

# Analysis of Determinants of the Speed of Adjustment to Target Capital Structure of Companies in Developing Economies

## Eugene Nivorozhkin

PhD in Economics, Senior Lecturer

[ORCID](#)

E-mail: e.nivorozhkin@ucl.ac.uk

University College London, London, the United Kingdom

## Eugeniu Kireu

Graduate from Master Program “Strategic Corporate Finance”

Head of Analytical Department

[ORCID](#)

E-mail: kireu@yandex.ru

National Research University Higher School of Economics, Moscow, Russia

Movchan’s group, Moscow, Russia

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### Abstract

The financial stability of a company, along with its operational effectiveness, depend on whether the company endeavours to optimise its capital structure, and the speed at which it can do so. The purpose of this article is to assess the relative impact of influential factors on the speed of adjustment to the optimal capital structure of companies in emerging markets. The relevant factors in question include corporate determinants, macroeconomic determinants, the specific financial characteristics of BRICS companies, and other pertinent external macroeconomic conditions.

To achieve this, we conducted a comparative study of various assessment methodologies and examined their findings. Within the scope of the overall study aims, we considered various models of assessing the speed of adjustment and identified those study methods most frequently used. We identified the determinants of optimal capital structure and the related speeds of adjustment, and suggested hypotheses based on assumed assessment results. We then proceeded to analyse the sustainability of those results and gauge the overall robustness of our approach.

The study results reveal that the speed of adjustment to target capital structure in developing economies is significantly higher than in advanced economies. The results indicate that these speeds vary in the range of 31–46% for book values of financial leverage and 60–79% for its market values. An empirical analysis of these results also showed that companies with a less-than-optimal debt level achieved the optimum level much quicker, and the speed of adjustment thereby depends heavily on the absolute value of the company money flow. Moreover, this is especially true in those companies with an excessive leverage value. Financial instability in the markets, meanwhile, had a positive effect upon the speed of adjustment for Chinese and Brazilian companies, while in the other BRICS countries the change of the speed of adjustment in the period of crisis finds no confirmation.

**Keywords:** speed of adjustment, capital structure, trade-off theory, agency conflict, pecking order theory, market timing theory, DPF method, least square method, instrumental variables method, generalized method of moments, partial adjustment model

**JEL classification:** G32, G34

## Introduction

Over a number of years, the subject of the capital structure of a company has been one of the most pressing and studied topics of financial economics. Commencing from the paper [1] (the main conclusion of which consists in the irrelevancy of choice of the capital structure from the point of view of its influence on the company value) several theories which explain the choice of the companies' capital structure were developed. The main purpose of these theories has been the theoretical justification of company conduct when choosing the capital structure. There was no conventional theory which explained the company capital structure before the research by Modigliani/Miller. So, this theory became the starting point for all subsequent research into this structure. At the same time, thanks largely to the fact that the conclusions of the 'irrelevancy hypothesis' of capital structure contradicted empirical facts, the study of this problem progressed in multiple directions. Mainly the Modigliani/Miller paper was criticized for its rather rigid and unrealistic prerequisites, which had little in common with the real conditions of operation in financial markets and the economy in general. Inasmuch as the theory implicates ideal financial markets, introducing any 'imperfect' variables such as taxes, transaction costs, agency conflicts or the costs of bankruptcy results in erroneous conclusions being reached.

However, one of the lines of further development of the theory of capital structure of a company were models based around consideration of the agency costs of a company's debt financing [2]; [3]. This approach served as the backbone of the trade-off theory of capital structure. This theory considers the optimum level of debt in a company, which is defined on the basis of the balance of benefits and costs of the financial leverage increase, as well as those factors which may be the source of such benefits and costs. Concerning agency costs, it is usual to place emphasis on the conflict of interest between managers and shareholders which emerges due to managers' disposition toward ineffective employment of company resources and the enlargement of their own privileges. Thus, the higher the company debt level, the less disposable assets are available to the managers and the more effective their performance should be in order to handle a high debt level. At the same time, a high debt level results in an agency conflict between the shareholders and creditors. Such conflicts are based around a transfer by the shareholders to the creditors of a selection of risks, where the shareholders prefer to implement high income projects which are more risky, even with a negative NPV value [4]; [5]. Apart from the aforementioned disagreements, other agency conflicts are highlighted, e.g. conflicts related to the company's possible liquidation [6] or insufficient investment [7]. Along with the balance among various agency conflicts, the main factor defining the optimum debt level of a company is the ratio of benefits from the growing tax shield to the increasing costs of bankruptcy, as studied in the paper [8]. Use of debt financing helps a company to realize benefits related to alleviation of taxes by the costs of debt interest

payment. The higher the debt level of a company, the more it saves on taxes and the higher the company value is. At the same time, an increase in the debt load results in the growth of bankruptcy risks of a company because at some point the free cash flow may be insufficient to fulfill the debt liabilities. Consequently, the optimal capital structure of a company is achieved in cases where equality of benefits and costs of the debt level increase, and is defined by the financial characteristics of the company and the factors which influence the amount of benefits and costs of raising debt funds.

One of the restrictions of early papers on the trade-off theory is the fact that the models of the optimal capital structure are single-period ones and do not take into consideration such factors as expectations and the dynamics of adjustment to the optimal debt level. In this regard, the trade-off theory developed from static models to dynamic ones [9]; [10] which enables it to take into consideration the influence of uncertainty on the dynamics of financial leverage. These models offer an opportunity to understand how companies achieve the optimal level of financial leverage and which particular factors define its dynamics.

Along with the trade-off theory, other theories which substantiate the capital structure of a company are pointed out. One of them is the pecking order theory in accordance with which companies finance their activity, first, from their internal funds, then use debt financing and, last of all, using the option of joint-stock capital [8]. Another very popular theory is the market timing theory, which presumes that a company issues or takes up shares depending on whether they are overvalued or undervalued by the market relative to their fundamental value [11]. In spite of differences in the theories explaining the choice of the company capital structure, models of dynamic trade-off choice are the most high-demand and widely used ones. Thanks to this concept, it is now possible not just to analyze the factors which influence a company's financial leverage, but also to detect the determinants of optimal capital structure and the speed of adjustment to it. This has become one of the most important courses of research development in this sphere.

