

JEL Classification: G32, D21, D58, C19, C61 **DOI:** https://doi.org/10.31521/modecon.V20(2020)-46

Tkachenko Volodymyr, PhD (Economics), Associate Professor, Associate Professor of the Department of Enterprise Economics, University of the State Fiscal Service of Ukraine, Irpin, Ukraine

ORCID ID: 0000-0003-4915-2518

e-mail: 30122013a@gmail.com

Dziadyk Khrystyna, applicant first higher education (bachelor) level, University of the State Fiscal Service of Ukraine, Irpin, Ukraine

e-mail: thumbelina03@ukr.net

Financial Cycle Controlling in the Anti-Crisis Financial Management System of the Enterprise

Abstract. Introduction. The stabilization of the domestic economy and the gradual increase of the economic potential of the state are directly related to the stable development of industry. In the difficult socio-economic conditions of industrial enterprises, there are factors of external and internal nature that destabilize their production activities. Imperfect legal framework, disproportionate taxation system, underdeveloped production infrastructure from the outside, as well as inefficient financial planning and asset management, a high degree of moral and physical deterioration of industrial enterprises, inability to timely diagnose negative trends in their activities - from within, financial management.

Purpose. The establishment of anti-crisis financial control with its subsequent transformation into classical financial controlling should be a dominant component of the anti-crisis concept of any enterprise. Controlling service, by its nature, becomes the most important intellectual and innovative resource of the enterprise. One of the controlling objects of management in the system of financial crisis management are the financial cycle of the enterprise. In order to determine what kind of anti-crisis measures should be taken at the enterprise, it is necessary to analyze the influence of various factors on the value of the financial cycle of the enterprise. To this end, a regression analysis will be performed.

Conclusions. Diagnostics is an important component of an enterprise's financial crisis management and should be undertaken well in advance of the clear signs of a financial crisis that make it possible to identify reasonable measures needed to prevent the occurrence of a financial crisis or overcome an already existing financial crisis; assess the scale and depth of the crisis. In this context, controlling is one of the effective tools of crisis management. Since controlling is not a sufficiently advanced system in crisis management, it requires periodic improvements and implementations, in particular, the improvement of crisis response systems, the creation of separate units of enterprise control, the development of early warning systems and response to crisis management controlling in crisis management of the enterprise.

Results. Controlling is aimed at functional support of crisis management. Controlling in the system of crisis management is a system of methods and tools to support management decision-making, planning and control over unstable conditions of activity of the enterprise in the course of performing the services of controlling its functions.

Keywords: controlling; financial controlling; anti-crisis financial management; economic-mathematical modeling; anti-crisis program.

УДК 331.658.3

Ткаченко В. В., кандидат економічних наук, доцент, доцент кафедри економіки підприємства, Університет державної фіскальної служби України, Ірпін, Україна

Дзядик Х. В., здобувач вищої освіти першого (бакалаврського) рівня, Університет державної фіскальної служби України, Ірпін, Україна

Контролінг фінансового циклу в системі антикризового фінансового управління підприємством

Анотація. У статті визначена необхідність, завдання та інструменти контролінгу в умовах антикризового фінансового управління підприємством. Окреслено пріоритети контролінгової діяльності у системі антикризового фінансового управління. Сформовано перелік нагальних завдань системи контролінгу в процесі антикризового фінансового управління. Актуалізовано питання контролінгу фінансового циклу підприємства. Систематизовано наукові погляди на трактування поняття «фінансовий цикл», здійснено їх критичний аналіз та оцінку. Доведено, що контроль не є достатньо розвинутою системою управління антикризовими ситуаціями, саме тому він потребує періодичних удосконалень та впровадження, зокрема, розробки систем попередження та реагування на контроль кризового управління. Контролінг в системі антикризового управління – це система методів та інструментів підтримки прийняття управлінських рішень, планування та контролю в нестабільних умовах діяльності підприємства. Визначено методичний розрахунковий апарат обчислення фінансового циклу підприємства. Побудовано контрольну карту річних значень фінансового циклу на прикладі ПАТ «Львівський міський молочний завод». Проведено факторний аналіз показників фінансового циклу досліджуваного підприємства. Обґрунтовано доцільність застосування економіко-математичного моделювання впливу показників на фінансовий цикл підприємства з метою розробки антикризових заходів. Здійснено комплексний кореляційно-регресійний аналіз впливу показників на фінансовий

Стаття надійшла до редакції: 23.03.2020

Received: 23 March 2020

цикл підприємства. Інтерпретовано результати регресійного аналізу впливу показників на фінансовий цикл підприємства та запропоновано антикризові заходи для ПАТ «Львівський міський молочний завод».

