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CORPORATE FINANCIAL HEALTH ASSESSMENT: METHODS AND TOOLS FOR EMERGING MARKETS

The paper address the methodological approaches to the corporate financial health assessment. The research purpose was to systematize corresponding methods and tools in the context of investment monitoring, with an emphasis on the level of financial development. The research methodology was based on the assumption that there are three key theoretical foundations for corporate financial health assessment: bankruptcy prediction, investment analysis and financial systems assessment. The main prerequisite of the research is that the choice of methods and tools to the corporate financial health assessment in emerging markets lies in the field of bankruptcy prediction models. Besides, it is advisable to analyze the potential of structural models for bankruptcy prediction, the principles of which are most closely related to investment analysis. Finally, the results of methodological approaches systematization in the research field need to be adjusted to the instruments of financial systems assessment. The research shows that the specifics of corporate financial health assessment in the emerging markets is associated with its theoretical, methodological and informational support. The focus of relevant methods and tools remains in the plane of bankruptcy prediction models. The models based on market indicators can be applied to public companies, but their applicability should be tested taking into account information limitations. Factors of corporate financial health, in turn, can be subdivided into market and specific ones, being adjusted for the level of financial development.

Keywords: *public companies, corporate financial health, financial diagnostics, bankruptcy prediction, emerging markets, investment monitoring.*

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ОЦЕНКА КОРПОРАТИВНОГО ФИНАНСОВОГО ЗДОРОВЬЯ: ИНСТРУМЕНТЫ ДЛЯ ФОРМИРУЮЩИХСЯ РЫНКОВ

В статье рассматриваются методические подходы к оценке корпоративного финансового здоровья. Цель исследования заключалась в систематизации соответствующих методов и инструментов в контексте инвестиционного мониторинга с акцентом на уровень финансового развития. Методология исследования базировалась на допущении о трех ключевых

теоретических основах оценки финансового здоровья корпораций: прогнозирование банкротства, инвестиционный анализ и оценка финансовых систем. Основной предпосылкой исследования являлось то, что выбор методов и инструментов оценки финансового здоровья корпораций на формирующихся рынках лежит в области моделей прогнозирования банкротства. Кроме того, целесообразно проанализировать потенциал структурных моделей прогнозирования банкротства, принципы которых наиболее тесно связаны с инвестиционным анализом. Наконец, результаты систематизации методических подходов в области исследований необходимо скорректировать с учетом инструментария оценки финансовых систем. Исследование показало, что специфика оценки финансового здоровья корпораций на формирующихся рынках связана с ее теоретическим, методологическим и информационным обеспечением. Фокус соответствующих методов и инструментов остается в плоскости моделей прогнозирования банкротства. Модели, основанные на рыночных показателях, могут применяться к публичным компаниям, однако их применимость должна проверяться с учетом информационных ограничений. Факторы корпоративного финансового здоровья, в свою очередь, могут быть подразделены на рыночные и специфические, корректируемые на уровень финансового развития.

Ключевые слова: публичные компании, корпоративное финансовое здоровье, финансовая диагностика, прогнозирование банкротства, формирующиеся рынки, инвестиционный мониторинг.

Background. Public companies are of systemic importance in the financial economy. It is no coincidence that the stock market capitalization is taken as the basis for evaluating financial markets' depth, access and stability [1; 2]. Therefore, the financial health of public companies (hereinafter – *corporate financial health*) is an important indicator of a country's investment attractiveness, and financial diagnostics (*corporate financial health assessment*) is one of the key areas of the corporate sector's investment monitoring. Despite rich instrumentation of financial diagnostics, methodological approaches to assessing the public companies' corporate financial health in the context of investment monitoring have not received comprehensive attention in the literature, which hinders the development of the research in this area. Besides, theoretical perspectives on the content of public companies' financial diagnostics often conflict with practice. However, the approaches elaborated for developed countries are not always applicable in emerging markets.

