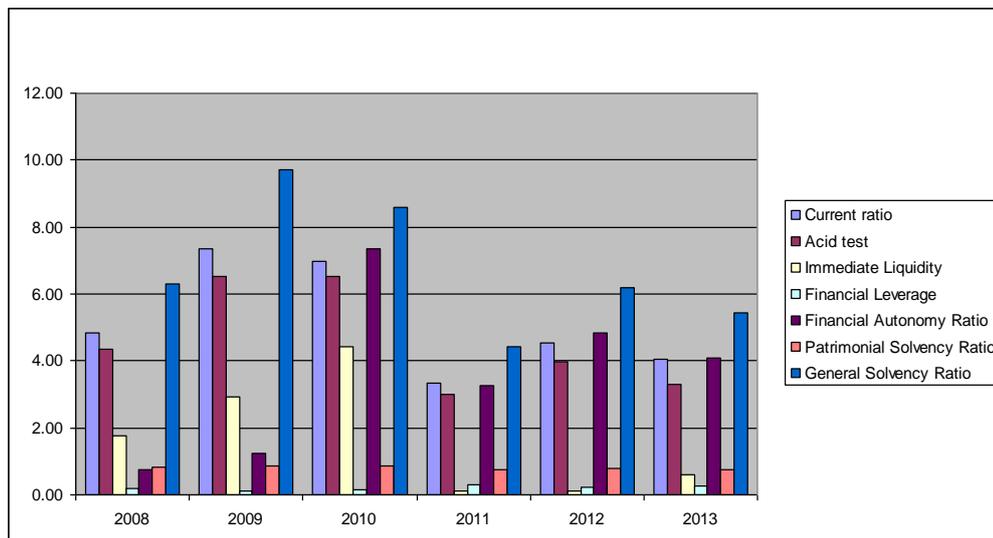
#### 4. Balance versus financial autonomy of the pharmaceutical companies listed on the Bucharest Stock Exchange

The pharmaceutical industry has proven over the years to be one of the strongest industries in the world, being able to support the economy of so many countries (N. Balteş & G. Minculete, 2014). The pharmaceutical market is very important for an emerging country, as is the case of our country. Original ideas, innovations and inventions have made of this sector a real impetus for economic recovery. A case in point is Romania itself, where the pharmaceutical sector contributes over 1.5 billion lei annually solely from the taxes retained by the state (N. Balteş & G. Minculete, 2014).

To highlight the importance of the pharmaceutical sector, this article presents and analyzes the situation of the balance and financial autonomy of the pharmaceutical companies listed on the Bucharest Stock Exchange, i.e.: Zentiva, Biofarm and Antibiotice.

In the graphs below, we can see the state of the balance and financial autonomy of the companies analyzed between 2008 and 2013.

Figure 1: The state of the balance and financial autonomy of Zentiva between 2008 and 2013

