

THE ASSESSMENT OF OPERATING LEVERAGE IN COMPANIES OF THE TELECOMMUNICATIONS INDUSTRY IN RUSSIA

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There are three basic approaches to the evaluation of operating leverage: 1) multiplicative approach (point-to-point approach); 2) regression analysis of time series; 3) proxy approach (static proxies). The most visual measurement of operating leverage degree is the ratio of operating costs (cost of goods sold plus selling, general and administrative expenses) to total assets. Investment in new assets is the most common means of increasing a company's value. In turn, improving the technical level of the company increases the proportion of non-current assets in the value of the total assets, resulting in an increase in fixed costs. This implies an increase in operating leverage. In order to evaluate operating leverage, the authors use the methods of mathematical statistics and regression analysis. In addition authors introduced a measure of evaluation which has not previously been used in the literature, depreciation-operating costs ratio. The results of the study according to the regression analysis of time series, the degree of operating leverage in telecommunications companies averaged 0.145; when evaluated with the measure proposed by the authors it was 0.217. Authors analyzed the effect of operating leverage on such value. In general, the industry demonstrates a positive correlation (correlation coefficient of 0.503), which means that an increase in operating leverage causes an increase in enterprise value.

Key words: operating leverage, fixed cost, depreciation, investment, firm value
JEL Classification: G23, G31, G32

1. INTRODUCTION

THE CONCEPT OF OPERATING LEVERAGE AND its measurement (degree of operating leverage – DOL) are widely used by economists in the management of profit. In according to one of the interpretations operating leverage is the factor of variability of financial result caused by the relation of fixed costs to total costs. The higher the share of fixed costs the higher degree of operating leverage, as the firm has fixed costs irrespective of sales volume. The highest levels of DOL are observed in capital-intensive industries such as the metallurgical industry, telecommunications industry, railway transport, oil-producing industry, etc. These industries require large investments.

2. MEASURE OF OPERATING LEVERAGE

The domestic and the foreign theories have not yet developed a clear interpretation of the term operating leverage, nor is there an established opinion of its measure. Note that most Russian scholars discourage foreign-language borrowing, so they use the Russian equivalent of the term *leverage* in their textbooks. Thus, the Great Economic Dictionary gives the following definition: “Leverage, operating is the share of operating costs in total production costs”, which is inconsistent with the essence of this indicator. The explanation of this statement should be based on the understanding of operating costs considered to be associated with operating (current) activities, i.e. costs associated with the production and sale of products.

The foreign literature distinguishes the two main approaches to the evaluation of DOL: 1) multiplier (point-to-point) approach; 2) regression analysis of time series; 3) proxy approach (static proxies).

According to the *multiplier approach*, DOL can be evaluated with a variety of measures: 1) as the ratio of the change in profit (per cent) to the change in sales (per cent), 2) various evaluation methods interpreted as static proxy measures: the ratio of fixed assets to total assets (Ferri and Jones 1979, 218; Mandelker and Rhee 1984), or 3) as the ratio of depreciation to proceeds from sales, or the ratio of depreciation to assets (O'Brien and Vanderheiden 1987, 51). There are other measures of the degree of operating leverage. For example, Novy-Marx (2011) defines the degree of operating leverage as the ratio of operating costs to total assets (Novy-Marx 2011, 117).

The *regression analysis of time series* was first introduced to evaluate the degree of operating leverage by Mandelker and Rhee (1984), Ang and Peterson (1985), and applied by De Young and Roland (2001), Griffin and Dugan (2003). To evaluate DOL, this study uses the relationship between earnings before interest and tax (EBIT) and sales.

G.N. Mandelker and S.C. Rhee undertook to empirically estimate operating leverage with the following regression equation (Mandelker and Rhee 1984, 47):

$$\ln EBIT_{jt} = D \ln S_{jt} + A + \varepsilon \quad (1)$$

$EBIT_{jt}$ – operating profit of company j for period t;

D – degree or operating leverage (DOL_{MR});

d – regression coefficient representing a degree of operating leverage;

S_{jt} – proceeds from sales of company j for period t;

ε – random error (disturbance term).

DOL values obtained by using time series regression are close to 1. According to T. O'Brien, sales and operating profit growth rates were likely to be similar at the moment of preparing consolidated reports on industrial groups. In the regression analysis of time series, O'Brien and Vanderheiden suggest allowing for an increase before evaluating DOL (O'Brien and Vanderheiden 1987, 47). In particular, they recommend de-trending the series of profit and proceeds from sales to control spurious correlation between the growth of profit and sales, which could shift the value of DOL to unit.

