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Riepina I. M.
Doctor of Economics, Professor,
Kyiv National Economic University named after Vadym Getman, Ukraine;
e-mail: rephousenew@gmail.com; *ORCID ID: 0000-0001-9141-0117*
Kuzhel M. Yu.
Ph. D. in Economics, Associate Professor,
Kyiv National Economic University named after Vadym Getman, Ukraine;
e-mail: marinakuzhel@gmail.com; *ORCID ID: 0000-0003-3708-7712*
Halytskyi O. M.
Doctor of Economics, Associate Professor,
Odessa State Agrarian University, Ukraine;
e-mail: oleksandrgalickij9@gmail.com; ORCID ID: 0000-0001-9549-7627
Lisovenko D. V.
Ph. D. in Technic, Associate Professor,
Odessa Military Academy, Ukraine;
e-mail: lisovenkodenis78@gmail.com; *ORCID ID: 0000-0002-4255-2589*
Fedchenko A. V.
Senior Lecturer, Odessa Military Academy, Ukraine;
e-mail: fedchtenko_alekc_@ukr.net

THE ANALYSIS OF VENTURE COMPANIES' RATIONAL INVESTMENT DECISIONS BY VALUE CRITERIUM

Abstract. The purpose of this article was to investigate the methodological tools for analyzing the rationality of investment decisions of venture capital companies by value criterion. Based on this goal, the state of development of venture business with participation of the corporate market in global venture agreements, global venture financing, the size of the global median of venture financing agreements in the stages of implementation of innovative entrepreneurial idea was analyzed. The result of the article was the systematization of the theoretical and methodological tools for the analysis of the rationality of investment decisions of venture companies by the criterion of value. The main criterion for the rationality of investment decisions is the possibility of return on investment in the future. Therefore, most of the world's venture capital firms are pursuing an absolute and relative return on investment. The most successful are investments with a threefold increase in the value of repaid capital. However, they usually take up a small proportion of such investment decisions (up to 5%). The rest balance at the limit of zero. Considering the state of development of venture business, the theoretical and methodological toolkit to substantiate investment decisions that can be based on the analysis of their rationality for venture capital companies on the criterion of value and some indicators of evaluating the effectiveness of venture financing research allowed to make the following general conclusions in the following: allows to increase its value in the future; rational investment models take into account two main criteria: profitability and riskiness; there are no clearly stated factors that determine the value of a venture capital firm; all models have some limitations and difficulties in their practical application.

Keywords: investment decisions, rationality, venture capital companies, venture capital, value, model.

JEL Classification G11, G24

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Рєпіна І. М.
доктор економічних наук, професор,
Київський національний економічний університет ім. Вадима Гетьмана, Україна;
e-mail: rephousenew@gmail.com; *ORCID ID: 0000-0001-9141-0117*

Кужель М. Ю.
кандидат економічних наук, доцент,
Київський національний економічний університет ім. Вадима Гетьмана, Україна;
e-mail: marinakuzhel@gmail.com; ORCID ID: 0000-0003-3708-7712
Галицький О. М.
доктор економічних наук, доцент,
Одеський державний аграрний університет, Україна;
e-mail: oleksandrgalickij9@gmail.com; ORCID ID: 0000-0001-9549-7627
Лісовенко Д. В.
кандидат технічних наук, доцент,
Військова академія, м. Одеса, Україна;
e-mail: lisovenkodenis78@gmail.com; ORCID ID: 0000-0002-4255-2589
Федченко О. В.
старший викладач, Військова академія, м. Одеса, Україна;
e-mail: fedchtenko_alekc_@ukr.net