The trends of the empirical analysis of interrelations between characteristic features of companies on the one hand, and economics with capital structure on the other, are characterized by increasing absorption by its optimization procedure. Increasingly greater attention is paid to defining how quickly companies take corresponding decisions and which factors influence this, rather than to validation of conclusions of the trade-off theory in practice, or to the assessment of the optimal capital structure. This paper is dedicated not only to research of determinants of the capital structure itself, but also to the way company characteristics influence the speed of adjustment of the company to the optimum, and whether these dependencies are the same in developing economies as they are in advanced economies.

The research of the speed of adjustment to the optimal capital structure has made significant progress in the

advanced economies, and over the last several years it has become of increasing relevance in developing economies. At the same time, the majority of papers focus on assessment of the value of the speed of adjustment itself, as well as analyses of individual sub-selections for various types of companies, countries and institutional conditions. The attempts to assess the influence of various determinants within one model which would take them into consideration as continuous variables (and would not depend on subjective breaking down into categories) are rather exceptional, even for developed markets.

In this paper, the influence of various determinants on the speed of adjustment to the optimal capital structure is analyzed, taking particular account of the continuity of values of the considered factors within one joint model. This enables us to exclude the influence of unaccounted determinants on the obtained assessments. Moreover, assessment of the speed of adjustment to the optimal capital structure is related to serious methodological difficulties. In this research, we applied the *DPF* method, which has proved itself in recent researches as the most accurate and reliable way of assessment of the value of the speed of adjustment. This methodology will help to obtain improved assessments of the speed of adjustment in emerging markets, and to evaluate accurately how various determinants influence its value.

## Comparative Analysis of the Speed of Adjustment to the Optimal Capital Structure

### *Analysis of the Dynamic Model of the Capital Structure Applying the Least Square Method*

Analysis of the speed of adjustment to the optimal capital structure is one of the most relevant topics of research in the recent years. Assessment of dynamic changes of the capital structure has remained unexamined for a long time, however, with the advent of corresponding theoretical tools and empirical testing development, research into this topic took a significant leap. One of the first papers dedicated to an analysis of the dynamics of the capital structure and factors which influence it was the

article [12]. In spite of the fact that the existing capital structure of companies cannot be explained unambiguously by a single theory, an important conclusion is that the dynamics of financial leverage are described in terms of deviations from some average level. This is indicative of the presence of the optimal capital structure following from the trade-off theory. Using the model of partial adjustment to the optimal capital structure (similar to the dividend model of J. Lintner [13]) the authors evaluated the speed of adjustment to the optimal capital structure for those companies which paid dividends on their shares, and those companies which did not make such payments. Depending on whether book or market values for calculating a company's financial leverage were used, the speed of adjustment to the optimal capital structure amounted to 7–10% for the selection of the companies paying dividends, and to 15–18% for the companies paying no dividends. A higher speed of adjustment in the companies making no dividend payments may be explained by the fact that such companies have more disposable assets which may be used to discharge a debt, while the companies paying dividends cannot pursue such a flexible policy, not least because reduction of dividends adversely affects the company value [14]. It is worth noting that adjustment to the optimal capital structure according to the estimations obtained by this paper is very slow: a company covers half of the distance between the current and optimal value of its financial leverage for 9.6 to 3.5 years according to the minimum and maximum values of the speed of adjustment respectively. Applying the least square method to assess the speed of adjustment to the optimal capital structure results in biased estimates of coefficients and an underestimation of the speed of the financial leverage adjustment. In the research [15] the speed of adjustment is estimated as 8.3%–10%, which is less than the values obtained in the papers by E. Fama and K. French. In other papers the estimates obtained by the least square method also show rather low estimates of the speed of adjustment. In the research [16] the speed of adjustment of the book leverage value to the target level amounts to 17%, and in the paper [17] it is assessed as between 22%–23% for book and market values respectively (Table 1).

**Table 1.** Comparison of the Estimates of the Speed of Adjustment to the Optimal Capital Structure Obtained by the Least Square Method

Author, year	Country, period	Speed of adjustment, %
Fama, French, 2002	USA, 1965–1999	Book leverage: 10–18 Market leverage: 7–15
Kayhan, Titman, 2007	USA, 1960–2003	Book leverage: 10 Market leverage: 8,3
Lemmon, Roberts, Zender, 2008	USA, 1965–2003	Book leverage: 17
Byoun, 2008	USA, 1971–2003	Book leverage: 23, Market leverage: 22

Author, year	Country, period	Speed of adjustment, %
Huang, Ritter, 2009	USA, 1972–2001	Book leverage: 9,3 Market leverage: 11
Flannery, Rangan, 2006	USA, 1966–2001	Market leverage: 14,6
Hovakimian, Li, 2011	USA, 1970–2010	Market leverage: 13

**Table 2.** Comparison of the Estimates of the Speed of Adjustment to the Optimal Capital Structure Obtained by the Least Square Method Taking into Consideration the Fixed Effects Model

Author, year	Country, period	Speed of adjustment, %
Lemmon, Roberts, Zender, 2008	USA, 1965–2003	Book leverage: 39
Byoun, 2008	USA, 1971–2003	Book leverage: 39 Market leverage: 32
Hovakimian, 2011	USA, 1970–2010	Market leverage: 17
Huang, Ritter, 2009	USA, 1963–2001	Book leverage: 74 Market leverage: 77
Frank, Goyal, 2008	USA, 1993–2004	Market leverage: 46
Flannery, Rangan, 2006	USA, 1966–2001	Market leverage: 38

Low estimates of adjustment to the optimal capital structure was but one of the factors accompanying a significant development in this sphere of research. Methodology of assessment of the speed of adjustment to the optimal capital structure was one of the key factors influencing the obtained results. In consideration of this, various methods of assessment were applied in subsequent papers.

