Model of Assessing the Impact of Factors on Cash Flow Multiplicators

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Abstract:

The article suggests one of the options for solving the problem of accounting for the impact of factors on the change in cash flow when investing or estimating the business valuation, including for the purposes of future M&A transactions.

The authors economically justified the multiplier of backing the stocks by the amount of sale proceeds used as an indicator that most efficiently describes the financial state of the issuer.

The article proposes a model of assessing the impact of factors that allows an investor to define the degree of impact of cash flow multipliers on the change in the multiplier of the stock market price to revenue.

Depending on the growth or fall in the value of multiplier of the stock market price to revenue, the investor can forecast future free cash flow or financial losses, which will allow them to make an economically justified decision to invest in stocks of a particular issuer. The article presents a case of using the developed model of the factors impact.

Keywords: Factor model, multiplier, capitalization, cash flow, business valuation, business profits, revenue, profitability, dividend, owner's wealth, investment.

JEL Classification: C38, M21, D24.

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1. Introduction

An increasing expansion of the field of activities, search for alternatives (Frolova, Nagibin, 2016) and diversification towards the securities market (Frolova, 2014) can be observed at the present stage of the economy development. Economic entities act both as issuers and investors. Major problem for the investor relates to obtaining reliable information about the financial position of the issuer and the results of its activities, since focus only on the changing stock price of the issuer can lead to an erroneous decision. The authors suggested a hypothesis about the relationship between balance sheet and market indicators. The relationship is represented by a model of assessing the impact of factors on cash flow.

Absolute values of indicators do not provide sufficient amount of information for making justified economic decisions; therefore, relative indicators are used widely in practice, along with "multiplying" indicators – multipliers, which describe the extent to which an increase in one parameter generates an increase in another parameter. This can be a degree of increase in output due to the growth of investment demand, growth of the business valuation due to the increase in financial and economic indicators of this business or the growth of total funds due to the growth of bank deposits. Depending on the scope of application, multipliers can be financial and non-financial, market and non-market, investment and credit, economic and social (Natocheeva *et al.,* 2015). Financial, market and investment multipliers have received the most widespread use in theory and practice of assessing the business and market assets valuation. These multipliers are efficiently used in the practice of enterprise financial planning (Natocheeva and Belyanchikova, 2017).

2. Literature Review

Specifics of forming the financial performance of various companies is reflected in the papers of Vitaliano (2003), Metzer (1981), Kaiser and Stouraitis (2001), O'Brien (1995). The issues of cash flow management and free cash flow formation are covered in the papers of a number of foreign scientists Jensen (1986), Stein *et al.* (2001), Emery *et al.* (2004). The issues of the stock market price valuation are reflected in the publications of Kendall (1953), Bodie *et al.* (1989), Wiegner (1985), Walter (1967), Grinblatt *et al.* (1984), Ankudinov and Lebedev (2014). Building and applying the models when making investment decisions were studied by Rubinstein (1973), Das *et al.* (2003), Andrews *et al.* (1996). Financial risks, risks of investors and factors that determine them were assessed by Jorion (2002), Korhonen and Peresetsky (2016), Peresetsky (2014), Arvanitis *et al.* (2017) and Kourtis *et al.* (2017).

3. Methods

Depending on the management goals and tasks of information users, decision-making in modern theories and practices is based on several settings and indicators that can be conditionally divided into three groups (note 1):

Traditional group. Indicators of this group are related to determining the profits of a commercial enterprise (Frolova, 2011). Business owners and their welfare growth are considered as final claimants for profits. The profits can vary (operating, gross, taxable, net, undistributed, etc.), because everything depends on the subjectivity of its definition. As a result, all indicators, coefficients and multipliers describing various types of profits are subjective and carry a significant risk of misleading the investor.

Moreover, focus on a positive financial result is a short-term perspective, without taking into account the relation between the revenues expected in the future and the risk related to their generation. It is more appropriate to apply relative and multiplicative indicators for comparison in the process of investing in various objects. Examples of such indicators are presented in Table 1.