АНАЛІЗ РАЦІОНАЛЬНОСТІ ІНВЕСТИЦІЙНИХ РІШЕНЬ ВЕНЧУРНИХ КОМПАНІЙ ЗА КРИТЕРІЄМ ВАРТОСТІ

Анотація. Мета статті полягала в дослідженні методичного інструментарію проведення аналізу раціональності інвестиційних рішень венчурних компаній за критерієм вартості. Це пов'язано з тим, що аналізом раціональності інвестиційних рішень саме венчурних компаній у даний час займається невелика когорта вчених. Переважна більшість дослідників аналізують процес створення венчурного бізнесу і його здатність фінансувати розробку інноваційних продуктів і послуг, а питання менеджменту вартості венчурних компаній залишаються нерозглянутими. Виходячи з поставленої мети було проаналізовано стан розвитку венчурного бізнесу за участі корпоративного ринку в глобальних венчурних угодах, глобальному венчурному фінансуванні, розмір глобальної медіани угод венчурного фінансування за стадіями реалізації інноваційної підприємницької ідеї. Результатом статті стала систематизація теоретико-методичного інструментарію аналізу раціональності інвестиційних рішень венчурних компаній за критерієм вартості. Головним критерієм раціональності інвестиційних рішень виступає можливість повернення в перспективі вкладеного капіталу. Тому більшість світових венчурних компаній простежує абсолютну і відносну величини повернення інвестицій. Найбільш успішними вважаються вкладення з триразовим збільшенням вартості повернутого капіталу. Однак вони зазвичай займають невелику частку таких інвестиційних рішень (до 5 %). Решта балансують на межі нульового значення. Розглянувши стан розвитку венчурного бізнесу, теоретико-методичний інструментарій обґрунтування ухвалення інвестиційних рішень, який можна покласти в основу аналізу їхньої раціональності для венчурних компаній за критерієм вартості та окремі показники оцінки результативності венчурного фінансування дослідження дозволили зробити такі узагальнювальні висновки: інвестиційне рішення венчурної компанії є раціональним, якщо воно дозволяє збільшити її вартість в майбутньому; моделі раціонального інвестування беруть до уваги два основні критерії: прибутковість і ризикованість; не існує чітко сформульованих чинників, що визначають вартість венчурної компанії; усі моделі мають певні обмеження і складності щодо їхнього практичного застосування.

***Ключові слова*:** інвестиційні рішення, раціональність, венчурні компанії, венчурний капітал, вартість, модель.

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Репина И. Н.
доктор экономических наук, профессор,
Киевский национальный экономический университет им. Вадима Гетьмана, Украина;
e-mail: rephousenew@gmail.com; ORCID ID: 0000-0001-9141-0117

Кужель М. Ю.
кандидат экономических наук, доцент,
Киевский национальный экономический университет им. Вадима Гетьмана, Украина;
e-mail: marinakuzhel@gmail.com; ORCID ID: 0000-0003-3708-7712
Галицкий А. Н.
доктор экономических наук, доцент,
Одесский государственный аграрный университет, Украина;
e-mail: oleksandrgalickij9@gmail.com; ORCID ID: 0000-0001-9549-7627
Лисовенко Д. В.
кандидат технических наук, доцент,
Военная академия, г. Одесса, Украина;
e-mail: lisovenkodenis78@gmail.com; ORCID ID: 0000-0002-4255-2589
Федченко А. В.
старший преподаватель,
Военная академия, г. Одесса, Украина;
e-mail: fedchtenko_alekc_@ukr.net

АНАЛИЗ РАЦИОНАЛЬНОСТИ ИНВЕСТИЦИОННЫХ РЕШЕНИЙ ВЕНЧУРНЫХ КОМПАНИЙ ПО КРИТЕРИЮ СТОИМОСТИ

Аннотация. Проанализировано состояние развития венчурного бизнеса с участием корпоративного рынка в глобальных венчурных сделках, глобальном венчурном финансировании, размера глобальной медианы сделок венчурного финансирования по стадиям реализации инновационной предпринимательской идеи. Результатом статьи стала систематизация теоретико-методического инструментария анализа рациональности инвестиционных решений венчурных компаний по критерию стоимости. Исследование позволило сделать вывод о преимуществах и недостатках отдельных моделей анализа рациональности инвестиционных решений венчурных компаний.

Ключевые слова: инвестиционные решения, рациональность, венчурные компании, венчурный капитал, стоимость, модель.

