APPLICATION OF COMBINED MODELING METHODS FOR ESTIMATING AND FORECASTING THE BUSINESS VALUE OF INTERNATIONAL CORPORATIONS

Igor Kryvovyazyuk

Department of Entrepreneurship, Trade and Stock Exchange Activity, Lutsk National Technical University, Lutsk, Ukraine

Serhii Smerichevskyi

Marketing Department, National Aviation University, Kiev, Ukraine

Olha Myshko

Department of Entrepreneurship, Trade and Stock Exchange Activity, Lutsk National Technical University, Lutsk, Ukraine

Iryna Oleksandrenko

Department of Finance, Banking and Insurance, Lutsk National Technical University, Lutsk, Ukraine

Viktoriia Dorosh

Department of Finance, Banking and Insurance, Lutsk National Technical University, Lutsk, Ukraine

Tetiana Visyna

Department of International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine

ABSTRACT

The purpose of the research is to study the feasibility of using the combined modeling method in evaluation of business value. Modern approaches and methods of evaluating business value and the possibilities of combining them are explored. The peculiarities of the methodology of evaluating the business value by methods of Gordon Growth Model and Exit Multiple are disclosed. During the research the fair value of Luxoft company and the reasons for its deviation from the cost of sale are found. Luxoft's business value forecast is calculated by 2023. Recommendations for further development of the field of knowledge of modern business analyst are given.

Application of Combined Modeling Methods for Estimating and Forecasting the Business Value
of International Corporations

1. INTRODUCTION

In an unstable economic environment, it is important for company managers to constantly control the current situation in running their own business and understand how it may change in the future. That is why, while making strategically important decisions (selling a business, reorganizing it, buying and selling shares, property insurance, project investment for business development, etc.), it is of the utmost importance to deepen such a field of knowledge of modern business analysts as evaluation of business value in order to obtain a comprehensive vision of position and potential of the company in the market. This enables finding ways to increase the effectiveness of the company, increase the effectiveness of investment decisions, determine the creditworthiness of the company, provides a clear idea of the business value. At the same time, the conditions of business formation and development are constantly getting more complicated, not only the business environment but also the system of knowledge possessed by the business analyst is changing. As a result, this requires exploring new approaches, and in particular combined modeling while making strategically important decisions including evaluation of business value. This approach helps to establish the fair value of the company and increase the reliability of its forecasted results in the long term.

2. LITERATURE REVIEW

The field of knowledge of modern business analytics is constantly changing, expanding and integrating into the system of new knowledge, acquiring new characteristics, influencing the quality of information prepared for managers and increasing the flexibility and efficiency of companies (Ashrafi et al., 2019; Torres et al., 2018). Business analytics, now more than ever, is influencing companies' development strategies, setting strategic management priorities. Evaluation of the business value is now an integral and important component of strategic management, both in the context of assessing a company's strategic position in the market and in the context of effectively managing its strategic opportunities (Kryvovyazyuk & Strilchuk, 2016a,b). Such evaluation acts as an analytical tool which purpose is to measure the effects, effectiveness and consequences of the implementation of development programs, to identify changes in the results in order to prepare the necessary ground for strategic decisions.

It should be emphasized that the problems of analyzing the different approaches to evaluation of the business value and the key methods and models in the context of each of them, developing sound strategies for identifying and measuring the value of control in any business, clarifying the factors affecting the business value, are increasingly rising in scientific research (Damodaran, 2006). For example, it concerns financial valuation in the context of disclosure of standards for its implementation, existing approaches in evaluation of the business value, fair value determination, resolution of disputes, expediency of using its models (Samonas, 2015; Hitchner, 2017). It is also important to determine the factors influencing the value of the business. In particular, the research found that 1% change in equity causes 1.183% change in the value of the firm, as well as 1% change in the short-term

debt causes 0.362% change in the value of the firm, in addition 1% change in change long-term debt causes 0.163% change in the value of the firm (Altan & Arkan, 2011).