Table 1. *Indicators of the traditional group describing the financial results*

Ratio	Calculation formula	Purpose
Return on assets – ROA	$ROA = \dfrac{NP}{A}$	Shows how much net profit falls on each asset unit
Return on equity – ROE	$ROE = \dfrac{NP}{E}$	Shows how much net profit falls on each equity unit
Earning per share – EPS	$EPS = \dfrac{NP}{NS}$	Shows how much net profit falls on one issued/outstanding share
Dividend per share – DPS	$DPS = \dfrac{DIV}{NS}$	Shows the amount of the dividend paid per one outstanding share
Return on sales – ROS	$ROS = \dfrac{EBIT}{S}$	Shows how much earnings before tax and interest falls on one revenue unit
Earnings Before Interest Tax - EBIT	$\dfrac{NP}{EBIT}$	Shows the percentage of profit potentially available for sending to capital holders in earnings before interest and tax.

1.   Market group. Indicators describing processes in the stock market (securities market). Growth in the welfare of owners who are the holders of securities is reflected through the growth of market capitalization. Indicators of the securities market and stock price that forms the company capitalization depend on many factors. In the meantime, demand and supply for the stock price have major impact on it, changing at infinitesimal intervals. The investor's focus on the stock price is speculation on a particular point in time or a short-term perspective. When

implementing long-term investments, the investor should evaluate not only the stock market price, but also its book value, as well as other business indicators that describe its financial result. These indicators allow the investor to understand whether the stock is undervalued or overvalued. The illustrative result is multipliers shown in Table 2 and their dynamic changes.

Table 2. *Indicators describing market capitalization*

Ratio	Calculation formula	Purpose
Price/Earning ratio – P/E	$\dfrac{P}{EPS}$	Shows the period of compensation for the invested funds
Price/price-to-book	$\dfrac{P}{B}$	Shows the stock backing with balance sheet assets
Price/sales	$\dfrac{P}{S}$	Shows the stock backing with the amount of revenue from sales

2.   Group of indicators describing the business cash flows. Profit, i.e. free cash flow, is important for the investor. Indicators of this group are of priority for the investor. Free cash flow always differs from net profit, since the value of net profit depends on a lot of subjective factors, and the cash flow reflects the real cash flow (Natocheeva *et al.,* 2013). The multipliers describing the cash flow are presented in Table 3.

Table 3. *Indicators describing the cash flow*

Ratio	Calculation formula	Purpose
Ratio of cash flow participation in sales revenue	$\dfrac{CF}{S}$	Shows the cash flow participation in the sales revenue formation
Cash flow / net profit ratio	$\dfrac{CF}{NP}$	Shows coverage of net profit with cash flow
Ratio of cash flow for an investor / (capital costs + dividends paid)	$\dfrac{CashGen}{Cash\operatorname{Re}qd}$	Shows how much of the funds is made from the flow to an investor relative to total costs
Price / cash flow ratio	$\dfrac{P}{CF}$	Shows how much stocks are overvalued or undervalued relative to cash flow.

It must be noted that various types of profit and various types of cash flow are used in the relative characteristics of cash flows: cash flow from operating activities, cash flow for an investor, net cash flow, free cash flow, aggregate cash flow. The values of multipliers obviously have sectoral and country-wise specifics. However, only the sectoral criterion was selected for the study, without taking into account the specifics of the countries of operation.

According to Bloomberg data, enterprises in various areas of economic activity, who are issuers of shares, were selected as a base for the study for the purpose of financial provision (Frolova, 2014). 73 out of 223 information service organizations were selected, the key activities of which are provision of financial information through books. 501 printing organizations, of which 175 are book publishing and 148 are factories for paper production, were selected from the area of material production. The correlation ratio was used to define the completeness of the connection (equation 1).

$$r = \frac{\sum \left(\left(X_i - \overline{X} \right) \times \left(Y_i - \overline{Y} \right) \right)}{\sqrt{\sum \left(X_i - \overline{X} \right)^2 \times \sum \left(Y_i - \overline{Y} \right)^2}}$$

(1)

where r is correlation ratio,

X_i, Y_i are values of parameters X, Y for i-th value,

$\overline{X}, \overline{Y}$ are weighted average values from a number of indicators selected for the study.