Формул: 1; рис.: 4; табл.: 1; библ.: 19.

Introduction. The economic life of the twentieth century forces scientists to reconsider their views on particular processes and phenomena. This concerns both the search for successful business venture markers and the criteria for the risk justification that venture capitalists are consciously pursuing when financing entrepreneurial ideas. A lot of scientists believe that people are usually rational, and most often they act according to their preferences. Based on this, the investment decision-making process of venture capital companies should be considered as a rational process of finding people the best choice for investing, taking into account the available information about the investment object. Of course, the purpose of investment is to increase the value of such a transaction. Therefore, economists and scientists face the urgent task of developing an algorithm for analyzing the rationality of investment decisions of venture companies on the basis of value.

Research analysis and assignment. The problems of investment decision making have been considered by many scientists. The most outstanding achievements in this area were the following researchers: J. Williams [1], F. Modigliani [2], M. Miller [2], W. Sharpe [3], R. Baharun [4], T. Jing Mi [4], D. Streimikiene [4], A. Mardani [4], J. Shakeel [4], V. Nitsenko [4,5,6], V. Mukoviz [5], O. Sharapa [5], O. Yatsenko [6], T. Tananaiko [6], G. Markowitz [7], J. von Neumann [8], J. Lintner [9], E. Fama [10], L. Fisher [11], S. Ross [12], G. Stewart [13], O.P. Zinchenko [14], V.P. Ilchuk [14], L.F. Radziievska [14], V.M. Yevtushenko [14], V.L. Kysil [15], R.V. Sadlovskyi [15], I.M. Riepina [16,17], K.O. Raputa [16], O. Hrybinenko [17], N. Parieva [17], O. Parieva [17], I. Savenko [17], N. Durbalova [17], B.H. Pylypenko [18] etc.

Fundamental approaches to the evaluation of investment decisions have been developed in their works. However, a small cohort of scientists is now analyzing the rationality of investment

decisions of venture capital companies. This is due to the fact that the vast majority of researchers analyze the venture business creation process and its ability to fund the development of innovative products and services, while the value management issues of venture companies remain sidelined.

The purpose of the article is to investigate the methodological tools for analyzing the rationality of investment decisions of venture capital companies by value criteria.

Research results. Venture business is due to the emergence of the rapid development of small business in the United States in the late 1950s.Thanks to venture capital, small innovative firms were able to realize the entrepreneurial idea, and venture investors who deliberately went on risky investments received an income, which many times overweighed the initial investment. Thus the world knew about Silicon Valley, Microsoft, Intel and Apple Computer [14—16]. Later, thanks to venture capital, the leading high-tech companies DEC, Compaq, Sun Microsystems, Lotus and others were created.

The success of the American venture business in the 1960s and its dynamic development has attracted considerable attention of financial experts in other countries. That provided the impetus for the expansion of venture business in a number of European countries in the eighties. At this time the venture business infrastructure began to be formed, which has contributed to its development.

Venturecompaniesareassociatedwithinvestinginriskyinnovationprojects, as they are the main source of large profits. They choose companies that have potential and their ideas are new and can maximize profits in the future.

In the recent years, there has been a revival of corporate business activity in global venture agreements (*Fig. 1, 2*) [19].