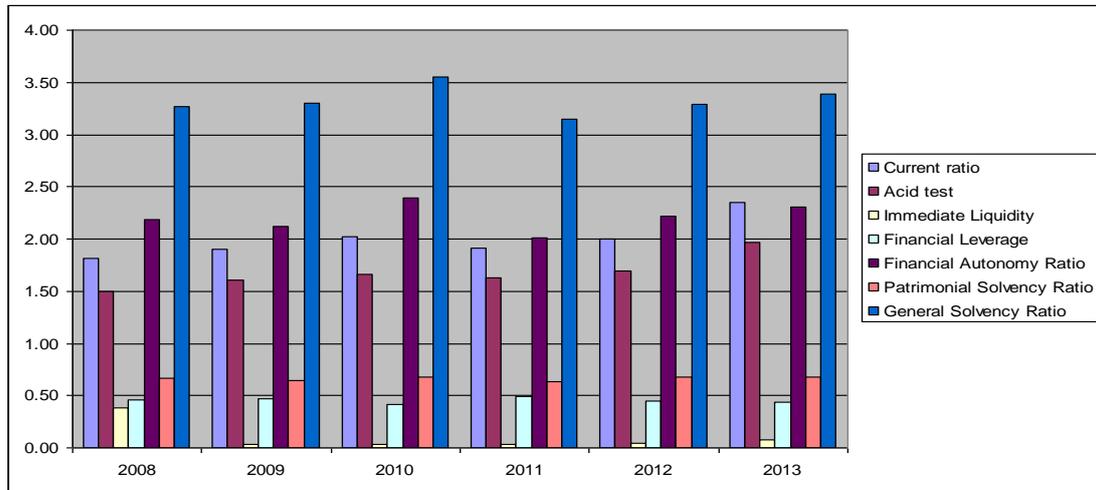


Source: Own calculations based on the financial statements of the company: [www.bvb.ro](http://www.bvb.ro) and [www.mfinante.ro](http://www.mfinante.ro)

All three companies analyzed show an adequate value of the general liquidity ratio, indicating the existence of short-term financial balance. The market leader, Zentiva, recorded a rate of 4.84 overall liquidity in 2008, which decreased to 4.04 in 2013. Floating assets were on average four times higher than short-term debt between 2008 and 2013, and the liquidity of the company was satisfactory, due to a positive working capital.

Antibiotice has a normal rate of liquidity in the period analyzed, and the values of this rate maintained at around 2 from 2008 until the end of 2013, as can be seen in the chart below.

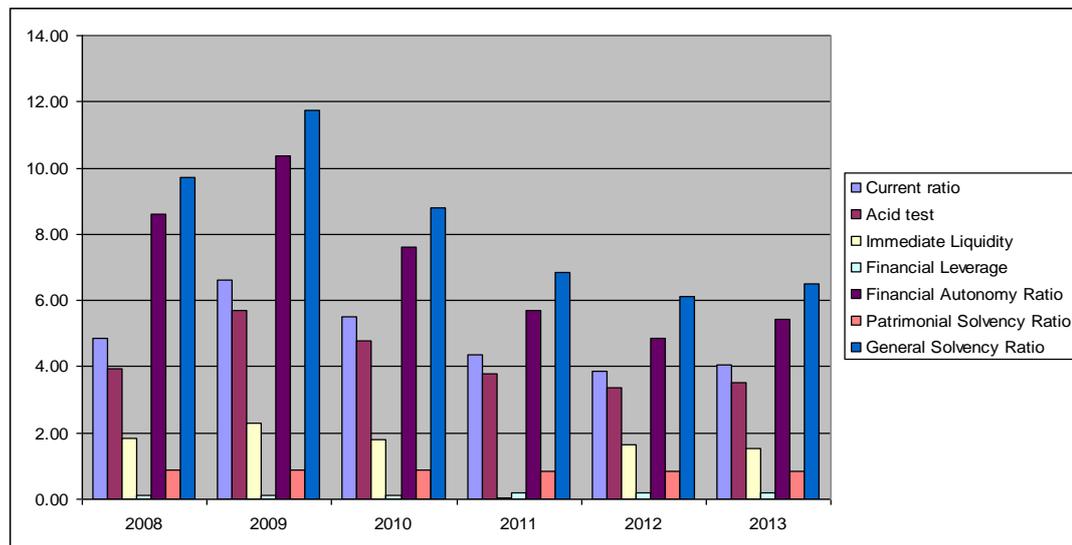
Figure 2: The state of the balance and financial autonomy of Antibiotice between 2008 and 2013



Source: Own calculations based on the financial statements prepared by the company: [www.bvb.ro](http://www.bvb.ro) and [www.mfinante.ro](http://www.mfinante.ro)

The average of the overall liquidity of Biofarm is about 4 during the analyzed period. Regarding the share of assets within current liabilities of the pharmaceutical companies listed on the Bucharest Stock Exchange, we can advance the following idea: over-unity values of this indicator show higher liquidities, the companies analyzed being thus able to expand further and to repay their debts on the agreed due dates.

