УДК 330.322.1

THE THEORETICAL AND METHODOLOGICAL BASIS OF STARTUPS VALUATION

M.V. Kotova, Ph.D., senior lecturer

Odessa national polytechnic university, Odessa, Ukraine

Котова М.В. Теоретико-методичні засади оцінки вартості стартапів.

Проаналізовано підходи до визначення сутнісних характеристик основних методів оцінки вартості венчурного бізнесу. Запропоновано оцінка вартість активів на основі теорії реальних опціонів. Визначено критерії та оцінка вартості стартапів.

Ключові слова: ризик, оцінка, венчурний бізнес, ефективність

Котова М.В. Теоретико-методические основы оценки стоимости стартапов.

Проанализированы подходы к определению сущностных характеристик основных методов оценки стоимости венчурного бизнеса. Предложена оценка стоимости активов на основе реальных опционов. Определены критерии и оценка стоимости стартапов.

Ключевые слова: риск, оценка, венчурный бизнес, эффективность

Kotova M.V. The theoretical and methodological basis of startups valuation.

The approaches to defining the essential characteristics of the main methods of venture business valuation are analyzed. The value of assets on the basis of the real options theory is suggested. Criteria and valuation of startup cost are defined.

Keywords: risk, valuation, venture business, efficiency

Due to the increasing role of innovations in the economic modernization process, there is a growing need for determining the appropriateness of investing in venture business.

Venture business is a risky scientific, technical or technological business, requiring, as a rule, significant investments. Typically, investments are made in terms of receiving rights for business management (stake in the business). Thanks to the investments venture enterprises have the opportunity to enter the next level of development that repeatedly increases their cost. The process of venture enterprise's growth and development is divided into stages: pre-startup – the stage on which the business idea and prototype are developed, a new product (service) is created and passes its first test; startup stage involves full product or service launch and work with the first customers; post-startup is a stage of business's growth and expansion with subsequent initial public offerings on the stock exchange (for joint stock companies).

In conditions of investments risk an important question is to determine the appropriateness of venture capital funding on startup stage and to explore further investment.

Analysis of recent researches and publications

Scientists V.V. Grigoriev, A.G. Gryaznova, V.E. Yesipov, N.V. Kovalenko. O.O. Tereshchenko, V.O. Shevchuk [1-6] and others researched methods of companies valuation, investment efficiency. Thus, N.V. Kovalenko recommended evaluating projects taking into account the balance of investment subjects' interests. V.O. Shevchuk suggested conceptual approach to determining companies valuation. At the same time question of startups assessing remains poorly studied, that has caused the general direction of research.

The purpose of article

The aim of the presented research results is determining the criteria and venture business valuation at startup stage.

The main material

To assess the value of the business and to determine the appropriateness of investing for enterprises that have been working in the market for a long time management application programs are created, most of which are implemented on similar principles and compete with each other in terms of functionality. Startups do not have a single model of functioning, and applying certain approaches depends on the specifics of problems being solved.

There are a number of difficulties in the startups assessment:

— high degree of activity efficiency's uncertainty, caused by work in new markets or by new business models;
— complexity in information detailing (about cash flows and the amount of reinvestments);
— uncertainty in business evaluating, which increases with the expansion of planning horizon;
— no income at the time of startup assessment;
— risks of the business value changes, which is associated with a significant proportion of intangible assets.

Therefore, when evaluating startups we need to:

— use different methods for business evaluating. To cope with the difficulties in the cash flow and value assessment, analysts often use several methods, focusing on indicators of similar companies;
— use a discount rate, as a means of uncertainty measurement, including risks, associated with investing in business (sensitivity to macroeconomic conditions, probability that the business will be liquidated or it would not have a commercial success);
— correct the necessary share for investors.

The most common in venture business assessing are: venture capital method, market multiples method, discounted cash flow method, real options method.

Innovative business valuation using the venture capital method includes four main steps.

Step 1. Estimation of expected income or profits in the future, planning horizon is normally 2-5 years.