Correspondingly, the research purpose was to systematize methods and tools to the corporate financial health assessment in the context of investment monitoring, with an emphasis on the level of financial development. Considering the theoretical background of the research issues, let us presume that there are three key theoretical foundations for corporate financial health assessment: *bankruptcy prediction, investment analysis and financial systems assessment*.

A large body of literature in the field of *bankruptcy (financial insolvency) prediction* is represented by numerous replicas of outstanding research that proposed new methodological solutions. Among these studies, we note the prominent articles of W. Beaver [3], E. Altman [4], J. Ohlson [5], M. Zmijewski [6]. Detailed reviews of the bankruptcy prediction methodology formation and development, including current trends of the machine learning implementation, are presented in many monographs and articles on this subject [for instance: 7]. It should be noted that the early models mainly belonged to the class of accounting-based models, whereas in the future they began to actively compete with market-based models. The R. Merton's concept of assessing corporate liabilities [8] made a significant contribution to the development of market-based models and became the basis of structural models (including the KMV models). These tools, based on the Options Pricing Theory, were originally and mainly intended for public companies (modifications for closed companies are not so numerous).

A comprehensive analysis of the KMV models is given in: [9, p. 181-198]. In particular, it has been shown that the line between bankruptcy prediction and the investment analysis is virtually erased. In fact, the decision on defaulting (more precisely, the feasibility of declaring a company bankrupt) in the KMV models is associated with the investment decision of the owners to purchase the business, which allows us to consider the company's

equity as a real option and, therefore, apply the pricing model for corporate financial health assessment. Basically (as was noted earlier), bankruptcy prediction models go back to the financial neoclassical concept and, as a rule, do not allow to take into account the institutional factors of the corporate financial health.

However, this conclusion concerns more financial models and less complex ones, including financial and non-financial parameters (a classic example is J. Argenti's model [10]). Remarkably, the investment monitoring of the corporate sector, as a rule, is not limited to financial indicators. With regard to investment monitoring, the main interest within the framework of the research issues are the models of financial systems evaluation (they are characterized by great diversity and, in particular, can be concentrated on assessing of a financial market, as well as analytics on international stock indices). Thus, the theoretical foundations of the corporate financial health assessment combine an extensive layer of research, the systematization of which is a necessary prerequisite not only in the choice of effective methodological approaches for the emerging market, but also in the development of investment monitoring methodology.

Material and methods. In order to systematize the methodological approaches to the corporate financial health assessment, we will rely on the results of a theoretical background analysis. Firstly, the main prerequisite of the research is that the choice of methods and tools to corporate financial health assessment in emerging markets lies in the field of bankruptcy prediction models. Secondly, taking into account the availability of market data on public companies, it is advisable to analyze the potential of structural models for prediction of financial insolvency, the principles of which are most closely related to investment analysis. Thirdly, the results of methodological approaches systematization in the research field need to be adjusted to the instruments of financial systems assessment, including an evaluation of financial development level.

In addition to the identified background of the research, the question of what unites the theoretical foundations of the corporate financial health assessment into a *unified, hierarchical and interconnected whole* is a priority for substantiating the effective and efficient methodology. Such a unifying principle in the choice of methodological alternatives should be a general concept, which allows us to speak not

just about the aggregate, but about the system of methodological approaches to financial diagnostics.

We suppose that the logic of this concept as a whole can correlate with the Capital Assets Pricing Model (CAPM), which, by analogy with an analysis of the issuer's default risk, will make it possible to speak about market and specific factors of the financial health of public companies [11; 12].

$$r = r_{rf} + \beta(r_m - r_{rf}) \quad (1)$$

r – expected return of investment (corresponding discount rate);

r_{rf} – risk-free rate of return;

β – beta of the investment;

r_m – market rate of return.