Ключові слова: контролінг; фінансовий контролінг; антикризове фінансове управління; економіко-математичне моделювання; антикризова програма.

Statement of the problem. In the context of the macroeconomic crisis, uncertainty is heightened, making the process of financial decision-making at the micro level significantly more difficult. Therefore, the lack or inability to control the enterprise is one of the key causes of the financial crisis. Quite often, an enterprise is in crisis for the very reason that controlling is in crisis. An axiom can be considered that inefficiency or lack of planning and control, along with the deterioration of market positions of enterprises is a key dominant in the financial crisis [14]. In such a situation, the risks of wrong decisions are increased and, as a consequence, the probability of bankruptcy of the company increases. In such circumstances, we believe that a set of instruments aimed at easing the uncertainty factor in a crisis should form controlling in the system of financial crisis management of the enterprise.

Analysis of recent researches and publications. Significant contribution to the development of the theory of management and anti-crisis management of the enterprise were made by scientists, including Arefyeva O. V., Amosov O. Yu., Babich V. P., Bilovol R. I., Blank I. O., Vasilenko V. A., Dovbnya S. D., Dmitrenko A. I., Egorov P. V., Ivanova N. Yu., Litvin N. M., Lysenko Y. G., Mozenkov O. V., Oleksienko N. V., Pushkar O. I., Ramazanov S. K., Stepanenko O. P., Timashova L. A., Tsurik V. V. Leading researchers in the field of financial crisis management are Klebanov T. S., Ligonenko L. O., Tereshchenko O. O., Bondareva G. G., Brovkova E. G., Kholod Z. M. are also engaged in the research of this direction. Stangret A. M. and others.

Formulation of aims of the article. The purpose of the article is to develop and substantiate the theoretical provisions and practical principles of controlling the financial cycle and stability in the system of financial crisis management of an enterprise in a market economy.

Exposition of basic material of research. For the first time in Ukraine, the concept of controlling in the crisis management financial system was formalized in the works of Tereshchenko O.O., which indicates that the peculiarity of controlling in the crisis management system is the priority of information and organizational support for risk management (due to the introduction of risk control) and functional support for financial decision making within the framework of the financial rehabilitation procedure [15, p. 325]. Thus, the fundamental difference between anti-crisis financial management and anti-crisis financial control is that anti-crisis management as an institution is responsible for making financial decisions and successful implementation of the anti-crisis program. Controlling in the system of financial crisis management of the enterprise provides coordination, information, instrumental and methodological support of crisis

management financial management. In addition, controlling provides performance evaluation, monitoring and monitoring of the success of anti-crisis measures.

The control system in the process of anti-crisis financial management as a whole and its individual subsystems in particular should ensure the following tasks [1, p. 164]:

- implementing (or increasing the efficiency of) the risk management system in order to expedite the identification of crisis phenomena and ensure that adequate measures are taken to overcome them;

- methodological and consultative support of management in the development of effective anti-crisis concept of the enterprise, formulation of strategic goals of anti-crisis management and development of the rehabilitation plan;

- expert and informational support of anti-crisis management in the process of implementation of individual anti-crisis measures;

- monitoring and control of the implementation of the anti-crisis plan and timely identification of deviations, additional risks and chances with appropriate adjustment of plans and activities;

- ensuring effective anti-crisis financial communication in order to reduce the risks of different groups of participants in financial relations with the enterprise.

The establishment of anti-crisis financial control with its subsequent transformation into classical financial controlling should be a dominant component of the anti-crisis concept of any enterprise [5]. Controlling service, by its nature, becomes the most important intellectual and innovative resource of the enterprise. One of the controlling objects of management in the system of financial crisis management are the financial cycle of the enterprise.