During the valuation of the company, it is necessary to find such methods that will allow to evaluate the business adequately, taking into account the purpose of evaluation and limitations in their use, as well as the peculiarities of the company functioning. It is now common to distinguish three approaches to evaluation of the business value – revenue, cost and market, which use methods of direct capitalization and cash flow discounting, net assets evaluation, liquidation value, analog companies, as well as market transactions and multiplier methods (Kutsyk & Yavtuhovska, 2015; Nedospasova, 2019). A critical analysis of existing approaches and methods has shown that they are predominantly applied to large enterprises and less to small and medium-sized enterprises (Marcello & Pozzoli, 2019). This is due to the standardization of models of evaluation that are more suitable for big business, whereas creating different sets of assessment can damage the evaluation of adequate business value. Thus, one common method used to value small businesses is based on the seller's discretionary earnings (SDE). This method can be used to value a business for sale as well as raising capital (Newcomer-Dyer, 2019). However, it is difficult to apply to big business. Adaptation of standardized models allows large-scale application, especially in the field of business of public companies, which is their major advantage.

Considering that standardized models cannot be used for all types of companies, and unified ones harm the establishment of adequate business value, it is advised to use combined modeling. It is difficult to create your own model, but the science has already developed a mechanism for creating business models, which is used to evaluate business opportunities (Tennent & Friend, 2011). However, in each case of the study, internal and external factors of influence should be taken into account, so there may be quite a number of options for combining methods and models. In particular, Business Value Analysis (BVA) can be performed using GQM + Strategies, which is designed to aid in the definition and alignment of business goals, strategies, and an integrated measurement program at all levels in the organization (Mandic et al., 2010). Another point is on using CAPM. Despite that market imperfections call into question the suitability of the CAPM for deriving the cost of capital, the valuation result of the CAPM can be derived using the approach of imperfect replication (Gleißner & Ernst, 2019). A combination of a process and a variance model is also proposed to determine the impact of business analytics on business value (Seddon, 2017). It allows improving the analyze-insight-decision-action process and determines the factors for generating additional profit for companies. That is, the use of combined modeling in the evaluation of the company value is the best recipe for obtaining the results adequate to the market conditions.

3. METHODOLOGY

As the foundation for applied research the sector of IT companies has been selected (in particular, Luxoft), which are increasingly being the object of assessment (Kryvovyazyuk & Kulyk, 2013; Sun et al., 2016; McKinsey & Company Inc. et al., 2020), as information technologies provide more and more opportunities for firms (Vitari & Raguseo, 2016). Such companies are growing rapidly, so investors have an interest in adequate evaluation of their value.

In this article, research is conducted using such methods and models as CAPM, DCFM, TGRM, GGM, EM. To obtain information databases, a targeted sampling method based on summary and synthesis of statistics was used. The study period covers from 2016 to 2023. The choice of such boundaries of the study period is explained by the slowdown in the growth of the IT market (lower limit) and the predicted 'technological boom', which is to take place

in 2023 (upper limit). The final results were obtained based on the forecast of intermediate GDP and Consumer Price Index values for 2023–2050 years.

It is suggested to use Gordon Growth Model and Exit Multiple methods to realize business value evaluation through combined modeling. In order to analyze the dynamics of the target price of the stock at the end of the forecast period, it is necessary to combine the DCFM (Discounted Cash Flow Model) and the method of comparing the company's value by market approach. These methods will be equally influential because the market where IT companies operate is innovative and high-risk one. To determine the cost of equity the modified Capital Asset Pricing Model (CAPM) should be used, based on agreed change of the risk-free interest rate on 20-year US Treasury Bonds (RFR), the Equity Investment Risk Premium (EIRP), and big company investment risk premium (RP) that should be adjusted for market risk for securities, which reflects the volatility of returns of the security compared to the securities of competitors (β):