Market factors act as determinants of the corporate financial health and can be systematized based on the methodological approaches used in financial systems assessment. *Specific factors* are subject to assessment using bankruptcy prediction tools that require adaptation to investment monitoring tasks. In the development of the proposed concept, its modification can be applied, corresponding to the Adjusted Capital Assets Pricing Model (ACAPM) [13].

$$r = r_{rf} + \beta(r_m - r_{rf}) + S_1 + S_2 + C \quad (2)$$

r – expected return of investment (discount rate);

r_{rf} – risk-free rate of return (for the developed market);

β – beta of the investment (for the developed market);

r_m – market rate of return (for the developed market);

S_1 – small capitalization premium;

S_2 – specific risk premium;

C – country risk premium.

Obviously, in order to study the idea of adjusting the basic indicators for assessing the investment value should receive a conceptual refraction. In the framework of the choice of methods and tools for the corporate financial health assessment in emerging markets, this means that market factors need to be determined taking into account the appropriate level of financial development. According to the accepted concept of financial diagnostics and research methodology, the system of relevant methodological approaches should be divided into two main blocks that meet the objectives of

assessing the market and specific factors of the corporate financial health, adjusted for country classification results.

In choosing methods and tools for assessing the *market factors of the corporate financial health* in emerging markets, it is advisable to be guided by the leading international practice of financial systems assessment. Thus, the depth, efficiency, access and stability of financial systems should be positioned as key prerequisites for the corporate financial health. The assessment tools in the models of monitoring of financial systems are largely represented by relative indicators (in relation to GDP, the total number of issuers in a separate market segment, etc.), which are aggregated according to data on financial institutions and capital markets. The final scores are generated using non-parametric models, including models of financial development indices. The specificity of these models allows to vary the composition

of the basic indicators and introduce additional areas of assessment, which let flexibly consider the level of financial development and the nature of analytical tasks [2].

Accepting the assumption of a universal characteristic of national financial systems, it is advisable to outline the *determinants of the corporate financial health*, depending on the level of financial development. For this, relevant country classifications are in demand, and, above all, those used in the compilation of leading global stock indices [14]. The choice of these classifications is not accidental, because the emerging markets group has the most clear and consistent characteristics in them (in addition to this group, developed and frontier markets are highlighted as well; underdeveloped countries remain beyond the classification) (table).

Table – The list of Emerging Markets

#	Country	MSCI	FTSE Russel	S&P Dow Jones
1	Brazil	+	+	+
2	Chile	+	+	+
3	China	+	+	+
4	Colombia	+	+	+
5	Czech Republic	+	+	+
6	Egypt	+	+	+
7	Greece	+	+	+
8	Hungary	+	+	+
9	India	+	+	+
10	Indonesia	+	+	+
11	Korea	+	-	-
12	Kuwait	-	+	-
13	Malaysia	+	+	+
14	Mexico	+	+	+
15	Pakistan	+	+	+
16	Peru	+	+	+
17	Philippines	+	+	+
18	Poland	+	-	+
19	Qatar	+	+	+
20	Russia	+	+	+
21	South Africa	+	+	+
22	Taiwan	+	+	+
23	Thailand	+	+	+
24	Turkey	+	+	+
25	UAE	+	+	+

Source: prepared by the author on the base of MSCI Emerging Market Index, S&P Emerging BMI, FTSE Emerging Index, 2019 [see also: 15].

In our opinion, country classifications have an independent significance in the development of methodological approaches to assessing the market factors of the financial health of public companies in emerging markets, since they allow revealing the financial specifics of the latter. In turn, the analytics of global, regional and national stock indexes is of high interest for investment monitoring purposes.

Let us consider methodical alternatives for assessing the *specific factors of the corporate financial health* in the emerging markets. The main range of alternatives here covers the choice between financial models of bankruptcy prediction. Therefore, we will go through them in more detail. The basic criteria used in these models is financial indicators. Among the most popular financial models in the emerging markets are that of regression (MDA, logit and probit models). There are numerous modifications, including those specialized in size, regional and industry belonging of the companies. It seems that in investment monitoring, preference should be given to universal models (it is more correct to say: conditionally universal) that have been tested on a global sample, including emerging markets [16]. Aggregated estimates for such models can act as indicators of the corporate sector financial stability as a whole and by certain types of economic activity.