#### ***Taking into Consideration Fixed Effects in the Model of the Least Square Method***

One of the areas of development involved the application of the least square method with fixed effects, which helped to take into consideration special characteristics of companies evaluating models in terms of the variables' departure from mean values.

The results of research based on this assessment method show a significantly higher speed of adjustment to the optimal capital structure than the ones using the least square method. Thus, the speed of adjustment in the paper [16] for the book leverage value is estimated as 39%, in the paper [17] it amounts to 32–39% (for market and book values of leverage respectively), and in the paper [18] it is calculated between 74 and 77%. Conspicuously, the obtained estimates differ significantly from the results of the least square method, and companies adjust very quickly to the optimal capital structure (Table 2).

The ordinary least square method and the least square method with fixed effects may result in biased estimates due to serious problems related to the assessment of panel data. Apart from the endogeneity problem emerg-

ing (because it is necessary to include lagged variables in the model) the biased estimates may be caused by short observation periods, panels imbalance, missed data, or censored data. The study of applicability of the abovementioned methods in estimating the speed of adjustment to the optimal capital structure revealed that both methods result in biased estimates of the speed of adjustment [19]; [16]; [18]. Therefore, including a fixed effects of companies variable in the model causes overestimation of the speed of adjustment. As a result, the real values of the speed of adjustment should be identifiable between the estimates obtained by the ordinary least square method and the least square method with fixed effects [20].

Application of the instrumental variables method discovered in the paper [21] allows us to solve the endogeneity problem, which results in biased estimates when using the least square method. As an instrument for market leverage, the author uses the values obtained from the book values of debt and shares. This is intended to facilitate the elimination of residual autocorrelation and the attaining of unbiased estimates. The estimates of the speed of adjustment obtained in this way should be between the estimates of the ordinary least square method and the least square method with fixed effects, namely within the range of 14.6–34.3%. However, the applied instrumental variables method assessed the speed of adjustment as 52.3% which contradicts the expectations. The instrumental variables method is highly sensitive to the quality of the utilised tools and requires a high correlation with the instrumented variable and absence of correlations with

errors. That is, the method should be relevant, and valid. In this respect, the book value of the financial leverage is unable to properly explain the dynamics of its market value, as it is a weak instrument, which results in biased estimates. In view of this, the practical application of the instrumental variables method to assess the speed of adjustment to the optimal capital structure prevents us from obtaining reliable results, thus making this method unsuitable.

The abovementioned results of previous research assess the mean speed of adjustment of companies to the target value of the leverage irrespective of special characteristics and external factors which can influence the speed of adjustment. It is possible to detect differences in the speed of adjustment for various types of companies, comparing the results obtained in sub-selections, as for instance in the paper [12]. That paper studies sub-selections of companies depending on whether those companies pay dividends or not. Thus, when assessing the ordinary model of partial adjustment for the selection of all companies, it is implicitly implied that the speed of adjustment is equal, irrespective of whether the optimal level of company capital is higher or lower. Neither the value of deviation from this level, nor the opportunities and costs of small adjustments to the optimum (as well as many other factors which may influence the speed of adjustment) are taken into consideration. The assumption of homogeneity of the speed of adjustment is a rather serious simplification of reality. This assumption may be applied to empirically confirm the validity of the procedure of small adjustment of the capital structure to the target level. One of the means of taking into account heterogeneity of the speed of adjustment is including in the model of dummy variables. These variables describe the specific character of the studied companies or external qualitative factors. So, in the paper [22] the authors study the dependence of the level free cash flows in a company on the speed of adjustment to the optimal capital structure by means of introducing corresponding dummy variables for the companies with a low, average and high free cash flow. At the same time, the authors (conscious of the problem of biased least square method estimates) use a corrected least square model with dummy variables (*LSDVC*). In that model, the estimates are coefficients corrected for the value of shifting, and obtained by means of an assessment of the least square model with dummy variables. At the same time, the extent of shifting is assessed by means of more complicated regression models using the generalised method of moments, which will be considered in more detail in the next section. The results obtained by the authors enabled them to define the differences in the speed of adjustment depending on the level of the free cash flow for companies with either excessive or insufficient financial leverage. The obtained estimates confirm the assumption that companies with large free cash flows have a higher speed of adjustment to the optimal capital structure, however, this conclusion describes dynamics of the capital structure only for the companies with the debt level lower than the

optimal one. By means of this methodology the authors found out a nonlinear dependence for the companies with an excessive financial leverage in which companies with the largest and smallest free cash flows adjust quicker to the optimal capital structure. Upon that the companies with an excessive level of debt load on the average have a higher speed of adjustment to the optimal capital structure. These conclusions are in line with the results of the research [23] in which the authors revealed a higher speed of adjustment for the companies with bigger absolute values of free cash flows. The companies with larger free cash flows have an opportunity to pay off a part of the debt or to take up shares in the market in order to optimize the capital structure while the companies with large negative cash flows have to resort to outside financing in the form of a debt or joint-stock capital, depending on whether the leverage is above or below the optimal level. Thus, the absolute value of free cash flows of a company may significantly influence the speed of adjustment to the optimal capital structure, the average value of which, as estimated by the author, amounted to 21.9% for the book leverage and to 22.4% for the market leverage.

At the same time, the influence of the value of a free cash flow on the speed of adjustment may be sensitive to the estimation method. So, the existence of a nonlinear link in the paper [22] is confirmed only when a corrected least square method with dummy variables is applied, while use of the generalised method of moments reveals only a linear positive interrelation.