Figure 3: The state of the balance and financial autonomy of Biofarm between 2008 and 2013



Source: Own calculations based on the financial statements prepared by the company: [www.bvb.ro](http://www.bvb.ro) and [www.mfinante.ro](http://www.mfinante.ro)

Regarding the relative liquidity ratio, the analyzed companies also meet the optimum values for this indicator. Whereas in Zentiva and Biofarm we can see a small share of the existing stock as

a result of their release for consumption, the value of the indicator being 4 in all six years analyzed, we cannot say the same about Antibiotice.

Antibiotice recorded a lower value of about 0.3 compared to the general liquidity ratio, which indicates the existence of untapped stocks in the company analyzed. The relative liquidity ratio shows an adequate value of about 1.5 in the analyzed period, indicating increased capacity for repayment of short-term debt.

The sole liquidity ratio which does not fall into the classic pattern of recording an optimum value in the period under review in order to reflect the warranty of liquidity for the enterprise is the rate of immediate liquidity, or, as it is known in the specialist literature, the acid test. If for Zentiva and Biofarm problems began to appear in 2011, when the index fell below 0.15, for Biofarm, the problems concerning the share of cash within short-term debt began to appear in 2009, as we can see in the chart above. From 2012, Biofarm was the only company from those analyzed to record optimum values of this indicator until the end of 2013, i.e. values above 1.5.

By presenting an overview of the liquidities of the pharmaceutical companies listed on the Bucharest Stock Exchange, we can reinforce the idea of the existence of a short-term financial balance of pharmaceutical companies, due to the over-unity values of the liquidity rates from 2008 to 2013, and at the same time indicate the existence of a positive fund of working capital, which ensures the capacity of the economic entities analyzed to face short-term obligations.

Solvency is the ability of the company to deal with medium-term and long-term maturities and depends mainly on the size of debt and the cost of borrowing (S. Petrescu, 2010). The first indicator examined is the patrimonial solvency ratio, which represents the share of own equity within the total equity. All three companies analyzed record an appropriate value, the value of this indicator being above 0.6 throughout the period under review, which reflects a normal situation. Zentiva and Biofarm recorded values of over 0.8, with no large fluctuations from 2008 until 2013. Antibiotice recorded an average patrimonial solvency ratio of 0.68, also illustrating a normal situation of its own equity within the total liabilities.

The general solvency ratio is another indicator of the degree of autonomy of the enterprise. The analyzed indicator represents the share of total assets within the total liabilities. The higher the ratio is, the higher the guarantee of the debt repayment on due dates. The patrimonial solvency ratio in Zentiva decreased from 6.28 in 2008 to 5.42 in 2013, but that is no reason for concern because the indicator values are optimal in all years analyzed. Biofarm also registered a decrease in this rate from 9.73 in 2008 to 6.52 in 2013. The only company that had no fluctuations in the overall solvency is Antibiotice, which kept an almost unchanged trajectory in the period under review, the indicator being at around 3, an optimum situation for the company.

An indicator used in financial risk detection is leverage (R. Higgins, 2012), which depends on the structure of funding and influences the rate of return on equity. According to financial professionals, the accepted maximum value of this index is 0.6. In the period under review, the companies analyzed recorded low values, less than 0.5, indicating a low share of total debt within own equity.

The financial autonomy rate is given by the ratio between own equity and total debt (Balteş N., 2010). This rate should be in inverse ratio with the financial leverage to indicate the stable and optimum situation of the selected companies. In the case of Zentiva, this indicator increased from 0.76 in 2008 to 4.10 in 2013, showing an increase in financial independence from one year to another. In the case of Antibiotice, the financial autonomy rate shows a linear trajectory, the indicator hovering at around 2 throughout the entire analyzed period. Biofarm reached 10.35 in 2009, indicating a full autonomy and, until 2013, this indicator dropped to the value of 5.44, indicating a higher share of total debt compared to its share in 2009.

Following a careful and detailed analysis of the main independence and financial autonomy indicators, we can conclude that the pharmaceutical industry is one of the few industries with a

strong financial stability that can meet payment obligations on due dates by relying mainly on domestic funding, being thus sure of sustainable financial growth.