In order to ensure a continuous production process, it is necessary to form certain types of assets – cash flows in accordance with the volume of economic activity of the enterprise and the duration of its operating cycle. The enterprise constantly transforms finished products into cash through sales of products. Information support for the calculations is the financial statements of the enterprise, namely - the balance sheet and the statement of financial results. Calculation of the financial cycle can be done in two ways [9, p. 101]: according to all data on receivables and payables; production and receivables related to receivables and payables.

Management of the financial cycle – the cash flow cycle – should be minimized to its duration and to minimize the capital invested in current assets. In the table. 1 approaches to defining the financial cycle.

Table 1 Approaches to interpreting the category «financial cycle»

Author	Definition
Blank I.O.	financial cycle is the interval between the beginning of payment to suppliers for raw materials and materials received (repayment of accounts payable) and the beginning of receipt of funds from buyers for the goods delivered to them (repayment of accounts receivable)
Van Horn James	financial cycle is a period of turnover of funds (funds) equal to the interval between the receipt and the expenditure of working capital
Kovalev V.V.	the financial cycle is the conditional name of the period, as a typical recurring element of the trade and technological process, at the beginning of which the money actually goes to pay suppliers for their purchased raw materials and at the end of which they return in the form of revenue
Podderiyogin A.M.	financial cycle of the enterprise – the period of rotation of funds invested in current assets, starting from the moment of repayment of accounts payable for raw materials, and ending with collection of accounts receivable for shipped finished goods
Slavyuk R.A.	views the financial cycle as a cash flow cycle, which is the time during which cash is withdrawn from circulation
Sheludko V.M.	financial cycle – the period of full turnover of cash invested in current assets, starting from the moment of repayment of accounts payable for raw materials and ending with collection of accounts receivable

Source: systematized by the author on the basis of [2, 7-8, 13, 15]

Based on the generalization of the above definitions, in our view, it is advisable to distinguish two approaches to determining the essence of the financial cycle. Scientists such as Van Horn James and Slavyuk R. view the financial cycle as a period of turnover equal to the interval during which working capital is withdrawn from circulation. The second group of economists, including Blank I., Kovalev V., Podderiyogin A., Sheludko V., see the financial cycle as the time lapse between payment of raw material and receivables and payment of accounts receivable for sold products and goods. Therefore, the above definitions boil down to the fact that the financial cycle is the interval between the payment of accounts payable for raw materials and materials and the repayment of receivables for sold products and goods. Accordingly, the length of the financial cycle is an important factor affecting an entity's need for current assets. The duration of the financial cycle is an important indicator of business activity and efficiency of managing current assets of the enterprise and depends on the turnover of stocks, funds in the accounts with buyers and suppliers and influences the parameters of optimization of cash flows.

The length of the financial cycle can be calculated by the following formula [15]:

$$FC = DTSC + DRT - DAPT, \quad (1)$$

DTSC – duration of turnover of stocks and costs, days; DRT – duration of receivables turnover, days; DAPT – duration of accounts payable turnover, days.

It is necessary to agree with Savchuk D., who shows that the duration of inventory turnover and cost and the length of accounts receivable are inertial in nature, and the decision to pay or not to pay, is made by the top manager of the enterprise [3, 4]. Therefore, if you place these factors on the level of controllability, the first place will be payables, the second – receivables, and the third – stocks of various materials. The longer the financial cycle, the more the enterprise feels the need for funds to carry out production and sales activities [13, p. 121]. Thus, as a management criterion, the duration of the financial cycle should strive for a minimum [12, p. 28]. Ideally, it is zero, and the negative value indicates that the enterprise risks financing its current activity, the formation of accounts payable for goods, works and services.

Let's analyze the financial cycle on the example of Lvivskyi miskiyi molohnyi zavod private joint stock company [11]. For this purpose, it is necessary to calculate the duration of turnover of inventories and expenses, duration of turnover of accounts receivable, duration of turnover of accounts payable.

Using the above formula, let us define the financial cycle Lvivskyi miskiyi molohnyi zavod. The dynamics of this indicator for 2009-2018 is shown in Fig. 1.