#### ***Analysis of the Speed of Adjustment to the Optimal Capital Structure Applying the Generalized Method of Moments***

Application of the generalised method of moments (GMM) in order to assess the speed of adjustment to the optimal capital structure is meant to eliminate the problems related to shifting of estimates when using the least square method, and has become one of the most widely used methods of evaluation of the considered models. One of such methods is Arellano-Bond GMM [24], which estimates a model using the first-order differences of variables as tools which makes it possible to eliminate the shifting related to nonobservable special characteristics of companies, even for panels with short time intervals. So, in the paper [25] the authors assess the speed of adjustment to the optimal capital structure for Malaysian companies using Arellano-Bond GMM. In view of the fact that the data panel comprises a large number of companies, but the length of the observation period is limited, this method is the optimal one. The obtained results indicate that the speed of adjustment for Malaysian companies is high enough and amounts to 53%, i.e. the capital structure adjusts to the optimal one in 1.75 years. This result shows that achievement of the optimal capital structure is correlated with serious benefits for companies, therefore, probably, these benefits are greater than those for companies in developed countries in which speed of adjustment is estimated at

lower values. Similar results were obtained in the paper [26] when using Arellano-Bond method of evaluation of the speed of adjustment of the BRICS and Eastern Europe countries. The obtained estimates confirm that in the emerging markets the speed of adjustment is higher than in the developed ones: the estimates vary within the range of 38 to 71%. At the same time in the paper [27] the estimates of the speed of adjustment for USA companies obtained by this method are comparable to the estimates for companies from emerging markets. The speed of adjustment amounts to 48% for the companies conducting their business only in the USA and 54% for

companies which are on foreign markets too. Therefore, the higher the level of internationalization of the company, the higher the speed of adjustment to the optimal capital structure. For 10% of companies conducting the major part of their business abroad, the speed of adjustment amounted to 64%. In the paper [28] the speed of adjustment is assessed as 59% and 65% for the book and market leverage of USA companies respectively, in the research [29] it was calculated as 37–40% of the book leverage of Thai companies, in the papers [30] and the abovementioned [25] it was identified as 53% to 57% for Malaysian companies (Table 3).

**Table 3.** Comparison of Estimates of the Speed of Adjustment to the Optimal Capital Structure Obtained by Arellano-Bond Generalized Method of Moments

Author, year	Country, period	Speed of adjustment, %
Xu, 2007	USA, 1970–2004	Book leverage: 59 Market leverage: 65
Tongkong, 2012	Thailand	Book leverage: 36,9–39,7
Ariff, Taufiq, Shamsheer, 2008	Malaysia	Book leverage: 52,90
Haron et al., 2013	Malaysia 2000–2009	Book leverage: 57 Market leverage: 54
McMillan, Camara, 2012	USA, 1991–2009	Market leverage: 48–64
Kokoreva, 2012	BRICS and Eastern Europe, 2002–2010	Book leverage: 38–71

Despite the fact that applying the Arellano-Bond GMM method eliminates the effect of unobservable special effects of companies and biased estimates caused by, it this specification of GMM has serious shortcomings. Inasmuch as Arellano-Bond GMM is based on use of lagged values of variables as tools for their first-order differences the estimates obtained by this method may be shifted significantly in finite samplings if the autoregressive parameter is close to 1. This problem turns up if the studied variable has weak temporal dynamics, i.e. it is not exposed to serious period-by-period deviations [18]; [27]. As part of an assessment of change in level of a company's financial leverage this problem may be especially acute because the capital structure of a company is often rather stable in the year-to-year intervals. For this reason, the assessment of the speed of adjustment by Arellano-Bond GMM may result in a significant shifting of estimates. In this case, if the speed of adjustment is rather low, changes of the financial leverage level, all other things being equal, will also be little, which means that use of Arellano-Bond GMM may result in a significant shift in the estimates of the speed of adjustment.

It is possible to overcome the problem of application of GMM for data with stable dynamics by assessing the set of equations in levels and differences offered in the papers [31] and [32]. When assessing such set of equations

the values of differences are used as tools to evaluate an equation in levels, and vice versa – the values of variables are tools to evaluate an equation in differences. The Blundell-Bond generalised method of moments came into common use in empirical studies of the speed of adjustment to the optimal capital structure because it takes into consideration the majority of problems inherent in applying other methods of analysis, and allows us to obtain more reliable estimates.

Thus, in the paper [16] the authors obtained an estimate of the speed of adjustment of the book value of the leverage of American companies to the optimum level of 25%. This estimate is within the range of the estimate obtained by the ordinary least square method and the estimate with fixed effects, which is in line with the expectations around the value of an unbiased estimate of the speed of adjustment. Similar results were obtained in the paper [33], which evaluated the speed of adjustment of companies from 22 developed countries as 23.9 and 22.5% for the book and market leverage respectively. Lower estimates of 15–18% were obtained in the paper [34] for the market value of the leverage and in the paper [28], it is set at 14% and 16% for the book and market leverages. The speed of adjustment of British companies is also comparable to previous estimates and varies in the range of 22–31% [35]. Higher speeds of adjustment for companies from devel-

oped markets were obtained in the paper [22]. Depending on the amount of free cash flows, the speed of adjustment is 47 to 69% for the book leverage and 29 to 57% for the market leverage. Therein, unlike in the corrected least square method there becomes apparent an unambiguous positive relation between the free cash flow level and the speed of adjustment for the companies with and excessive debt as well as with an insufficient debt. In the research [36] the authors consider small and medium Spanish companies and evaluate the speed of adjustment to the optimal capital structure as 24–33% for the companies with excessive and insufficient debt respectively. The obtained results indicate a significantly lower speed of adjustment than the one defined in the paper [22]. A lower speed of adjustment for the companies with excessive debt would seem to contradict previous results. However, in view of the fact that the selection comprises small and medium companies, the dynamics of adjustment may differ significantly from it in the largest companies. A lower speed of adjustment for the companies with large debts may be related to the fact that small companies develop dynamically and the necessity to decrease the debt load reduces over the course of time as a result of the company capitalization growth. An interesting conclusion of this paper is that the dynamics of the capital structure are not aimed at the optimal level for all companies, as in just 52% of companies the capital structure approaches the optimal one.