Structural financial models, as was noted earlier, are mainly used specifically for public companies. However, it is logical to assume that in the conditions of the emerging market, the predictive accuracy of these models does not always meet expectations, which is associated with increased information asymmetry. However, analysis of data on Russian public companies shows that the structural model is able to provide more accurate results than the regression one [17, p. 174]. In general, accounting (for example, Z" Altman's model) and market (including KMV modifications) models are recommended to be used in combination [18], which can provide a higher quality of financial diagnostics.

Alternative regression and structural models are models based on machine learning methods (neural networks, decision trees, etc.). These models provide high predictive accuracy and are rapidly gaining popularity, including the emerging markets. For example, the financial risk assessment of a company based on neural network modeling is offered by the Russian information and analytical system SPARK. At

the same time, the explanatory ability of such models causes reasonable criticism [19, p. 134]. The priority task of scientific research is also transformed: in the conditions of working with big data, the question of justifying the model is replaced by the question of finding an effective methodology [20, p. 133].

Comprehensive bankruptcy prediction models allow to complement the basic methods and tools of the corporate health assessment with high-quality indicators of external and internal business conditions. Thus, within the framework of one complex methodology, it is possible to combine the assessment of market and specific factors of the financial health, as well as flexibly take into account the specifics of the emerging market and other significant aspects of investment monitoring.

Conclusions. The specifics of corporate financial health assessment in the emerging markets is associated with its theoretical, methodological and informational support. Literature shows that the main choice of relevant methods and tools lies in the plane of bankruptcy (financial insolvency) prediction models. At the same time, the models based on market indicators can be applied to public companies, but their applicability should be tested taking into account information limitations. Factors of public companies' financial health, in turn, can be subdivided into market and specific ones, being adjusted for the level of financial development. The external financial business environment requires close attention, which predetermines the direction of further empirical research.

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References

1. Čihák M., Demirgüç-Kunt A., Feyen E., Levine R. *Benchmarking financial systems around the world*. World Bank Policy Research Working Paper, 2012, no. 6175, 56 p. (In English).
2. Sahay R., Čihák M., N'Diaye P., Barajas A., Bi R., Ayala D., Gao Y., Kyobe A., Nguyen L., Saborowski C., Svirydzhenka K., Yousefi S.R. *Rethinking financial deepening: stability and growth in emerging markets*. IMF Staff Discussion Note, 2015, May, no. 15/08, 41 p. (In English).
3. Beaver W. H. Financial ratios as predictors of failure. *Journal of Accounting Research. Empirical Research in Accounting: Selected*