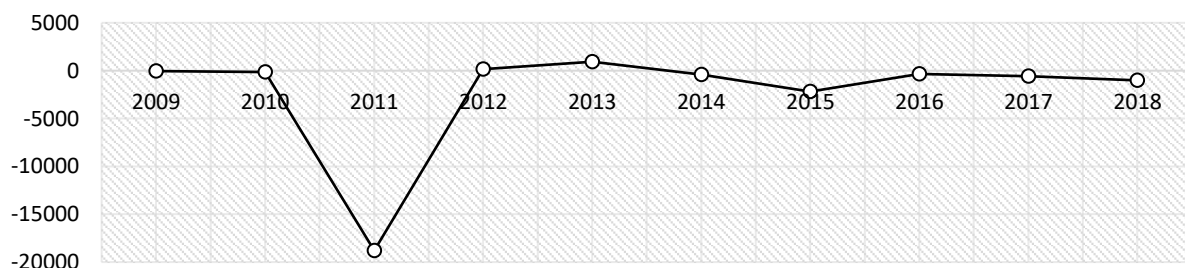


Figure 1 – Dynamics of Financial Cycle of Lvivskyi miskiyi molohnyi zavod for 2009-2018

Source: calculated on the basis of the financial statements [11]

From Fig. 1. it is seen that during the period under review at the Lvivskyi miskyi molohnyi zavod the value of the financial cycle of the enterprise was positive only in 2012 and 2013. The negative value of the financial cycle indicates that the enterprise has a greater share of use in the turnover of borrowed funds; and there is a severe shortage of cash associated with low receivables.

In general, this indicator had no stable dynamics, but it should be noted that in the period 2016-2018. there was a tendency to decrease the value of the financial cycle, which is negative. Therefore, in order to identify the main reasons for this trend, it is necessary to analyze the dynamics of the components of this indicator (Table 2).

Table 2 Factor Analysis of Financial Cycle Indicators of Lvivskyi miskyi molohnyi zavod

Indicator	Year			Increase, %	
	2016	2017	2018	2018 / 2017	2018 / 2016
Duration of inventory turnover and costs, days	2,14	2,14	2,7	26,15	26,32
Duration of receivables turnover, days	773,61	455,71	104,15	-77,15	-86,54
Duration of accounts payable turnover, days	1114,64	1032,95	1133,12	9,70	1,66
Financial cycle, days	-338,89	-575,10	-1026,26	78,45	202,83

Source: calculated on the basis of the financial statements [11]

It can be seen from Table 2 that the duration of inventory and expense turnover and receivables is much less than the duration of accounts payable. The low value of the stock turnover indicator is related to the specificity of the products produced by Lvivskyi miskyi molohnyi zavod since this type of production has a short shelf life.

Particularly noteworthy is the fact that the duration of accounts receivable turnover in 2018 has decreased by about 7 times compared to 2016, despite the fact that the duration of accounts payable turnover has undergone almost no significant changes. This is a signal that the company has serious problems with the availability of its own financial resources, as the company is forced to

reduce accounts receivable in order to reduce the amount of accounts payable.

In order to determine what kind of anti-crisis measures should be taken at the Lvivskyi miskyi molohnyi zavod, it is necessary to analyze the influence of various factors on the value of the financial cycle of the enterprise. To this end, a regression analysis will be performed [10].

Before you perform a regression analysis, you must determine the relationship between the factors. For this purpose, it is necessary to carry out correlation analysis. For convenience, we use regression indicators to denote them by variables (Table 3).

Table 3 Indication of factors influencing the financial cycle of the enterprise

Indicator Name	Designation
Financial cycle of enterprise	Y
Average tangible assets	X ₁
Cost of products sold	X ₂
Average receivables	X ₃
Proceeds from the sale	X ₄
Average accounts payable	X ₅

Source: by the author

To find out the degree and strength of the relationship between the studied values, we construct a correlation matrix in Table. 4.