Analysis of the influence of certain factors on the speed of adjustment to the optimal leverage is of special interest, since these factors are not necessarily limited by the financial indicators of companies. In the paper [37] the author analyzed the influence of affiliation of Japanese companies to large corporate conglomerates (known as 'Keiretsu'). The author made a preliminary conclusion that companies which are part of corporate conglomerates adjust to the optimal capital structure significantly slower than other companies, which is probably caused by close interrelations between the companies and the bank providing services to them. Thus, the speed of adjustment of the companies which are members of Keiretsu groups is 3.7%, while the speed of adjustment of other companies is 11.1%. The degree of shared cross-ownership among the companies also significantly influences the speed of adjustment: for the companies with high cross-ownership the speed of adjustment amounts to 8.2% while for other companies that figure is 20.8%.

An extensive analysis of the speed of adjustment is described in the paper [38] which considers 37 countries with developed and emerging markets, and the obtained estimates of the speed of adjustment therein vary in the range of 4.03–40.61% for the book leverage, and 10.87–52.86% for the market leverage. In general, the obtained results are highly dissimilar and give no opportunity to separate emerging markets from developed ones based on the speed of adjustment criterion. With this background, the authors focus on the analysis of the influence of institutional factors on the speed of adjustment, and this would have enabled them to explain the sources of differences among certain countries. The speed of adjustment in Asian countries was studied in the paper [39] using a selection of 11 countries. The authors got estimates in the range of 24 to 45% for companies from various industry sectors. So, high-tech industries show the highest speed of adjustment, while consumer-goods makers display the lowest. Generally, these results show that companies from the highest-risk sectors prefer to adjust the capital structure to the optimal one quicker, while companies from less risky sectors optimize at a slower rate.

Assessment of the speed of adjustment for Romanian companies made in the paper [40] indicated a rather quick annual reduction of deviation from the target book values of the capital structure, namely 63%, which is somewhat higher than the estimates from the paper [26] for Eastern European countries (30–41%). Therefore, the obtained estimates are comparable because in the paper [26] the results do not depend on the specification of GMM.

Significant studies of the speed of adjustment to the optimal capital structure have been conducted for African countries also. In the paper [41] an analysis of book values of the financial leverage helped to evaluate the speed of adjustment as 57–63%, in the paper [42] it amounted to 56.7%, and in the paper [43] the figure was 59% for long-term debt and 39.6% for joint debt. Similar results of the speed of adjustment when evaluating Nigerian companies were achieved in the paper [44] by including in the ordinary least square method the fixed effects regression obtained when assessing a corresponding model at the first stage. At the same time, an assessment of regressions which applied the Blundell-Bond GMM gave no meaningful results in the same selection of companies, which in its turn prevents a firm conclusion being drawn about the reliability of obtained results (Table 4).

**Table 4.** Comparison of the Estimates of the Speed of Adjustment to the Optimal Capital Structure Obtained by the Blundell-Bond Generalized Method of Moments

Author, year	Country	Speed of adjustment, %
Caglayan, Rashid, 2014	Great Britain, 1981–2009	Higher TL: 24.5–29.6 Lower TL: 21.9–31.0
Lemmon et al., 2008	USA, 1965–2003	25

Author, year	Country	Speed of adjustment, %
Xu, 2007	USA, 1970–2004	Book leverage: 14 Market leverage: 16
Flannery, Hankins, 2013	USA, 1998–2004	15–18% depending on the length of the selection
Rubio, Sogorb-Mira, 2012	Spain, 1995–2007	Higher TL: high CF – 69 medium CF – 54 low CF – 47
		Lower TL: high CF – 57 medium CF – 36 low CF – 29
Aybar-Arias et al., 2012	Spain, 1995–2005	Book leverage: 24–33
Brendea, 2014	Romania, 2004–2011	Book leverage: 63
Yamada, 2014	Japan, 1977–2010	In a Keiretsu group – 3.7, otherwise – 11.1 High cross-ownership – 8.2; low – 20.8
Antzoulatos, Koufopoulos, 2013	22 developed countries, 1990–2010	Book leverage: 22.5–23.9
Öztekin, Flannery, 2012	37 countries, 1991–2006	Book leverage: 4.03–40.61; medium – 21.11 Market leverage: 10.87–52.86; medium – 26.29
Getzman et al., 2014	11 Asian countries, 1995–2009	Book and market leverage: 24–45 depending on the sector
Etudaiye-Muhtar, Ahmad, 2015	African countries, 2003–2012	Book leverage: 57–63
Lemma, Negash, 2013	9 African countries, 1999–2008	Book leverage: 57–63
Lemma, Negash, 2014	9 African countries, 1999–2008	Book leverage: 56.7 Long-term - 59, joint: 39.6

One of the most widespread modifications of Blundell-Bond GMM is the use of tools with longer time lags, thus enabling one to obtain unbiased estimates of the speed of adjustment in case of a limited selection [45]. Assessment by Blundell-Bond GMM gives an opportunity to use a large number of tools which may adversely affect the accuracy of assessment if the selection contains an insufficient amount of information [18]. Thus, in the considered paper, the authors evaluated the model using long time lags for differences of variables' values. They analyzed the models with different time differences (of 4 to 28 years) and thus managed to obtain the estimates of the speed of adjustment in the range of 17.5–21.1% for the book leverage, and 15.6–22.3% – for the market leverage. These values are within the range of the estimates ob-

tained when evaluating the regression applying the least square method. That is, they confirm the assumption that unbiased estimates of the speed of adjustment are higher than the estimates obtained by the ordinary least square method and lower than the estimates obtained by the least square method with fixed effects. In their research, the authors confirmed this assumption by applying the Monte Carlo method. This revealed a significant dissimilarity of the estimates obtained by the least square methods from the real values of the generated speed of adjustment, while the estimates obtained by the long time lags method virtually replicate the generated values. At the same time, it is important to note that use of this method is limited significantly if the studied data panel is limited, which, in the first instance, is characteristic of emerging

markets where data about companies is accessible only for a relatively small number of years. A similar method of evaluation was used in the paper [22] which assessed the speed of adjustment within 18–42% for the companies with excessive debt and 17–36% for the companies with a debt level lower than the optimum. The obtained estimates are indicative of a rather high speed of adjustment. However, these estimates are lower than the ones obtained when assessing the system by Blundell-Bond GMM, which conforms to a greater extent to the dynamics of adjustment of the leverage to the optimal level revealed in other developed countries.