- Studies*, 1966, vol. 4, pp. 71-111. (In English).
4. Altman E.I. Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *The Journal of Finance*, 1968, September, pp. 589-609. (In English).
 5. Ohlson J. A. Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*, 1980, vol. 18, no. 1, pp. 109-131. (In English).
 6. Zmijewski M. E. Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, 1984, vol. 22, p. 59-82.
 7. Altman E., Hotchkiss E. *Corporate financial distress and bankruptcy*. 3rd ed. Hoboken, New Jersey: John Wiley & Sons, 2006, xiv + 354 p. (In English).
 8. Merton R.C. On the pricing of corporate debt: The risk structure of interest rates. *Journal of Finance*, 1974, vol. 29, no. 2, pp. 449-470. (In English).
 9. Caouette J.B., Altman E.I., Narayanan P., Nimmo R. *Managing credit risk: the great challenge for global financial markets*. 2nd ed. Hoboken, New Jersey: John Wiley & Sons, Inc., 2008, xxvi + 627 p. (In English).
 10. Argenti J. Corporate planning and corporate collapse. *Long Range Planning*, 1976, December, pp. 12-17. (In English).
 11. Sharpe W. F. Capital asset prices: a theory of market equilibrium under conditions of risk. *Journal of Finance*, 1964, vol. 19, no. 3, pp. 425-442. (In English).
 12. Lintner J. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, 1965, vol. 47, no. 1, pp. 13-37. (In English).
 13. Mercer C.Z. The adjusted capital asset pricing model for developing capitalization rates: an extension of previous build-up methodologies based upon the capital asset pricing model. *Business valuation review*, 1989, December, vol. 8, no. 4, pp. 147-156. (In English).
 14. Lvova N.A. Fenomen formiruyushchegosya finansovogo rynka i ego teoreticheskoe osmyslenie [The phenomenon of the emerging financial market and its theoretical understanding]. *Bankovskaya sistema: ustojchivost' i perspektivy razvitiya: sbornik nauchnyh statej devyatoj mezhdunarodnoj nauchno-prakticheskoy konferencii po voprosam bankovskoy ekonomiki* [Banking System: Sustainability and Development Prospects: Collection of Scientific Articles of the 9th International Scientific and Practical Conference on Banking Economics], Polesky State University, Pinsk 25-26 October 2018, Ed.: Ministry of Education of the Republic of Belarus [et al]; Editorial Board: K.K. Shebeko [et al]. Pinsk: PolesGU, 2018, pp. 85-90. (In Russian).
 15. Lvova N.A. Konceptsiya finansovoj diagnostiki publichnyh kompanij dlya formiruyushchegosya finansovogo rynka [The concept of public companies' financial diagnostics for the emerging financial market]. *Ekonomika i predprinimatel'stvo* [Journal of Economy and Entrepreneurship], 2018, no. 9, pp. 940-948. (In Russian).
 16. Altman E., Iwanicz-Drozowska M., Suvas A. Distressed firm and bankruptcy prediction in an international context: a review and empirical analysis of Altman's Z-score model. *Proceedings of the 7th International Risk Management Conference «The safety of the financial system. From idiosyncratic to systemic risk»*, 2014. Available at: <http://people.stern.nyu.edu/ealtman/IRMC2014ZMODELpaper1.pdf> (accessed 27.05.2019). (In English).
 17. Lukasevich I.YA., Lvova N.A. Kak izmerit' rasstoyanie do bankrotstva: podhody dlya formiruyushchegosya rynka [How to measure the distance to bankruptcy: solutions for the emerging market]. *Menedzhment i biznes-administrirovanie* [Management and Business Administration], 2019, no. 1, pp. 165-178. (In Russian).
 18. Agarwal V., Taffler R.J. Comparing the performance of market-based and accounting-based bankruptcy prediction models. *Journal of Banking and Finance*, 2008, vol. 32, no. 8, pp. 1541-1551. (In English).
 19. Fedorova E., Gilenko E., Dovzhenko S. Bankruptcy prediction for Russian companies: application of combined classifiers. *Expert Systems with Applications*, 2013, no. 40, pp. 7285-7293. (In English).
 20. Kolyshkin A.V., Gilenko E.V., Dovzhenko S.E., Zhilkin S.A., Choe S.E. Prognozirovanie finansovoj nesostoyatel'nosti predpriyatij [Forecasting the financial insolvency of enterprises]. *Vestnik SPbGU. Seriya 5: Ekonomika* [St Petersburg University Journal of Economic Studies], 2014, iss. 4, pp. 122-142. (In Russian).