Sustainable growth is the maximum growth rate of the sales of a company made with the help of domestic capital but without attracting external resources. Specifically, this indicator shows the rate of growth of a company focusing on domestic capital growth rather than increasing its financial leverage (D. Whitehurst, 2003). In these circumstances, the value of the financial leverage is very low and the financial autonomy rate is high, indicating stability as well as financial autonomy.

After analyzing the pharmaceutical companies listed on the Bucharest Stock Exchange, we intend to nuance the interdependence between liquidity and solvency in the pharmaceutical industry, using the Pearson correlation coefficient.

In the table below, we can see the calculations necessary to determine the correlation indicator.

Table 1: Calculations based on the Pearson correlation coefficient

Year	The Average of the General Liquidity Ratio of the Companies listed on Bucharest Stock Exchange	The Average of the General Solvency Ratio of the Companies listed on Bucharest Stock Exchange	X <sup>2</sup>	Y <sup>2</sup>	XY
	(X)	(Y)			
2008	3.84	6.43	14.71	41.30	24.65
2009	5.29	8.25	27.94	67.98	43.58
2010	4.85	6.98	23.48	48.75	33.83
2011	3.21	4.81	10.29	23.18	15.44
2012	3.47	5.20	12.03	27.08	18.05
2013	3.48	5.11	12.12	26.11	17.79
N=6	$\Sigma X = 24.12$	$\Sigma Y = 36.78$	$\Sigma X^2 = 100.57$	$\Sigma Y^2 = 234.40$	$\Sigma XY = 153.34$
	$(\Sigma X)^2 = 581.98$	$(\Sigma Y)^2 = 1352.91$			

Source: Own calculations based on formulas found in the book *Probabilități, statistică și econometrie asistate de programul Excel* [Probabilities, Statistics and Econometrics Assisted by Excel], A. Popovici, 2013

The Pearson coefficient can range between -1 and +1 (N. Balteș & G. Minculete & M. Rodean, 2014). In the case study above, as a result of calculations, the coefficient has a value of 0.97, which shows that between the general liquidity and the overall solvency of the pharmaceutical companies listed on the Bucharest Stock Exchange in Romania there is a close and direct correlation. The association between these two variables is positive, which indicates the mutual influence of the two variables. Specifically, a decrease in liquidity will automatically lead to a reduction in the payment on due dates of the debt incurred by the companies analyzed.

After conducting this research, we can note a marked mutual influence of the two categories of analyzed indicators, which is why, with the help of a thorough financial analysis, we can detect inconsistencies in the company. The optimum solutions to remove existing hazards that can eventually lead to bankruptcy can thus be found.

## 5. Conclusions

The financial and economic crisis has left its imprint on the Romanian society. The economy has been shaken ever since the slightest shockwave of this economic disaster occurred, “fragility” being the word that describes the state of the most important industries.

Economic development will not result in averting the crisis, and the economies of the world, no matter how much they will grow, will still be susceptible to collapse at the slightest shockwave of this ill-fated phenomenon (G. Gorton, 2012).

The word “crisis” has two essential elements: one represents danger, the other opportunity (P. Kotler, 2009), and for most of the existing companies worldwide crisis meant mostly danger. History confirms once again that these phenomena, which have been more or less forecast – crises, are similar to pandemics: they start as a disease and spread in ever wider circles (N. Roubini & S. Mihm, 2010).

In this research paper, we analyzed and interpreted the most important balance and financial autonomy indicators within the pharmaceutical industry in order to give a more nuanced account of the importance of this sector.

The companies listed on the Bucharest Stock Exchange recorded increased liquidity being thus able to convert their assets into cash rapidly. The solvency ratio of the analyzed companies guarantees debt repayment on due dates.

Furthermore, by using the Pearson correlation coefficient, we proved the existence of a direct relationship and interdependence between liquidity and solvency, both variables exerting a strong influence on each other.