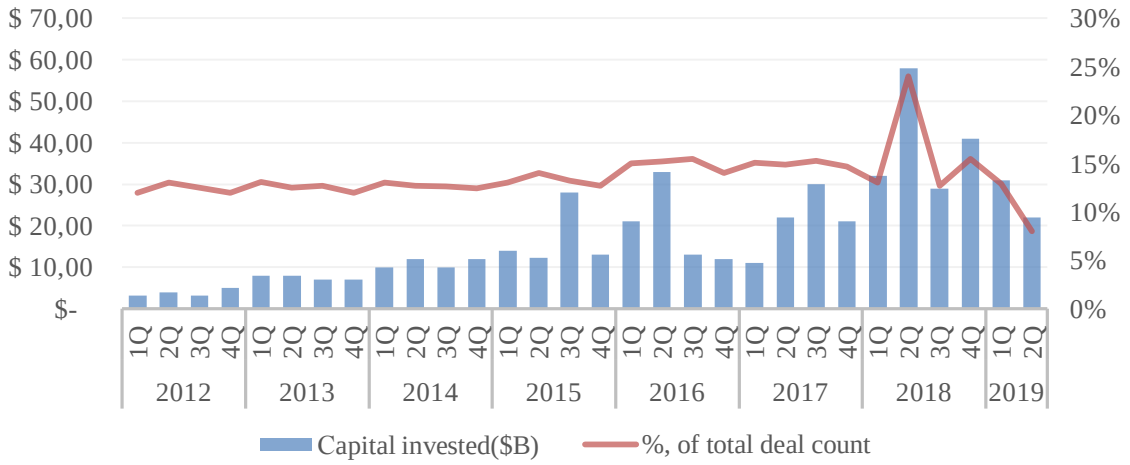

Fig. 1. Corporate Market Participation in Global Venture Transactions

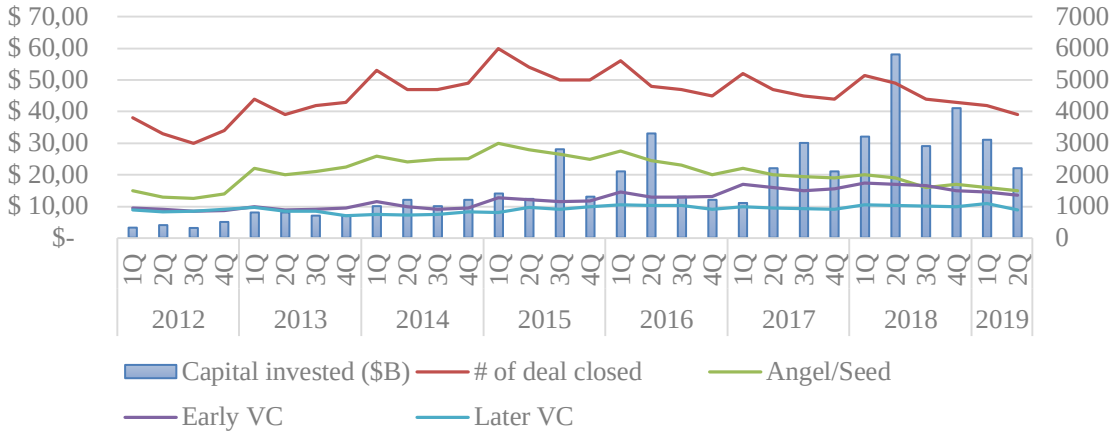

Fig. 2. Global Venture Financing in 2012 — 1st half of 2019

Fig. 1 and *2* show the record level of venture capital investments in 2018. The moderation of the first half of 2019 can be explained by the concerns related to the US-China trade war, based on a difficult Brexit situation, and increased tensions in Argentina and Turkey.

Venture companies are looking to create demand for new products and take a strong competitive position in the market. They are able to market a product, create demand for it and generate big profits. Therefore, they invest in different stages of the implementation of an innovative entrepreneurial idea (*Fig. 3*) [19].

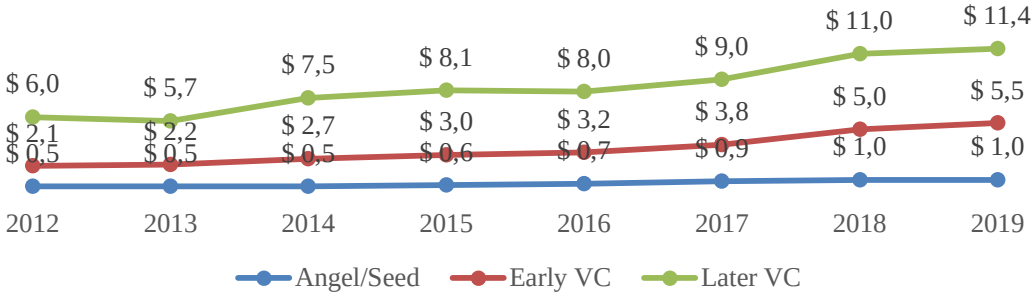

Fig. 3. Global Median Stage of Venture Financing Transactions by Stage, in million dollars

Despite a $ 1 billion shortfall, the US has continued to dominate investment over the past few years. The continent of America, which has invested more than $ 500 million annually, has recently completed funding rounds, including Flexport ($ 1 billion), DoorDash ($ 600 million), UiPath ($ 568 million), SpaceX ($ 535.7 million) and SoFi (500) millions of dollars).