#### **Methodologies of Evaluation of the Speed of Adjustment with Data Generation and the Dynamic Model of Evaluation with a Censored Dependent Variable**

A great variety of methodologies of evaluation of the speed of adjustment applying different specifications of GMM made it possible to solve, to a great extent, the problem of biased estimates and obtaining reliable results. At the same time, there is no commonly held opinion concerning the most preferable and reliable GMM method. This resulted in alternative methods of evaluation of the speed of adjustment, intended to solve the problem of biased estimates as part of other evaluation procedures. So, in the paper [46] the authors study the speed of adjustment for American companies since 1965 to 2008 using the methodology developed [47]. They assess the speed of adjustment for existing real data applying the ordinary least square method in which the estimates contain some biased value. Additionally, the authors generate another selection (*Placebo sample*) which consists of initial values for financial leverage, to which random changes of debt level or joint-stock capital are added in each period. Thus, the values obtained for financial leverage do not depend on the company's characteristic features. Thus, having assessed a similar model for the generated selection with random deviations of the leverage values, one can get the coefficients which have only the biased value, which emerges when using the least squares method. Then, the difference of the estimates obtained when evaluating each selection will constitute an unbiased estimate of the speed of adjustment to the optimal capital structure.

One of the major deficiencies of this method is the complexity of theoretical justification of the assumption of categorical bias of the estimates obtained from different selections. At the same time, the estimates obtained using the generated selection are close to the estimates obtained applying GMM. The estimates of the speed of adjustment obtained by this method for USA companies amount to

12% for the book leverage value and 14% for its market values. The authors also revealed a positive relation between the value of the company's deviation from the optimal capital structure and the speed of adjustment, and what is more, this dependence is stronger for those companies with excessive debt load.

Another way of assessment of the speed of adjustment to the optimal capital structure was offered in the paper [48]. This methodology is intended for evaluation of unbalanced dynamic panel data which comprise a fractional dependent variable which was called *DPF estimator*. This valuation function is a tobit variable censored on both sides which makes it possible to take into account the limitedness of the financial leverage values in the range of zero to one. In this case the estimate of the financial leverage is the share of debt in the total value of the company capital. The estimate of the speed of adjustment by this method implicates the procedure of data generation which takes into consideration the censored character of the financial leverage data and the evaluated model of partial adjustment takes into consideration existence of fixed effects of each company. Therein, the estimate of fixed effects was obtained as the sum of the initial level of the financial leverage and mean temporal effects of the company special characteristics which influence its financial leverage. The analysis of accuracy of estimates carried out by the author using Monte Carlo simulation revealed that the estimates obtained by the *DPF* method describe the true values of the speed of adjustment much better not only in comparison with the least square method comprising fixed effects, but also in comparison with Blundell-Bond GMM and the method using longer lags of variables in differences. Assessment of the speed of adjustment of the market leverage obtained by this method for USA companies for the period of 1965 to 2010 amounted to 26% which is in the range of the estimates obtained by GMM. The authors also found evidence that companies with significant deviations from the target capital structure have a higher speed of adjustment. Moreover, the higher the company default risk characterized by its credit rating, the quicker it adjusts the capital structure to the optimal level.

This methodology was also applied in the paper [49] which evaluates the speed of adjustment of G7 countries. The obtained results evaluated the speed of adjustment just one percentage point lower than the abovementioned paper, namely as 25%. Further still, the authors compared the estimates obtained by the abovementioned models of the least square method and GMM, the results are presented in Table 5.

**Table 5.** Comparison of the Estimates of the Speed of Adjustment for Different Evaluation Methodologies [49], %

	OLS	FE	AB	BB	DPF	LD 4	LD
Book leverage	11.3	38.1	27.0	18.2	25.0	23.0	22.4
Market leverage	14.0	42.0	31.4	20.6	31.2	29.5	22.9

Conspicuously, the estimates obtained by the *DPF* method are closer to the estimates obtained in the system GMM with long-term time lags and Arellano-Bond GMM while the estimates of Blundell-Bond GMM are a little smaller than the abovementioned ones. All in all, the estimates obtained by these methods are rather close to each other and are in the middle of the range of estimates derived using the ordinary least square method and the least square method with fixed effects, and this conforms to the expectations as regards the value of unbiased estimates of the speed of adjustment. In emerging markets the *DPF* method of evaluation was applied for the companies listed at the Johannesburg Stock Exchange since 2000 to 2010. The obtained estimate amounts to 54% for the leverage comprising only long-term debt and is consistent with the estimate of Blundell-Bond GMM for African companies. However, at the same time, the speed of adjustment for the leverage comprising joint debt of the company amounted to 80%, which is significantly greater than earlier estimates and brings up the issue that it is necessary to take into consideration short-term debt; and the authors have not found for it a statistical demonstration of existing of the optimal level aimed at by the company.

## Research Hypotheses

The results of analysis of the speed of adjustment to the optimal capital structure are highly sensitive to the applied methodology. Thus, empiric studies indicate that application of the least square method results in underestimation of the speed of adjustment and the least square method with fixed effects causes overestimation of obtained estimates. In this case the unbiased estimate of the speed of adjustment should be in the range of the estimates obtained by the abovementioned methods [20]. So, the first hypothesis is phrased as follows.