The pharmaceutical industry is one of the few sectors that have adapted to the adverse conditions on the fly, being a real impetus for economic development globally, this being evident not in theory but also in the analysis of the annual financial statements of the companies analyzed in this paper.

## References

1. Balteș, Nicolae (coord.); Comaniciu, Carmen; Sava, Raluca; Bratian Vasile; Ciuhureanu Alin-Teodora; Taran-Morosan, Adrian (2013) *Analiza economico-financiară a întreprinderii*, Editura Universității „Lucian Blaga”, Editia a 2-a revizuită și adăugită, Sibiu, pp. 222-235;
2. Balteș, Nicolae (2010) *Analiză și diagnostic financiar*, Editura Universității „Lucian Blaga”, Sibiu, pp. 66-75;
3. Baltes, Nicolae; Minculete, Georgiana (2013), *Considerations Regarding the Financial Performance of the Company in Terms of Liquidity and Solvency*, 1st International Conference for Doctoral Students IPC 2013, 22-23 November, 2013, ISSN 2344-3448, ISSN-L 2344-3448;
4. Balteș, Nicolae; Minculete (Piko), Georgiana; Rodean (Cozma), Maria (2014), *The analysis of the relationship between profit and average salary in the pharmaceutical industry*, Revista Economie Teoretică și Aplicată, Suplimente ECTAP - International Finance and Banking Conference - FI BA 2014 (XII Edition), p. 215-220;
5. Balteș, Nicolae; Minculete (Piko), Georgiana (2014), *The Analysis of the Financial Risks in the Pharmaceutical Industry in Romania*, Revista Economică, Numărul 2, Volumul 66, p. 7-15;
6. Berman, Karen; Joe, Knight (2011) Case, John, *Inteligență financiară: ghidul managerului pentru înțelegerea adevăratei semnificații a cifrelor*, Editura Curtea Veche, București, pp. 174-185;
7. Cătoi, Iacob (coord.); Bălan, Carmen; Popescu, Ioana; Orzan, Gheorghe; Vegheș, Călin; Dănețiu, Tiberiu; Vrânceanu, Diana, *Cercetări de marketing – tratat*, Editura Uranus, București, 2009, pp. 551-557;
8. Gorton, G. (2012), Some reflection on the recent financial crisis, National Bureau of Economics Research, Cambridge: [www.nber.org](http://www.nber.org);

9. Higgins, Robert (2012) *Analysis for Financial Management*, Tenth Edition, United States, pp. 47-50;
10. Kotler, Philip; Caslione, John (2009), *Chaotics: management și marketing în era turbulenței*, Editura Publica, București, pp. 19-33;
11. Minculete (Piko), Georgiana; Baltas, Nicolae (2014), *Economic and Financial Implications of the Pharmaceutical Industry in Romania*, Revista Studia Universitatis "Vasile Goldiș", Numarul 1, Volumul 24, pp. 190-198;
12. Petrescu, Silvia (2010) *Analiză și diagnostic financiar-contabil*, Ediția a III-a revizuită și actualizată, Editura CECCAR, București, pp.247-255;
13. Popovici, Alexandru (2013) *Probabilități, statistică și econometrie asistate de programul Excel*, Editura Niculescu, București, pp.34;
14. Roubini, Nouriel; Mihm, Stephen (2010) *Economia Crizelor*, Editura Publica, București, pp. 27;
15. Robu, Vasile; Anghel, Ion; Șerban, Elena-Claudia (2014) *Analiză economico-financiară a firmei*, Editura Economică, București, pp. 449-452;
16. Whitehurst, David (2003) *Fundamentals of Corporate Finance*, Sixth Edition, McGraw-Hill Primis Custom Publishing, United States, pp. 134-141;
17. Industria farmaceutică în România – principalele tendințe și impactul asupra societății și economiei, Institutul Național de Prognoză, 2011: <http://www.lawg.ro/files/assets/userfiles/files/Industria%20Farmaceutica%20din%20Romania.pdf>;
18. [www.bvb.ro](http://www.bvb.ro);
19. [www.mfinante.ro](http://www.mfinante.ro).

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