Depending on the r values, the relationship can be described by different orientation and completeness. Orientation is described by the sign of the values obtained, and the completeness is described by their magnitude. The completeness indicators are shown in Table 4.

Table 4. Indicators of completeness of the connection

Direct connection	Inverse connection
=0 – no connection	=0 – no connection
≈ 0 – almost no connection	≈ 0 – almost no connection
≤ 0.3 – weak connection	≤ - 0.3 – weak connection
0.3 >, < 0.7 – partial average connection	- 0.3 >, < - 0.7 – partial average connection
≥ 0.7 – strong connection	≥ - 0.7 – strong connection
≈ 1 – almost complete	≈ - 1 – almost complete
= 1 – complete close	= - 1 – complete close

The authors calculated the ratios of paired connection between the CF/S indicators – the ratio of cash flow participation in sales revenue and the ratio of cash flow in net profit with the multipliers of the first and second group of indicators. Calculations results are presented in Tables 5 and 6.

Table 5. Values of the orientation and tightness of the CF/S connection

Ratios	paper	information services	printing
ROE	0.414234	0.47383	-0.35833
ROA	0.618217	0.637081	-0.36582

EPS	-0.10521	-0.16876	-0.73876
DPS	0.0685119	0.14495	-0.44013
P/E	-0.2196	-0.02938	0.190311
P/B	0.0200067	0.48715	0.433926
P/S	0.2	0.781273	0.340141
PDD	-0.30858	0.389655	0.020733

As can be seen from Table 5, the value of the CF/S multiplier has a direct partial connection with the ROE financial results and a stronger dependence on ROA, while the inverse connection in the printing industry is average, which is explained by the specifics of the sector that does not receive high profit indicators and finances its activities mainly through the accounts payable. The indicator of earnings per share in all areas of activity showed an inverse connection, the strongest in the printing industry. Dividend per share has a direct strong connection in the services sector and the direct average in printing. Direct connection of various degrees was revealed with the indicator price to revenue, which is obvious, since there are the same values in the denominator of these indicators.

Table 6. *Values of the orientation and tightness of the CF/NR connection*

Ratios	paper	information services	printing
ROE	-0.72314	-0. 6935	0.125718
ROA	-0.76756	-0.74918	-0.13153
EPS	0.040299	-0.16138	-0.69069
DPS	0.166875	-0.39075	0.150163
P/E	0.849185	0.0341	-0.1568
P/B	-0.88381	0.148	0.565299
P/S	-0.75623	-0.5826	-0.06148
PDD	-0.1052	-0.3743	0.02

Calculations presented in Table 6 also reflect the absence of a strict relationship between the CF/NP multiplier and the values of indicators of other groups – for example, the connection with P/E varies from -0.1568 in printing to 0.849185, i.e. from weak inverse to direct strong. According to the combined result from Tables 4 and 5, CF/S has a direct relationship and the inverse with CF/N for all areas of activities chosen for the study.

The authors suggest P/S as an aggregate multiplier, since this indicator is most often used by investors to assess the investment attractiveness of joint-stock companies. A model of the impact of internal and external factors was developed for the study, including interest rates on loans, credit and taxes. It was taken into account during the model formation that the instantaneous and interval indicators are used in the

indicators of this kind, the average values of which are used for the annual period. In order to exclude temporary disagreements, only instantaneous indicators are used for the model, showing the result for the period – EBIT, S, NP, CF – and the market capitalization value as average for the period or by the end of the period (equations 2, 3, 4, 5, 6, 7).

$$\frac{P}{S} = \frac{P}{CF} \times \frac{CF}{S}$$ (2)

$$\frac{CF}{S} = \frac{CF}{NP} \times \frac{NP}{S}$$ (3)

$$\frac{P}{S} = \frac{P}{CF} \times \frac{CF}{NP} \times \frac{NP}{S}$$ (4)

$$\frac{NP}{S} = \frac{EBIT}{S} \times \frac{NP}{EBIT}$$ (5)