In most cases, forecast period is set according to the time, when the venture capitalist is planning to sell a business or related to initial public offerings on the stock market (IPO).

When evaluating the expected revenue for a startup, which success is closely linked to the recruited audience of customers, it is possible to use the method of assessment of potential audience by the client cost, when the expected revenue is determined by multiplying the expected number of future customers on their current value or weighted yield.

Step 2. Calculating the value of capital (business) at the end of the forecast period.

It is possible to calculate the final cost by using the method of comparison with similar businesses. To make a comparison, venture investors are choosing several mature and liquid companies, whose characteristics mostly correspond to business profile.

It should be noted, that the choice of analogues significantly affects the valuation. Therefore, some similar businesses can be more attractive for investors, others – for business owners.

Step 3. Assessment of current value of the company taking into account the expected rate of return.

Required (expected) rate of return is set at a high level, to take into account the riskiness of investments in venture business.

Stage of venture companies' development, related to the level of investment risk, plays a key role in business assessing. There is a direct correlation between the stage of development and the market value of venture enterprise that is displayed on the expected level of profitability.

At the pre-startup stage investor requires a profitability of 80% and more, the profitability at the startup stage stands at 50-70%, at the post-startup stage – 25-50% accordingly.

Step 4. Determination of investor's share (ownership interest), as the ratio between investments and the present value of the enterprise, including investments.

There are several problems when calculating the enterprise value using the venture capital method. The indicators that are accepted in the calculation are a subject of dispute between the owners and investors, forecasted values of the rate of return and the investor's share in the business become a bargaining point between the two sides.

The assessment using the venture capital method is used for short-term forecasting; it is based on the current indicators of similar enterprises' activity.

There is uncertainty, associated with using the same expected rate of return indicator for several years. Depending on the successful implementation, on the product life cycle, rate of return varies, this fact is not considered in the calculations.

The market multipliers method is a simple technique; it is often used in venture capital evaluating. Firstly, we should find the data (sales, revenues, profits) that is used for similar businesses' start-ups. On the basis of these data we form the multiplier that is applied to key indicators of business' value creation.

The cost of venture business (S_i) at the time of exit is calculated using the formula:

$$S = M \times \text{Expected Revenues}, \qquad (1)$$

where M – the value of numerical multiplier.

Difficulties in the application of this technique are connected with finding an appropriate analogue, due to differences in geographic factors, markets, business models, scale effect. In addition, the similar enterprise has already made success in the market, while most startups fail, so this assessment brings uncertainty, showing the value of the business in case of its success.

In any case, when assessing company, we should focus on the key factors of value creation. For example, McKinsey experts as part of their model of the Internet business's "McKinsey Performance" efficiency evaluation use three groups of factors: factors of visitors attracting (attendance of a site and the cost of new users attracting); buying activity (the proportion of visitors who make purchases and orders; growth rates of revenues from main products sales, time spent by visitors surfing the site); constancy of audience (the proportion of purchases or orders made by regular customers in sales income, ratio of the regular customers number to the total users number, regular customers' growth rate).

When assessing the future cash flows of companies (investment projects) the capitalization and discounted cash flow methods are used.

The income capitalization method is used when projected future income is stable, which is not suitable for startups assessing. So, from the classic methods, discounted cash flow method (further DCF) is more appropriate for venture business assessing.

DCF model is a method for estimating the intrinsic value of the business (assets), taking into consideration the forecasts of all funds, that business can make available for investors in the future.

DCF method has forecast nature and depends more on future expectations, than on the historical results, based on free cash flows (FCF), which are less amenable to manipulations, than other figures and ratios, which are calculated on the basis of income statement and balance sheet.

DCF has weaknesses, particularly, small changes in the input parameters can lead to significant changes in the business value.

In its pure form using this method is problematic: with the existing cash flow and high rates of growth, and due to the absence of business operation history, its cost will be significantly underestimated. For adequate innovative business's evaluation it is necessary to adjust the classical DCF by this method, to take into account a high level of uncertainty.

In A. Demodaran's studies [7] the approach to the start-ups evaluation is presented; it takes into account the specific characteristics of venture business.