*H1*: the estimates obtained by the least square method are underestimated in comparison to the *DPF* method while the estimates of the least square method with fixed effects are overestimated.

The next hypothesis considers influence of the direction of deviation from the target capital structure on the speed of adjustment. Thus, in accordance with the results of the majority of empiric studies it is presumed that companies with excessive debt load will adjust to the optimal capital structure quicker than companies with insufficient debt level [17]; [23]; [22]; [46]. At the same time companies with debt load exceeding the optimal level are greatly limited in the opportunities of equity raising, and the high value of the capital and large interest payments may decrease significantly the company's opportunities of debt repayment. Thus, there are two variations of the third hypothesis:

*H2a*: estimates of the speed of adjustment for companies with the debt level exceeding the optimal level are higher than for companies with low debt level.

*H2b*: estimates of the speed of adjustment for companies with the debt level exceeding the optimal level are lower than for companies with low debt level;

Also the distance from the target capital structure influences significantly the speed of adjustment: the more the deviation from the target leverage value, the quicker companies strive to achieve the optimal value [12]; [50]; [51]; [52]; [23]; [53]; [46]; [22]. At the same time a series of papers produced opposite results [54]; [55]; [25], thus, the hypothesis of existence of a positive dependence may be discarded in actual practice. Moreover, the ratio of the value of the company cash flows to the value of the gap between the current capital structure and the optimal one has a significant impact on the speed of adjustment.

The value of the gap covered by the absolute value of the company money flow may be covered at significantly lower expenses, inasmuch as in case of a positive cash flow it is a cheap source of the capital structure optimization, and in case of a negative cash flow the expenses of getting access to the capital market and financial leverage optimization are replaced with the company need in fund raising for its operating and investment activities. In this regard hypothesis 3 is phrased as follows.

*H3*: the speed of adjustment to the optimal capital structure at the value of deviation from it within the range of the absolute value of cash flow is higher than beyond such range.

At the same time a more detailed division of companies' states according to the ratio of deviation from the target capital structure to the value of cash flow is considered in the part dedicated to the methodology of assessment of a corresponding model.

## Research Methodology

Empiric studies of the speed of adjustment to the optimal capital structure constitute a wide range of assessment methodologies. The researches considered before showed that an assessment methodology may produce a critical effect on the obtained estimates. Thus, application of the least square method results in the estimates of the speed of adjustment value shifted downwards. One of the reasons for that is disregard of companies' special features. In its turn application of the least square method with fixed effects results in overestimation of the speed of adjustment due to the endogeneity problem which is caused by introducing lag values of the dependent variable which brings about correlation of balance. In this relation application of the least square method to evaluate the speed of adjustment to the optimal capital structure prevents us from obtaining reliable results, therefore this research is based on use of more advanced evaluation methods, in particular GMM and *DPF*. At the same time verification of the hypothesis of bias of the least square method's estimates is of considerable interest, due to it the results of the least square method model, the GMM model and the *DPF* model will undergo the comparative analysis.

The generalized method of moments also has various specifications and is optimal to assess short data panels inherent in emerging markets, however by reason of the fact that Arellano-Bond GMM may result in biased estimates for data series with stable values of the financial leverage using of system Blundell-Bond GMM is more justified. At the same time use of a modified system GMM with longer lags of variables in differences which has proved to be successful in some papers is more applicable for the data panels with long time lags.

In spite of the advantages of the estimates obtained by GMM over the methodology using the least square method there is a series of material constraints imposed on applicability of this method. In the first instance, one of the most significant drawbacks of GMM estimates is the possibility to obtain estimates of the optimal level of the financial leverage beyond the range of its possible values. So, companies with high profitability levels and a stable financial position may have a very insignificant increase in costs of financial imbalance when debt increases. This may result in a situation where balance between benefits from the tax shield and expenses of financial imbalance is attained when the company liabilities exceed the assets value, i.e. when the leverage value exceeds one which is unreal for a financially sound company. At the same time for companies with a low financial stability the optimal leverage level may be assessed as below zero, however a company is reasonably limited by zero debt load.

In this case the obtained estimates of the optimal leverage level require censoring, i.e. restriction of the assessed values to zero and one. This methodological problem is solved using the *DPF* method which constitutes a tobit model and a two-sided censoring of the evaluated optimal values of the financial leverage. Moreover, the model specification allows to work with unbalanced panel data and takes into consideration the problem of unobservable effects occurrence related to introducing lag variables, hence, it allows to obtain unbiased estimates of the speed of adjustment to the optimal capital structure. In this research the main method of evaluation of the speed of adjustment to the optimal capital structure will be the *DPF* method, however, in addition to it we analyzed the results obtained by using the least square method as well as GMM.

### The Partial Adjustment Model

The assessment of the speed of adjustment to the optimal capital structure implicates use of the partial adjustment model. The standard partial adjustment model is described with the following equation:

$$L_{it} - L_{it-1} = \gamma(TL_{it} - L_{it-1}) + \varepsilon_{it}. \quad (1)$$

This formula describes the process of change of the financial leverage where in each period the company financial leverage  $L_{it}$  adapts to the optimal value at a speed of  $\gamma$ . At the same time the optimal leverage value is an unobservable variable, however its target level is defined by a set of determinants of the target capital structure  $X$ .

$$TL_{it} = \alpha_i + \beta X_{it} \quad (2)$$

Thus, the unobservable target value of the leverage in equation (1) may be defined through determinants of the target capital structure by plugging equation (2) in equation (1), herewith rearrangement of summands helps to distinguish the speed of adjustment to the optimal capital structure  $\gamma$ :

$$L_{it} = (1 - \gamma)L_{it-1} + \gamma\alpha_i + \gamma\beta X_{it} + \tilde{\varepsilon}_{it}. \quad (3)$$

The speed of adjustment to the optimal capital structure constitutes a difference in the values of the regression coefficient at the lag value of the leverage variable  $L_{it-1}$  and one.