Table 4 Correlation matrix of factors of influence on the financial cycle of Lvivskyi miskyi molohnyi zavod

	Y	X ₁	X ₂	X ₃	X ₄	X ₅
Y	1					
X ₁	0,682276	1				
X ₂	0,941833	0,810944	1			
X ₃	0,698129	0,096923	0,480779	1		
X ₄	0,947673	0,795882	0,996629	0,497491	1	
X ₅	0,726358	0,207600	0,581232	0,898013	0,599436	1

Source: calculated on the basis of the financial statements [11]

We calculate r-critical to determine if all the factors under study are sufficiently relevant to the enterprise financial cycle:

$$r_{kp} = \left[\frac{t_{kp}^2}{t_{kp}^2 + (n - 2)} \right]^{1/2} = \left[\frac{2.1199^2}{2.1199^2 + 14} \right]^{1/2} = 0.4929$$

Since the close relationship between all the factors studied and the financial cycle of the enterprise is higher than the critical value, all factors are suitable for inclusion in the regression model.

Let's check the model for multicollinearity. Since there is more than 0.9 between the cost of sales and sales revenue [10], there are multicollinearity between these factors and it is impossible to include them in the model at the same time. Therefore, the factor that is more closely related to the financial cycle of the enterprise, namely sales revenue, will be included in the model.

The result of the regression analysis is presented in table 5.

Table 5 Multiple regression result

	Estimate	Standard error	t-statistic	P-Value
Constant	0,0000	0,0000	2,5042	0,0293
X1	0,085	1,8544	2,1620	0,0044
X3	0,993	4,7427	5512349,409	0,0001
X4	1,002	29,9530	85754855,857	0,0002
X5	-0,994	9,7643	-383198948,741	0,0001

Source: calculated on the basis of the financial statements [11]

Therefore, the financial cycle regression equation looks like:

$$Y = 0,085X_1 + 0,993X_3 + 1,002X_4 - 0,994X_5$$

Let's carry out a critical analysis of the obtained model (Table 6).

Table 6 Analysis of Variance

	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	4	21445657657.26	5361414414.31	1334925620.89	0.000000
Residual	11	482674	9878330674		
Total (Corr.)	15	21446140331.26			

Source: calculated on the basis of the financial statements [11]

1) t-statistic: $t_{table}(0.05; \gamma = 16 - 1 - 4 = 11) = 2.201$. All calculated values of t-statistics are greater than the table value, which indicates the significance of these coefficients;

2) Darbin-Watson statistics:

$$DW = \frac{\sum_2^T (\varepsilon_i - \varepsilon_{i-1})^2}{\sum_1^T \varepsilon_i^2} = \frac{2865273}{482674} = 5,936$$

The table values of the lower and upper limits of the Darbin-Watson table criterion are $D_L = 0.734$ and $D_U =$

1.935. Since $5.936 > 1.935$, we can conclude that the model lacks autocorrelation.

3) significance of the coefficient on F-statistics:

$$F_{table}(0.05; f_1 = 4, f_2 = 11) = 3.36$$

Since $13349,8 > 336$, the calculated coefficients of the equation are significant.

4) P-value: The P-value of all coefficients is less than 0.05, so the coefficients of the regression equation are significant.

5) regression statistics:

Table 7 Regression statistics

Multiple R	0.99522
R-squared	0.981234
R-squared (adjusted for d.f.)	0.938354
Standard Error of Est.	4326.732

Source: calculated on the basis of the financial statements [11]

R-squared = 0.98, this means that the 98% variation in the financial cycle depends on the variation of factor traits, and 2% is the variation of factors not included in the model plus a stochastic variable. Since the normal coefficient of determination is greater than the adjusted

one, and they have high values and differ insignificantly from each other, the model is considered good. The constructed equation shows how the value of the financial cycle of an enterprise will change as each indicator changes, if all niche indicators will not change (Table 8).

Table 8 Impact of indicators on the financial cycle of the studied enterprise

Indicator name	Change	Impact on net income, thousand UAH.
Average tangible current assets	increase by 1	increase by 0.085
Average accounts receivable	increase by 1	increase by 0.993
Sales revenue	increase by 1	increase by 1.002
Average accounts payable	decrease by 1	increase by 0.994

Source: determined based on the regression equation

Thus, the largest impact on the size of the financial cycle of Lvivskiy miskiy molohnyi zavod has sales revenue, so the activity of the enterprise should be aimed at increasing sales revenue. As the ratio of average payables in the regression equation is negative, it is necessary for the enterprise to reduce the amount of payables.