To evaluate DOL, the economists should either have time-series data or divide the company's costs in variable costs and fixed costs. In fact, although the concepts of fixed and variable costs are elementary, costs can hardly be itemized as fixed or variable. To facilitate the evaluation of DOL American scientists propose different indicators which could be used for *proxy approach*. For example, M. Dugan and K. Shriver (1989, 1992) compare different operating leverage proxies (Dugan and Shriver 1989, 119; 1992, 314). In different periods of time, the following static proxy measures were suggested: (1) Fixed assets / Assets (B. Rosenberg, W. McKibbon; M. Ferri and W. Jones; G. Mandelker and S. Rhee); (2) Assets / Sales (B. Rosenberg, W. McKibbon); (3) Depreciation / Sales (T.J. O'Brien and P.A.Vanderheiden); (4) Depreciation / Assets (T.J. O'Brien and P.A.Vanderheiden).

The argument for the proxy measure of “Fixed Assets / Assets” is as follows: since the value of fixed assets is reduced by fixed depreciation, companies with a higher ratio of fixed assets to the value of property may expect higher fixed costs (in the form of depreciation) than variable costs and, therefore, higher leverage.

Other alternative “proxies” are the ratio of “Depreciation / Assets” and the ratio of “Depreciation / Sales”. The use of these measures is first limited as above. In addition, depreciation rates vary between companies due to different useful lives of fixed assets. Moreover, depreciation often correlates with sales (that is, firms can use not only straight-line depreciation, but also base on the volume of production), although in this case it will also be considered fixed.

The assessing of DOL with proxies above was made by Th. O’Brien and P. Vanderheiden based on data of 62 firms from the different industries. The results shown that none of the proxies was related to the degree of operating leverage (correlation coefficient of about 0). It indicates that the “proxies” are not efficient. The lack of such correlation can be explained by the several reasons. For example, two firms with a similar share non-current assets in total balance may use different variable costs (labor costs of production workers). Whereupon the share of fixed costs in these firms will be different. Another example is the auditing or consulting companies which may have a relatively small share of fixed assets in the current assets, but relatively high costs of salaries management personnel (fixed costs). Such company may have a high DOL.

The most demonstrative measure of operating leverage is a “share of fixed costs in total operating costs”. This measure reflects the effect of internal factors typical for the company. The build-up of company’s material-technical base leads the increase of its technological level. It means an increase of the share of fixed assets in total assets, and is accompanied by the growth of operating leverage.

Depreciation is an integral part of fixed costs and a factor in the formation of operating profit. In accordance with IFRS the amount of depreciation is allocated in a separate line in the profit and loss account drawn up differently than accounting in the Russian system of accounting. Therefore, authors suggest the ratio of depreciation to operating costs as a measure of operating leverage. This method has not previously been applied in the literature (DOL_A).

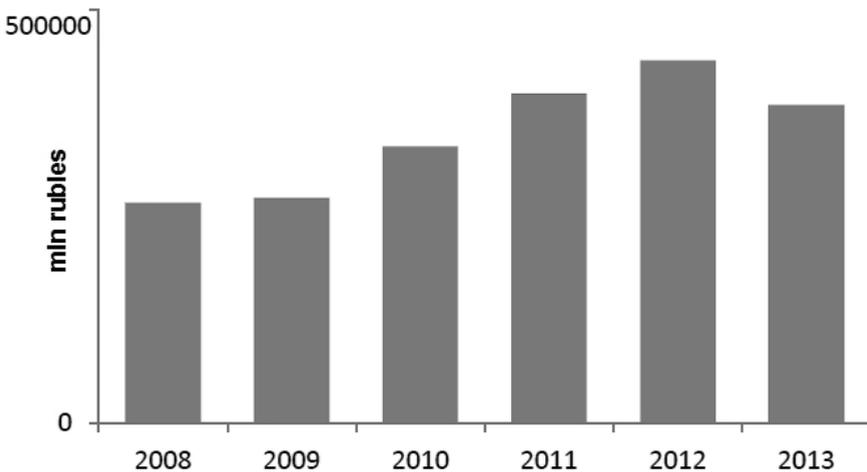
Investment in new assets is a factor in creating the value of a company. Further, improving the technical level of the company increases the share of non-

current assets in total assets, resulting in increased fixed costs. This implies an increase in operating leverage.

For the purposes of the study, we developed index databases based on the open public information available on the websites of Russian telecommunications issuing companies. For the analysis, we used such indicators as proceeds from sales, operating income, depreciation, operating costs, as well as the multipliers P/B, EV/S. Data on the multipliers by company are presented on the site www.2stocks.ru. To evaluate operating leverage, the authors used the methods of mathematical statistics and regression analysis, and proposed a measure not previously used in the literature – the ratio of depreciation to operating costs.

The telecommunication and information technology is nowadays one of the most important sectors of the economy, which ensures the functioning of other industries and the whole country. Telecommunications have become more attractive to investors due to a variety of factors. In recent years, Russian telecommunication companies have demonstrated a steady growth and have been largely intense in generating all types of innovation by making the most of its positive effect. One of the factors in the development of the domestic multiservice market which provides major investment and new equipment loans is international cooperation (see Figure 1).