Список литературы

1. Čihák M. Benchmarking financial systems around the world / Čihák M. [et al.]. – World Bank Policy Research Working Paper, 2012. – № 6175. – 56 p.
2. Sahay, R. Rethinking financial deepening: stability and growth in emerging markets / Sahay R. [et al.]. – IMF Staff Discussion Note, 2015. – May. – № 15/08. – 41 p.
3. Beaver, W. H. Financial ratios as predictors of failure / W.H. Beaver // Journal of Accounting Research. Empirical Research in Accounting: Selected Studies. – 1966. – Vol. 4. – P. 71–111.
4. Altman, E.I. Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy / E.I. Altman // The Journal of Finance. – 1968. – September. – P. 589 – 609.
5. Ohlson, J.A. Financial Ratios and the Probabilistic Prediction of Bankruptcy / J. A. Ohlson // Journal of Accounting Research. – 1980. – Vol. 18. – № 1. – P. 109 – 131.
6. Zmijewski, M. E. Methodological issues related to the estimation of financial distress prediction models / M. E. Zmijewski // Journal of Accounting Research. – 1984. – Vol. 22. – P. 59–82.
7. Altman, E., Corporate financial distress and bankruptcy / E. Altman, E. Hotchkiss– 3rd ed. – Hoboken, New Jersey: John Wiley & Sons. 2006. – xiv + 354 p.
8. Merton, R.C. On the pricing of corporate debt: The risk structure of interest rates / R.C. Merton // Journal of Finance, 1974. – Vol. 29. – №2. – P. 449 – 470.
9. Caouette, J.B. Managing credit risk: the great challenge for global financial markets / Caouette J.B. [et al.]. – 2nd ed. –Hoboken, New Jersey: John Wiley & Sons, Inc., 2008. – xxvi + 627 p.
10. Argenti, J. Corporate planning and corporate collapse / J. Argenti // Long Range Planning, 1976. – Dec. – P. 12 – 17.
11. Sharpe, W. F. Capital asset prices: a theory of market equilibrium under conditions of risk / W. F. Sharpe // Journal of finance. – 1964. – Vol. 19. – № 3. – P. 425 – 442.
12. Lintner, J. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets / J. Lintner // Review of economics and statistics. – 1965. – Vol. 47. – № 1. – P. 13 – 37.
13. Mercer, C. Z. The adjusted capital asset pricing model for developing capitalization rates: an extension of previous build-up methodologies based upon the capital asset pricing model / C. Z. Mercer // Business valuation review. December 1989. Vol. 8. № 4. P. 147 – 156.
14. Львова, Н.А. Феномен формирующегося финансового рынка и его теоретическое осмысление / Н.А. Львова // Банковская система: устойчивость и перспективы развития: сборник научных статей девятой международной научно-практической конференции по вопросам банковской экономики, УО «Полесский государственный университет», г. Пинск 25–26 октября 2018 г. / Министерство образования Республики Беларусь [и др.]; редкол.: К.К. Шебеко [и др.]. – Пинск: ПолесГУ, 2018. – С. 85 – 90.
15. Львова, Н.А. Концепция финансовой диагностики публичных компаний для формирующегося финансового рынка / Н.А. Львова // Экономика и предпринимательство, 2018. – №9. – С. 940 – 948.
16. Altman, E. Distressed firm and bankruptcy prediction in an international context: a review and empirical analysis of Altman's Z-score model / E. Altman, M. Iwanicz-Drozdowska, A. Suvas // Proceedings of the 7th International Risk Management Conference «The safety of the financial system. From idiosyncratic to systemic risk», 2014. – Режим доступа: <http://people.stern.nyu.edu/ealtman/IRMC2014ZMODELpaper1.pdf> (дата обращения: 27.05.2019).
17. Лукасевич, И.Я. Как измерить расстояние до банкротства: подходы для формирующегося рынка / И.Я. Лукасевич, Н.А. Львова // Менеджмент и бизнес-администрирование, 2019. – №1. – С. 165 – 178.
18. Agarwal, V. Comparing the performance of market-based and accounting-based bankruptcy prediction models / V. Agarwal, R.J. Taffler // Journal of Banking and Finance, 2008. – Vol. 32. – № 8. – P. 1541 – 1551.
19. Fedorova, E. Bankruptcy prediction for Russian companies: application of combined classifiers / E. Fedorova, E. Gilenko, S. Dovzhenko // Expert Systems with Applications, 2013. – №40. – P. 7285 – 7293.
20. Кольшкин, А.В. Прогнозирование финансовой несостоятельности предприятий / А.В. Кольшкин [и др.] // Вестник СПбГУ. Серия 5: Экономика, 2014. – Вып. 4. – С. 122 – 142.

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