$$CAPM = (RFR + EIRP + RP) \times \beta. \qquad (1)$$

The Terminal Growth Rate Model (TGRM) will be defined as the Average Consumer Price Index (CPI) multiplied by the Gross Domestic Product (GDP) Growth Rate:

$$TGRM = CPI \times \text{GDP}. \qquad (2)$$

The Target Price of Share (TPS) by Gordon Growth Model and Exit Multiple is determined based on Enterprise Value (EV), Net Debt (ND) and Number of shares (average) (NofS):

$$TPS = (EV - ND) \div \text{NofS}. \qquad (3)$$

To calculate Free Cash Flow to the Firm (FCFF) and their growth rates for the period 2015–2020, we determine Earnings Before Interest After Taxes (EBIAT) based on indicators of Revenue (Rev), Cost of Goods Sold (CGS) and Expenses (Ex), and adjust the resulting value with Depreciation (DA), capital expenditure (CAPEX) and net working capital gain (ΔWC):

$$EBIAT = Rev - CGS - Ex, \qquad (4)$$
$$FCFF = EBIAT + DA - CAPEX - \Delta WC. \qquad (5)$$

Subsequently, net cash flows are discounted and the forecasted value of the IT company is calculated. Recommendations for further use of methodology of business value evaluation are given.

4. RESULTS AND DISCUSSION

Luxoft was sold to DXC Technology in 2019 for $ 2 billion, at a share price of $ 58 (SEC Report, 2019). How fair was the cost?

An assessment of the market risk of the securities of the company relative to its competitors revealed that the majority of competitors carry out high-risk activities in the IT market (Table 1).

Table 1 Results of calculation for β-factor for competing companies

Indicators	Beta
Accenture	1.12
Wipro	0.46
TCS	1.65
Epam Systems	1.44
Median	1.28

Igor Kryvovyazyuk, Serhii Smerichevskyi, Olha Myshko, Iryna Oleksandrenko, Viktoriia Dorosh and Tetiana Visyna

In determining the value of the Luxoft business based on the CAPM model, Equity Investment Risk Premium was found to be 5.84%. This indicator does not include additional risks, which is responsible for diversifying the company's earnings in different currencies. The estimated cost of Equity was 9.84% (Table 2).

Table 2 β-factor calculation and CAPM models for LUXOFT

Indicators	Estimated value
for Beta	
Covarience	0.000862
Varience	0.000736
Luxoft`s beta	1.17
for CAPM (Cost of equity)	
Risk-free rate	2.57
Equity Investment Risk Premium	5.84
Cost of equity	9.84

In the developed model term growth is driven by the growth of two key indicators – GDP and the Consumer Price Index in those countries and regions where the company operates. The average growth of each of these indicators over the period 2023–2050 is taken into account. As a result, the average annual GDP growth rate was 3.40% and the consumer price index–1.5%, respectively. The forecasted growth rate will be 4.96%.

The results of the Luxoft target value calculations based on Gordon Growth Model and Exit Multiple are presented in Table 3.

As a result, the value of Luxoft in 2023 will be: for Gordon Growth Model 2197287 thousand dollars, for Exit Multiple–1893006 thousand dollars. The price of one company share in 2023 will be: for Gordon Growth Model–65.45 dollars, for Exit Multiple–56.39 dollars.

The fair value of Luxoft will be 2045147 thousand dollars.