Overall, the application of the method involves a number of stages.

At the first stage the future cash flows are estimated. As mentioned earlier, many analysts recommend assessment of startups in the short term. DCF method makes it possible to extend the planning horizon.

There are two ways of future cash flows' estimating. "Top down" method initially involves evaluation of overall market volume for the developed product (service), and then the revenue and net profit of business are calculated.

When "bottom up" estimating, at first the opportunities of investor are examined, then sales volumes, operating costs, necessary reinvestments are evaluated. Net cash flows are forecasted in limited investment opportunities.

Let us consider in detail the assessment of future cash flows using the "top down" method.

The assessment of future cash flows using the "top down" method begins with an assessment of the total market for the product (service). Essentially, at first potential revenues are estimated, and then the necessity for the capital is calculated.

The first step in assessing the income is assessment of the potential market for the product (service) wherefore market size, market growth rate are estimated. Then we calculate the market share, for which a venture business will be claiming in the future. Assessments will depend on the quality, novelty, uniqueness of the proposed product or service, potential of business management. Optimistic predictions about market shares must be accompanied by large investments in production and marketing.

The next step is the operating margin evaluation. There are some difficulties when evaluating the operating margin, due to lack of business history, significant operating losses at the stage of business development. When forecasting the operating margin, we should focus on the successfully functioning companies in the market. After finding the target margin level, the expected profitability can be calculated. When evaluating the operating margin it is necessary to determine the detailing level. In other words, the operating margin assessment is done or we should predict in detail such costs as wages, materials, sale and advertising. The general rule is: level of detailing should decrease while reducing confidence in the future of business.

Then, amount of reinvestments to generate annual projected business growth is calculated. For venture business reinvestments will firstly be directed to coverage of negative cash flow. That is, at the initial stages of new business functioning additional investments may be required.

After determining the operating margin and revenues before tax, operating profit after tax should be calculated.

Before determining future cash flows by using "top down" method, it is necessary to verify the absence of contradictions. Since the operating income and reinvestments are individually assessed, there is a possibility of these indicators' inconsistency.

Invested capital profitability index is used to check for conformity. Invested capital profitability index by industry is compared with such index for venture business, when given business will reach a sustainable position in the market. If invested capital profitability index for venture business is higher than the industry's, projected reinvestments are insufficient, the correction of calculations should be carried out. On the contrary, If invested capital profitability index is lower, the reinvestment amount is too high. After verifying the absence of contradictions, final calculation of free cash flow indicators is made (FCF) taking into account the annual reinvestments.

At the second stage of DCF method is the discount rate determined. Methods that are suitable for venture business on startup stage include cumulative method and the method of capital assets evaluation.

Cumulative method involves, that the discount rate includes a minimum guaranteed rate of return, inflation rate and the coefficient that takes into account the degree of risk and other specific features of a particular investment. Calculation formula:

$$i = r + inf + g , \qquad (2)$$

where i – the discount rate;
r – the risk-free rate or minimally guaranteed rate of return;
Inf – the inflation rate;
g – the risk premium.

As a result of assessments it is necessary to identify [8]:
— Minimally guaranteed (risk-free) rate of return in the country (r), inflationary processes (Inf). The risk-free rate of return is usually determined

basing on the long-term government bonds' rate of return. This choice is caused by the fact that long-term government bonds are characterized by low risk, related to insolvency, by high degree of liquidity. Moreover, when determining the rate of return with this type of securities, the long-term impact of inflation is taken into account. However, in current market conditions, long-term bonds do not reflect the real rate of return with minimal risk and are determined primarily by political, not by economic factors. Therefore, it is recommended to use the average rate of long-term currency deposits in largest Ukrainian banks as a risk-free (taking into account the inflationary process (r + Inf)).

— Risk rate or risk premium (g). This rate takes into account such risks: insufficient products diversification (products of one type dominate in the structure of production); insufficient diversification of commodity markets (orientation on a strictly limited category of consumers); small business size (shortage of property funds when it is necessary to cover the invested funds); country risk and lack of information about the business implementation prospects.