Conclusions. Diagnostics is an important component of an enterprise's financial crisis management and should be undertaken well in advance of the clear signs of a financial crisis that make it possible to identify reasonable measures needed to prevent the occurrence of a financial crisis or overcome an already existing financial crisis; assess the scale and depth of the crisis. In this context, controlling is one of the effective tools of crisis

management. Since controlling is not a sufficiently advanced system in crisis management, it requires periodic improvements and implementations, in particular, the improvement of crisis response systems, the creation of separate units of enterprise control, the development of early warning systems and response to crisis management controlling in crisis management of the enterprise. Controlling is aimed at functional support of crisis management. Controlling in the system of crisis management is a system of methods and tools to support management decision-making, planning and control over unstable conditions of activity of the enterprise in the course of performing the services of controlling its functions.

References:

1. Krystek, V., Moldenhauer, P. & Evertz, D. (2009). Controlling in aktuellen Krisenerscheinungen: Lösung oder Problem? *Controlling & Management*, 3, 164-168 [in English].
2. Lindgren, C., Balico, T., Enoch, C., Guide, A.-M., Quintyn, M. & Teo, L. (2009). Financial Sector Crisis and Restructuring. Lessons from Asia. IMF Occasional Paper, 188. [in English].
3. Tytenko, L. V. (2018). Economic security as an element of strategic management system: accounting and analytical aspect. *Baltic Journal of Economic Studies*, 4, 309–318. doi: <https://doi.org/10.30525/2256-0742/2018-4-3-309-318> [in English].
4. Bohdan, S. V., Tytenko, L. V. & Mizirenko, O. S. (2018). Management internal control in the system of providing economic security of the enterprise. *Ekonomika ta suspiljstvo*, 19, 1358-1363. doi: <https://doi.org/10.32782/2524-0072/2018-19-202> [in Ukrainian].
5. Ghajevs'jka, L. M. & Marchenko, O. I. (2019). Pidpryjemnyjka dijajlnistj. Universytet DFS Ukrajinj. [in Ukrainian].
6. Ivanova, N. Ju. & Sokolova, N. M. (2015). Conceptual approach to anti-crisis monitoring of the enterprise. *Naukovi zapysky. Ekonomichni nauky*, 44, 85-88 [in Ukrainian].
7. Lypych, L. Gh. & Ghadzevych, I. O. (2012). Controlling in the crisis management system. *Visnyk Nacionaljnogho universytetu «Ljvivs'jka politekhnika»*, 722, 377-381 [in Ukrainian].
8. Majevs'jka, Ja. V. (2009). Types and place of financial controlling in the enterprise. *Naukovyj visnyk NLTU Ukrajinj*, 19.6, 47-52 [in Ukrainian].
9. Ostrovs'jka, O. A. (2014). An innovative resource for controlling in the crisis management of corporate finances. *Finansy Ukrajinj*, 3, 100-113 [in Ukrainian].
10. Pajanok, T. M., Krajevs'jkyj, V. M., Paranycja, N. V. & Boghdan, S. V. (2020). Ekonometryka: prykladnyj aspekt. Universytet derzhavnoji fiskaljnoji sluzhby Ukrajinj [in Ukrainian].
11. Public Joint Stock Company Lvivskiy miskiy molohnyi zavod. Retrieved from <http://lvivmoloko.pat.ua/>
12. Savchenko, A. M. & Pajanok, T. M. (2017). Analysis of receivables of the enterprise using economic and mathematical methods. *Ekonomist*, 3, 27-32 [in Ukrainian].
13. Savchuk, D. Gh. & Tereshhenko, O. O. (2011). The current state and prospects of development of financial controlling. *Finansy Ukrajinj*, 2, 117-126 [in Ukrainian].
14. Skoryk, M. O. & Prokopenko, N. S. (2017). Problems of financial support for the development of small business in Ukraine. *Ekonomika upravlinnja*, 3(75), 109-114 [in Ukrainian].
15. Tereshhenko, O. O. (2004). Antykrizove finansove upravlinnja na pidpryjemstvi. K. KNEU [in Ukrainian].