Table 3 Calculation of the company's target value and shares for 2023

Indicators	Estimated value
Gordon Growth Model	
Estimated discounted value, thousand dollars	3060712
Cost of the company, thousand dollars	2306177
Net debt, thousand dollars	108890
Value of the company is adjusted by net debt, thousand dollars	2197287
Target share price, dollars	65.45
Exit Multiple	
Exit Multiple (company value / operating profit)	12.2
Estimated discounted value, thousand dollars	2594071
Cost of the company, thousand dollars	2001896
Net debt, thousand dollars	108890
Value of the company is adjusted by net debt, thousand dollars	1893006
Target share price, dollars	56.39

Revenue forecast: The company's total revenue will grow by 11.35% (from 906 to 1552000 thousand dollars in 2018–2023). This indicator is defined as the average weighted growth dynamics of all segments in which the company conducts its business (growth rates by segments of activity: financial services–14.84%; transport services–12.0%; information

services–22.0%; telecommunications–19.1%; media–30.0%; healthcare–43.5%; technology–19.17%; travel and air travel–7.8%; energy–21.05%; agribusiness–19.5 %; logistics–33.0%; production– 13.3% (Luxoft Holding, Inc., 2019).

The final results of the forecast are presented in Table 4.

Table 4 Financial indicators forecasting

Indicators	Periods							
	The actual period			Estimated period				
	2016	2017	2018	2019	2020	2021	2022	2023
Revenue from sales, thousand dollars	650752	785561	906000	1033957	1181125	1352416	1552035	1629015
Earnings Before Interest After Taxes, thousand dollars	71300	64701	55433	78867	81853	83754	84116	70256
Net cash flows, thousand dollars	63741	76035	36583	77473	85157	97936	112965	136537
Growth rate,%	17,60	19,30	-51,90	111,8	9,90	15,00	15,30	20,90

Summarizing the research findings, it can be noted that the forecasted stock price and the fair value of the company that were obtained for 2023 is close to its 2019 sale price. The reason for this, believed to be a slightly inflated purchase price for the company. Considering similar cases of buying companies in this field, it should be noted that the phenomenon of buying with an overpriced price is the normal occurance, but, usually, for a certain period of time the price is somewhat reduced. That is why we predict that the company will return to such indicators in 2023, but in this case they will be real for Luxoft.

5. RECOMMENDATIONS

The further application of Business Evaluation Methodology using methods of the Gordon Growth Model and Exit Multiple requires substantiated results at each stage of the evaluation. The resulting business value should be compared with the trends of stock prices of companies in the stock market in order to make further strategic decisions regarding the buying and selling of business. It should be noted: the results of the studies will be more accurate the longer the time lag will be taken as an estimate. It will provide further development of the sphere of knowledge of modern business analyst.

6. CONCLUSION

Strategic decisions made by company managers affect the efficiency of their functioning. Business analytics is a reliable tool for substantiating the effectiveness of further decisions. One of the most important points in making strategic decisions is to evaluate the value of the business, the purpose of which is to measure their effects, effectiveness and consequences.

In order to avoid the disadvantages that arise while using standardized and unified methods and models of evaluating a business value, it is advised to use its combined

modeling. An analysis of existing approaches to the business value evaluation convincingly proves the feasibility of such a combination of models to obtain adequate and reliable results of evaluation. Current business value evaluation methodology should be based on the Gordon Growth Model and Exit Multiple methods, and include models such as DCF, CAPM and TGR. This avoids errors in calculations and final decisions.

The validation of the developed methodology of evaluation of the business value made it possible to establish the fair value of Luxoft, its slight deviation from the sale price, which was overpriced, which is typical for the processes of buying and selling of IT companies. Forecasting changes in the company's cash flows to 2023 shows a significant average annual growth rate of 34.58%. The results of the research indicate the feasibility of applying the developed methodology for the further development of the sphere of knowledge of modern business analyst.

REFERENCES

[1]   Altan, M. and Arkan, F. (2011) Relationship between firm value and financial structure: a study on firms in ISE Industrial Index. *Journal of Business & Economics Research,* 9(9), pp. 61-65.

[2]   Ashrafi, A., Ravasan, A. Z., Trkman, P. and Afshari, S. (2019) The role of business analytics capabilities in bolstering firms' agility and performance. *International Journal of Information Management,* 47, pp. 1-15.

[3]   Damodaran, A. (2006) *Damodaran on Valuation: Security analysis for investments and corporate finance*, 2nd Edition. New York : Wiley Finance, 704 p.