It is advisable to group the rate risk by levels: I risk level – regional and industry risks; II risk level – risk of investing in a particular business.

I risk level. For a preliminary study of risk sectors (markets), you first need to estimate the share of industries in total production in the country, to make a comparative analysis of industries (markets) by different groups of indicators: gross indexes of dynamics (absolute increase of output; absolute increase of profit), financial ratios (the total profitability coefficient; share of production per employee; the average share of profit over all enterprises in the industry), relative structure indicators (employment structure by sectors; structure of profit by sectors (markets), index indicators (index of production's physical volume; index of profit; profitability index).

On the basis of performed calculations we should make conclusions about the investment attractiveness of an industry (market), estimate the overall risk of investing in given sector (market).

II risk level. The risk of investing in certain (particular) business takes into account several most important factors: the size and financial structure of business, quality of management, production and territorial diversification etc.

It should be noted, that the cumulative method for determining the discount rate entirely based on the use of expert assessments, and therefore, is inherently subjective. The calculated rate of discount may differ across the investors.

The capital assets assessment method is based on the analysis of changes in profitability of stocks, which are freely circulating on the stock market. There is a complexity of applying this methodology to calculate the beta coefficient for startups, due to lack of diversification factor, the history of venture business functioning.

Lack of capital diversification (due to the fact that startup founders focused on investing in their own business) takes into account the correlation coefficient between enterprises, whose shares are traded on the public market and the market sector in which these businesses operate.

So for venture business over time and after attracting investors, expansion of investments portfolio, the correlation coefficient (β) will change:

$$\beta = \frac{\text{Market beta}}{\text{Correlation with market}}, \qquad (3)$$

where Market beta - the market beta for startups target market;

Correlation with market – correlation between indicators, demonstrated by the overall market and by startup. The index will be closer to 1 with the expansion of sales volume, startup profits.

Further, in case of debt capital presence, discount rate should be corrected, after weighing the proportion of debt and sharing investments.

At the third stage of DCF method we evaluate the final cost of business (terminal value) forecasting for now the exit of investor from the business or startup's readiness for public sale of shares.

One way to calculate the final value of the business is using the Gordon model. In this model the cash flows after the forecast period ($FCFF_{(t+1)}$) are capitalized using the coefficient, calculated as the difference between the discount rate and long-term growth rates:

$$\text{Terminal value}_t = \frac{FCFF_{(t+1)}}{(1 - \text{Stable growth rate})}, \qquad (4)$$

where FCFF (t+1) – free cash flow at the time of investor's withdrawal from business;

Stable growth rate – long-term growth rates of business.

Next you define the current value of business:

$$S_i = M * \text{Expected Revenues}, \qquad (5)$$

On the fourth stage we evaluate the viability of business, taking into account the possibility of survival in this market:

$$\text{Expected present value} = \text{Present value}(1\text{-Probability of failure}), \qquad (6)$$

where Probability of failure - the possibility of failure (collapse) in the business.

If the success of a business depends on the presence of certain persons in the state (key employees), it is advisable to calculate the change in value of the business (Key personal discount) in case of their dismissal:

$$\text{Key personal discount} = \frac{\text{Value of firm} - \text{Value of firm}_{keypersonlost}}{\text{Value of firm}}, \qquad (7)$$

where Value of firm$_{key person lost}$ – value of the firm in case of key staff dismissal.

In contrast to the discounted cash flow method, which takes into account only revenues and expenditures of funds, real options method allows considering quantitative evaluation of strategic business opportunities, value of intangible assets. To assess the value of real options we use the Black - Scholes model:

$$V_2 = S * N(d_1) - K * e^{-rt} * N(d_2) \qquad (8)$$

Here with

$$d_1 = \frac{Ln\left(\frac{S}{K}\right) + \left(r - y + \frac{\delta^2}{2}\right) * t}{\delta * \sqrt{t}} \qquad (9)$$

$$d_2 = d_1 - \delta * \sqrt{t} \qquad (10)$$

where S – the present value of the underlying asset – present value of expected cash flows from the project launch today, (PV (FCFF));

K – option exercise price (value of investments required for the project's implementation);

t – term of the option's life – the period of time remaining until its expiration (number of years, during which a startup will have exclusive rights to the project realization);

r – risk-free interest rate, in accordance to the life of the option on an annualized basis;

y – dividend yield of the asset (cost of postponement (investments delay));

δ – standard (rms) deviation of the coefficient's natural logarithm, showing the change in value of underlying asset (rms deviation of cash flows for the project).