Figure 1. Investment in the ICT industry



Source: Ministry of communications of the Russian Federation, RosBusinessConsulting

The indicators of market capitalization show that the communications industry occupies the third place in the number of companies and capitalization

after the oil and gas industries. The development of the telecommunications industry occurs due to large-scale investment and attracting companies to the major projects. It results in developing new management models and business processes, as well as, IT technologies. These include the improving of the financial sustainability of operators, increasing traffic, the attraction of new customers and the strengthening of the telecommunication network.

An expanding market, stability and competition with other foreign companies for the first place in the Russian telecommunications market have been and remain the primary interest of foreign partners to Russian companies. A variety of alliances has been formed from beginning of the development of the Russian telecommunication industry. They differ in the degree of integration and forms of joint activity. A number of programs for the development of Russian telecommunications have also been developed.

Two random variables – operating profit and sales revenue – are the subject of our study in terms of establishing their correlation. A preliminary analysis of the corresponding dependency diagrams showed that they are characterized by pronounced exponential nonlinearity. We decided to take the logarithm of the sample data. Then we used MATLAB technology to develop a model of linear dependence of the sample data transformed. In our study, we took the opportunity of using the random variables where they appeared in a standard form with the parameters m and σ^2 :

$$X = m_x + \sigma_x \varepsilon(\mu, \sigma) \quad (2)$$

$\varepsilon(\mu, \sigma)$ – random perturbation.

For simulation modeling, the values of $\mu = 0$ and σ as appropriate are normally used, although in terms of the “three sigma rule” $\sigma = 3$ is more preferable. At such values, random perturbation is called “white noise”. Regression equations are similar to the model proposed by Mandelker and Rhee.

According to the method, the degree of operating leverage in telecommunications companies averaged 0,145 (DOL_{MR}) on the basis of regression analysis of time series; in accordance with the measure proposed by the authors, it was 0,217 (DOL_A). The latter can be interpreted to the effect that the average share of depreciation in operating costs in the industry is 21,7%.

100 Taking into account that enhancing investment in fixed assets causes the growth of enterprise value, we analyzed the effect of operating leverage on enter-

prise value. The correlation was established between the degree of operating leverage calculated with the measure proposed by the authors (DOL) and enterprise value calculated on the basis of the multiplier EV/S. The relationship between the indicators is calculated as follows:

$$\rho_{xy} = COV_{xy} / (D_x D_y)^{1/2} \quad (3)$$

ρ_{xy} – the relationship between the indicators;

COV_{xy} – covariance between X and Y;

D_x, D_y – sample variances.

In general, the industry shows a positive correlation – the correlation coefficient was 0,506, which means that technical capacity building increases enterprise value.

3. CONCLUSION

This paper evaluated the operating leverage for companies of the telecommunication industry in Russia. As measures to evaluate operating leverage different methods were used. The authors proposed the most demonstrative measure to assess the operating leverage as the ratio of “Depreciation / Operating costs” (DOL_A). The paper found that the buildup of technical capacity leads to an increase in operating leverage. The authors established a positive relationship between the operating leverage and the value of the company for the telecommunication industry.

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Rezime:

Procena operativnog leveridža u kompanijama iz oblasti telekomunikacija u Rusiji

Koncept operativnog leveridža koristi se u upravljanju profitom u celom svetu i zbog toga je veoma značajan. U literaturi postoje tri osnovna pristupa za evaluaciju operativnog leveridža: 1) multiplikativni pristup; 2) regresiona analiza vremenskih serija; 3) proksi pristup (statički proksi). Operativni leveridž se najčešće izračunava prostim deljenjem operativnih troškova (troškovi prodatih proizvoda plus troškovi prodaje, opšti i administrativni troškovi) sa ukupnom imovinom. Vrednost kompanije se može podići kroz ulaganja u novu imovinu. Unapređenjem tehničkog nivoa kompanije raste udeo osnovnih sredstava u ukupnoj imovini, kao i fiksni troškovi, zbog čega dolazi do povećanja operativnog leveridža. U radu je korišćena matematička statistika i regresiona analiza za procenu operativnog leveridža telekomunikacionog sektora u Rusiji, koji je treći po veličini na ovom tržištu odmah iza industrije nafte i gasa. Pored toga, autori u radu koriste meru za procenu operativnog leveridža koja prethodno nije bila korišćena u literaturi – količnik amortizacije i operativnih troškova. Rezultati dobijeni korišćenjem regresione analize pokazuju da prosečan operativni leveridž za telekomunikacione kompanije iznosi 0,145, dok je njegova vrednost 0,217 kada se iskoristi mera koju su predložili autori. U radu je analiziran i uticaj operativnog leveridža na vrednost preduzeća. Postojanje pozitivne korelacije između ove dve varijable, koeficijent korelacije 0,503, ukazuje na to da operativni leveridž povećava vrednost preduzeća.

Ključne reči: operativni leveridž, fiksni trošak, amortizacija, investicije, vrednost preduzeća

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