Although the number of venture capital deals in Europe continued to decline, overall investment in startups remained strong in the first half of 2019 compared to previous quarters. While UK investment remains relatively weak comparatively to previous periods, corporate finance rounds in other European countries helped keep venture capital investment up: except Northvolt, other major funding rounds included GetYourGuide, which was created Germany ($ 484 million), Spain Glovoapp23 ($ 174.8 million), the Finnish company Wolt ($ 130 million), the French company Meero ($ 230 million) and ZnanyLekarz, based in Poland ($ 93 million).

One of the important aspects of venture capital activity is the acquisition of shares of an innovative firm, the management of its activities, as well as the expansion of production and product improvement.

The risks that arise during performance are shared between the project developer and the investor. There is no guarantee that the idea will be successful and profitable, so the pledge is the share of the shares of the innovative enterprise.

At different times, scientists have developed a sufficient theoretical and methodological toolkit to substantiate investment decisions that can be the basis for analyzing their rationality for venture capital companies by value criterion (*Table*).

The basis for the formation of theoretical and methodological tools for substantiating investment decisions is the work of Irwin Fischer «The theory of interest: how to determine real income in the investment decision process», which was published in 1930 and attracted public opinion to aggravate the problems of price and inflation. In the late 1930s, John Williams developed the theory of determining the value of investment projects through the analysis of discounted cash flow, which had a significant impact on the further development of investment theory [13; 14]. Its main idea is that investment decisions depend on two factors: expected returns and risk. However, when the model was considered, it was purely theoretical and did not have a developed basis for its practical application. In the late 1940s, John von Neumann and Oscar Morgenstern developed a theory of expected utility [1]. This theory is the result of the development of neoclassical theory of individual choice for risk situations. Neumann-Morgeshter's theory involves constructing a utility function for investors based on the values of future income, but taking into account their subjective preferences, actually choosing one or the other solution means choosing the probability distribution of the expected income, which in these circumstances is random.

Table

Theoretical and methodological tools for justifying investment decisions

Theoretical background	The gist
Fisher I. The Theory of Interest, 1930 [11]	The bottom line is that the true value of money is always higher than its future value due to the alternative of possible investment, as well as the impact of inflation and risk factors. Indicator: Discounted Cash Flow, DCF
Williams J. B. The Theory of Investment Value, 1938 [1]	The theory of determining the value of investment projects through the analysis of discounted cash flow.
Dzh. fon Neiman, Oskar Morhenshtern. Theory of Games and Economic Behavior, 1947 [8]	The main idea of Expected Utility Theory is that, at risk, the individual makes the investment decision based on maximizing expected utility.
Markowitz H. M. Portfolio Selection, 1952 [7]	The basis is the methodological principles of statistical analysis and optimization of the ratio of risk level and profitability of risky instruments of financial investment.
Modigliani F. The Cost of Capital, Corporation Finance and the Theory of Investment, 1958 [2]	The main idea is that investment decisions are only effective and expedient if they lead to an increase in the firm's market value.
Stewart G. The Quest for Value: a Guide for Senior Manager, 1962 [13]	The core of the proposed method is to calculate forecast cash flows, assess and account for the risk and determine the present value of cash flow. In this case, the discount rate should correspond to the degree of the confidence of the investor in obtaining future income, that is, to take into account the degree of risk associated with a particular investment. Therefore, as a discount rate should be used the yield of alternative investment solutions with similar or comparable risk. *Indicator:* Certainty Equivalent (CE), Risk-Adjusted Discount Rate (RADR)
Sharpe W. F. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, 1964 [3]	It is based on determining the required level of profitability of individual financial instruments of investment, taking into account the level of their systematic risk.
Lintner J. V. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, 1965 [9]	It is argued that investors are not risk averse and evaluate assets on only two parameters - the average expected return and the standard deviation of the random yield.
Fama E. F. Efficient Capital Markets: A Review of the Theory and Empirical Work, 1970 [10]	It reflects the dependence of the stock market's price performance on the level of information support of its participants. Depending on the conditions of participants' information support, a weak, medium (semi-strong) and strong stock market price performance should be distinguished.