Analysis of options' value assessing model demonstrates, real that the price of the option is higher when the present value of expected cash flows grows, the cost of project implementation is lower, there is more time before the expiry of the option implementing – a greater risk.

The greatest impact on the increase in option's value has the present value of expected cash flows

The main difficulties that may arise when applying the Black – Scholes model are associated with obtaining reliable data, required to calculate the rms deviation.

Using the real options method is appropriate for venture business evaluation, when the following conditions are satisfied: result of the project is associated with a high level of uncertainty;

management of the company is able to make flexible management decisions if new data on project appears; financial result largely depends on intangible assets, which are in the process of developing and commercial viability of which is difficult to prove.

With the help of the real options method it is possible to calculate that part of business cost, which is created through the uniqueness of the product, having significant competitive advantages in the market, effective management.

Conclusions

According to results of the research, the criteria by which the startups are estimated were determined: the current business cost; proposed rate of return; viability and conditions of exit from the business; risks level and the prospect of their minimizing; stable growth of the industry (market), targeted by the product (service); final cost for the period of investor's withdrawal from business.

Formal application of corporate valuation methods leads to the provision of irrelevant information. In the situation of the venture capital business, there is a considerable share of subjectivity. Business valuation is the subject of negotiations between investors and owners, when the parties are trying to agree about the share in the capital and rate of return.

Under these conditions, when evaluating future cash flows, final cost and viability of startups it is reasonable to use discounted cash flow method, taking into account the specifics of venture business. Valuations of assets having option characteristics should be performed according to the real options method.

The peculiarities of the startups functioning allow normalizing the evaluation methodology and optimizing the process of funds attracting in the venture capital business.

References:

1. Григорьев В.В. Оценка предприятия: теория и практика / В.В. Григорьев, М.А. Федотова. – М.: НОРМА-ИНФРА-М, 2006. – 320 с.
2. Грязнова А.Г. Оценка бизнеса: учебное пособие / А.Г. Грязнова, М.А. Федотова. – М.: Финансы и статистика, 2001. – 514 с. 3. Есипов В.Е. Оценка бизнеса / В.Е. Есипов, Г.А. Маховикова, В.В. Терехова. – СПб.: Питер, 2006. – 464 с.
3. Коваленко Н.В., Мархайчук М.М., Аналіз привабливості інвестиційного проекту з урахуванням балансу інтересів суб'єктів інвестиційного процесу / Коваленко Н.В., М.М. Мархайчук // Вісник економічної науки України. – 2013. – № 1. – С. 51 – 55.
4. Корягін М., Шевчук В. Теоретико-методологічні засади оцінки вартості підприємства / М. Корягін., В. Шевчук // Економіст. – 2012. – № 10. – С. 58 – 60.
5. Терещенко О.О. Фінансова діяльність суб'єктів господарювання: Навч. Посібник/ О.О. Терещенко – К.: КНЕУ, 2003. – 554 с.
6. Aswath Damodaran. Valuing Young, Start-up and Growth Companies: Estimation Issues and Valuation Challenges *[Електронний ресурс]* – Режим доступу: – http://www.stern.nyu.edu /~adamodar/younggrowth.pdf

7. Котова М.В., Шаповал С.С. Обоснование методики расчетов ставки дисконтирования в отечественной практике / М.В. Котова, С.С. Шаповал // Економічний простір: Збірник наукових праць. – Дніпропетровськ: ПДАБА, 2009. – Вип.22/1 – С. 92 – 99.

Котова Марина Володимирівна / Marina V. Kotova

MarinaKo@i.ua