[4]   Gleißner, W. and Ernst, D. (2019) Company valuation as result of risk analysis: replication approach as an alternative to the CAPM. *Business Valuation OIV Journal,* 1(1), pp. 3-18.

[5]   Hitchner, J. R. (2017) *Financial valuation: applications and models,* 4th Edition. New York : Wiley Finance, 1296 p.

[6]   Kryvovyazyuk, I. V. and Kulyk, Y. M. (2013) Problems in application of information technologies for managing enterprise's logistics system. *Actual Problems of Economics,* 150 (12), pp. 254-262.

[7]   Kryvovyazyuk, I. V. and Strilchuk, R. M. (2016) (a), Evaluation of strategic position of engineering enterprises in the context of their opportunities' diagnostics. *Actual Problems of Economics,* 182 (8), pp. 146-155.

[8]   Kryvovyazyuk, I. V. and Strilchuk, R. M. (2016) (b), Strategic opportunities management at engineering enterprises. *Actual Problems of Economics,* 183 (9), pp.144-155.

[9]   Kutsyk, V. and Yavtuhovska, I. (2015) Methods and approaches to the company valuation: theoretical aspect, problems of their use. *Herald of Lviv University of Trade and Economics. Economic sciences,* 48, pp. 82-87.

[10]   Sun, L., Liu, K., Jambari, D. I. and Michell V. (2016) Evaluating business value of IT towards optimisation of the application portfolio, *Enterprise Information Systems*, 10(4), pp. 378-399.

[11]   Luxoft Holding, (2019) Inc. Annual Report. https://www.luxoft.com/

[12]   Marcello, M. and Pozzoli, M. (2019) Critical issues when valuing small businesses. *Business Valuation OIV Journal,* 1(1), pp. 47-56.

[13]   McKinsey & Company Inc., Koller, T*.,* Goedhart, M. and Wessels, D. (2020) *Valuation: Measuring and Managing the Value of Companies,* 7 Edition. New Jersey : Wiley Finance, 896 p.

[14]   Mandic, V., Basili, V., Harjumaa, L., Oivo, M., Markkula, J. (2010) Utilizing GQM+Strategies for business value analysis: an approach for evaluating business goals. Proceedings of the 2010 ACM-IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM 2010), New York, Article 20, pp. 1-10.

[15]   Nedospasova, D. D. (2019) Modern methods of valuation of business assets: goals, approaches and methods the value of the business. *Journal of Economy and Business,* vol. 4(2), pp. 141-143.

[16]   Newcomer-Dyer, R. (2020) How to Value a Business: The Ultimate Guide for 2020. *Fit Small Business, 2019.* https://fitsmallbusiness.com/how-to-value-a-business/

[17]   Samonas, M. (2015) *Financial forecasting, analysis, and modelling: a framework for long-term forecasting.* Padstow : John Wiley & Sons, 232 p.

[18]   Seddon, P. B., Constantinidis, D., Tamm, T. and Dod, H. (2017) How does business analytics contribute to business value? *Info Systems J*, 27, pp. 237– 269.

[19]   SEC Report Annual and transition report of foreign private issuers. Luxoft, 2019. https://investor.luxoft.com/websites/Luxoft/English/3020/annual-reports.html

[20]   Tennent, J. and Friend, G. (2011) *Guide to Business Modelling, 3th edition.* The Economist Series. NJ: John Wiley & Sons, 298 p.

[21]   Torres, R., Sidorova, A. and Jones, M. C. (2018) Enabling firm performance through business intelligence and analytics: A dynamic capabilities perspective. *Information & Management,* 55 (7), pp. 822-839.

[22]   Vitari, C. and Raguseo, E. (2016) Big Data: *Evaluating business value and firm performance* [Research Report]. Grenoble Ecole de Management. http://hal.grenoble-em.com/hal-01403743/document