Combination of the above distributed indicators results in a four-factor model

$$\frac{P}{S} = \frac{P}{CF} \times \frac{CF}{NP} \times \frac{EBIT}{S} \times \frac{NP}{EBIT}$$ (6)

$$\Delta\frac{P}{S} = \Delta\frac{P}{S}(\frac{P}{CF}) + \Delta\frac{P}{S}(\frac{CF}{NP}) + \Delta\frac{P}{S}(\frac{EBIT}{S}) + \Delta\frac{P}{S}(\frac{NP}{EBIT})$$ (7)

4. Results

The model shows that changes in the values of the stock market price to revenue are formed from changes in the stock market price to cash flow, cash flow to net profit, profit before interest and tax to revenue and net profit to profit before interest and tax. In fact, the model demonstrates the relationship between the market and traditional (balance sheet) indicators. The summands of the cash flow indicators had the greatest impact. This conclusion is important in assessing the business valuation, for example, where the cash flow in the post-forecast period during the selection of valuation methods is determining for the investor.

The cash flow itself is largely determined by the increased discount rate (profitability) for risk compensation due to the change in the cash value over time through discounting. At the same time, selecting methods for forecasting the future cash flow of the enterprise and use of forward multipliers are of fundamental importance. The forecast value of the stock market price to revenue can be calculated on the basis of forecasting the sales volume, net profit and profit before

interest and tax of public companies. Table 7 shows the dependence of the model indicators on the functional dependence of indicators.

Table 7. *Functional dependence of multipliers*

Function	$Y(x)$	$x1$	$x2$	$x3$	$x4$
Component	$\dfrac{P}{S}$	$\dfrac{P}{CF}$	$\dfrac{CF}{NP}$	$\dfrac{EBIT}{S}$	$\dfrac{NP}{EBIT}$

The authors suggest using the elimination method to study the impact of various multipliers on the stock market price to revenue (equations 8, 9, 10, 11, 12, 13, 14).

$$Y(x) = x1 \times x2 \times x3 \times x4 \times ... \times xn \tag{8}$$

$$\Delta Y(x1) = (x1_1 - x1_0) \times x2_0 \times x3_0 \times x4_0 \times ... \times xn_0 \tag{9}$$

$$\Delta Y(x2) = x1_1 \times (x2_1 - x2_0) \times x3_0 \times x4_0 \times ... \times xn_0 \tag{10}$$

$$\Delta Y(x3) = x1_1 \times x2_1 \times (x3_1 - x3_0) \times x4_0 \times ... \times xn_0 \tag{11}$$

$$\Delta Y(x4) = x1_1 \times x2_1 \times x3_1 \times (x4_1 - x4_0) \times ... \times xn_0 \tag{12}$$

$$\Delta Y(xn) = x1_1 \times x2_1 \times x3_1 \times x4_1 \times ... \times (xn_1 \times xn_0) \tag{13}$$

$$\Delta Y(x) = \Delta Y(x1) + \Delta Y(x2) + \Delta Y(x3) + \Delta Y(x4) + ... + \Delta Y(xn) \tag{14}$$

5. Discussion

Conclusions of the authors correlate with the results of the methods for the level of return on capital used in foreign practice: the "hockey stick" method, the conditional and the first Chicago methods (O'Brien, 1995; Gulkin and Terebyakina, 2002; Schumann, 2006), where the major indicator is the stock market price to the enterprise earnings $\dfrac{P}{E}$ (Achleitner and Lutz, 2008; de Caux, 2005).

The authors propose to use the developed model of taking the impact of the factors under study into account when calculating changes in this indicator, which will allow the investor to more accurately predict future cash flows and select the most appropriate methods for assessing the business valuation.

6. Conclusion

The conducted study allowed to:
1. prove that when an investor makes a decision, it is necessary to consider not only the absolute values of indicators in the current period of time, but also the relative ones, as well as various multipliers – first of all, the stock market price to revenue;
2. prove that there is no strict direct relationship between the values of multipliers, but there is a significant indirect connection;

3. develop a model of dependence of the stock market price to revenue on traditional and market cash flow multipliers;
4. prove that the cash flow multipliers have the greatest impact on the price/revenue multiplier;
5. prove that the change in the indicator of the stock market price to revenue is largely determined by changes in the cash flow and changes in financial results;
6. prove the correlation of the developed model with the methods of funds return on invested capital used in foreign practice to define the market valuation of new companies at the end of the forecast period.

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