* systematized by the authors.

On this basis, we can conclude that conceptually this theory does not differ from the theory of discounted cash flow previously considered, which also determines expected income and risk by the main factors of investment decision-making. However, it should be noted that the theory of expected utility has had a decisive influence on the further development of investment management. This theory is embodied in the works of G. Markowitz, W. Sharpe and others [1—13].

The main criteria of the rationality of investment decisions is the possibility of return on investment in the future [18]. Therefore, most of the world's venture capital firms are pursuing an absolute and relative return on investment. The most successful are investments with a threefold increase in the value of the repaid capital. However, they usually take up a small proportion of such investment decisions (up to 5%).The rest balance at the limit of zero (*Fig. 4*).

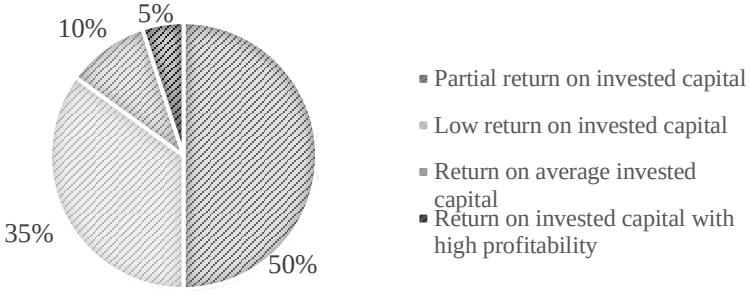

Fig. 4. Percentage of return on investment by venture capital firms

Ukrainian researcher B.G. Pylipenko [18] suggested the economic criteria for deciding on the feasibility of implementing projects by venture investors, the idea of which is to compare the venture capital investment return for a particular venture investor with a capitalized rate of interest on alternative investment (lost opportunity rates) for 6:

$$\left(\frac{V \cdot I^N}{(1+r)^m}\right) / \left(\sum_{i=1}^{n} \text{Inv}_i^N \cdot (1+r)^n\right) > (1+R)^m,$$

where $V \cdot I^N$ is the total income of a venture investor of the N round of financing from the holding of common and / or preferred shares, UAH; Inv_i^N is volume of investments made by the investor of N round of venture financing, UAH; r is the discount rate (internal rate of return of the venture project),%; n is number of periods of investment, years; m is number of periods before the venture investor first round of financing from the invested enterprise, years; R is lost opportunity rate,%.

The rate of lost opportunity is determined by the investors' propensity to invest alternatively in other assets: property, deposit programs, portfolio securities, banking metals, etc. This rate is recommended to be calculated as the weighted average venture capital cost (WACVC), which reflects the minimum rate of return that would be expected from alternative investment by venture investors and creditors of their funds, and is calculated as the average of the value of individual investment units, for the period of venture investment of an innovative enterprise. Venture investors' aggregate profit is generated as a result of the increase in the venture company's market value.

Conclusions. Considering the state of development of venture business, the theoretical and methodological toolkit for substantiating investment decisions, which can be based on the analysis of their rationality for venture capital companies on the criterion of value and some indicators of evaluating the effectiveness of venture financing can be summarized as followed:

- an investment decision of a venture company is rational if it allows to increase its value in the future
- models of rational investment take into account two main criterion: profitability and riskiness;
- there are no clearly stated factors that determine the value of a venture capital firm;
- all models have some limitations and difficulties in their practical application.

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