Assessment of the partial adjustment model assumes that the speed of adjustment to the optimal capital structure is homogeneous, i.e. equal for all considered companies.

Equation (3) constitutes a model specification used to evaluate the speed of adjustment applying the least square method. Use of the least square method and other methodologies with fixed effects implies the possibility of taking into consideration the company special characteristics and temporal effects. The model specification for this methodology is represented by equation (4):

$$L_{it} = (1 - \gamma)L_{it-1} + \gamma\alpha_i + \gamma\beta X_{it} + v_i + n_t + \varepsilon_{it}, \quad (4)$$

where  $L_{it}$  – the leverage value at the moment of  $t$ ;  $X_{it}$  – list of determinants of the optimal capital structure;  $\beta$  – estimates of influence of these determinants;  $\gamma$  – speed of adjustment;  $v_i$  – companies' fixed effects;  $n_t$  – temporal fixed effects.

In order to assess this specification the generalized methods of moments and the *DPF* method which give more reliable estimates are also applicable.

### The Modified Partial Adjustment Model with Heterogeneous Speed of Adjustment: General Specification.

At the same time application of the abovementioned single step procedure prevents us from assessing influence of some determinants on the speed of adjustment to the optimal capital structure. In this regard a need of applying a two-step assessment method arises which is based on the methodology used in the paper [38]. In this paper at the first step unobservable values of the target level of the financial leverage are evaluated using the *DPF* method applied to the model similar to equation (4). Using the obtained coefficient values and values of determinants of the optimal capital structure one may evaluate the target value of the financial leverage for each company. Then, after assessing these values one may calculate the deviation value of the financial leverage from the optimal value  $\hat{Dev}_{i,t}$ :

$$\hat{Dev}_{i,t} = L_{it} - L_{it-1}. \quad (5)$$

Plugging equation (5) into equation (2) as the deviation value from the target leverage we have the following model specification:

$$L_{i,t} - L_{i,t-1} = \lambda_j(\hat{Dev}_{i,t}) + \delta_{ij}, t. \quad (6)$$

Evaluation of the model specification represented as equation (6) helps to make a departure from restrictions related to the single-step assessment procedure and assessment of the speed of adjustment as an exceptionally homogeneous value. Indeed, the speed of adjustment may depend on a multitude of other factors: in the first instance, the same company financial indicators which define the level of the target capital structure, economic indicators, country or other factors including institutional ones influence it. In this case the speed of adjustment itself is the value defined by some list of determinants and is given by the following equation:

$$\lambda_i = \Lambda Z_{it} + \mu T_{ct} + \tau_t Y_t, \quad (7)$$

where  $Z_{it}$  – list of financial indicators;  $T_{ct}$  – list of macro-economic country indicators; – temporal fixed effects.

At long last, plugging of the variable of the speed of adjustment from equation (7) in equation (6) enables us to have the final model specification (8) which differentiates influence of various determinants on the company speed of adjustment to the target capital structure. Therein, assessment of this model allows to apply the least square method because of absence of dependent variable lags

$$L_{i,t} - L_{i,t-1} = (\Lambda Z_i + \mu T_{ct} + \tau_t Y_t)(\hat{Dev}_{ii,t}) + \delta_{i,t}. \quad (8)$$

At the same time in view of the fact that assessment of the model is made on the basis of the evaluation results of the partial adjustment model at the previous step it is reasonable to use the least square method and with *bootstrapped* errors – the methodology which helps to leave out any exterior effects brought about by generation of variables for the obtained estimates.

Therein, for the models which use dummy variables as determinants the equation looks as follows:

$$L_{it} - L_{it-1} = \gamma_i \hat{Dev}_{i,t} Dummy_k + \tilde{u}_{it}. \quad (9)$$

#### **The modified partial adjustment model with heterogeneous speed of adjustment: influence of the deviation value and company cash flows**

The speed of adjustment to the optimal level of the financial leverage is preconditioned by a broad list of factors and is the result of assessment of potential benefits and expenses caused by change of the leverage level. Undoubtedly, the greater the benefits from achieving the optimal level, the higher the speed of adjustment should be. In this case one of the main factors defining the balance of benefits and expenses from change of the financial leverage level is the distance from the actual level to the optimal one as well as the direction one needs to take in order to optimize the capital structure. Indeed, for companies with the capital structure rather close to the optimal one, especially taking into consideration transaction costs benefits from such adjustment are significantly less than for companies which capital structure is far from the optimal one, hence, the speed of adjustment should be slower. Moreover, the balance of benefits and expenses may be different for companies with excessive debt load and companies with the debt level less than the optimal one, hence, the

speed of adjustment may differ significantly depending on the direction of approaching the optimum.

Along with the deviation value and direction the extent of flexibility of the company financial policy may be of paramount importance, and it is in a great measure defined by the value of cash flows it generates. The company cash flows influence significantly the costs of adjustment to the optimal capital structure, therewith, their absolute value is of the main importance [23]. If a company has high positive cash flows it has a cheap source of cash it can use to discharge a debt or redeem shares depending on whether its debt load is insufficient or excessive. On the other hand, a company with high negative cash flows may have great investment opportunities, and this preconditions its tendency to finance its activity by raising debt funds or using its equity capital depending on the ratio of the actual and optimal leverage. In this case raising additional capital covers the company need in financing and provides additional benefits from optimization of the capital structure and decrease of costs of such financing.

Interaction of the factors described above solves the methodological problem related to defining the criteria of the value of deviation from the target capital structure and the value of the company cash flows. In a series of researches criteria of allocation of companies to groups were often defined by the values' getting into some percentile or by another quantitative criterion which has been defined on a rather subjective basis. Correlation of the deviation value with the company cash flows allows not just to eliminate this methodological drawback, but to assess the interrelation of some determinants of the speed of adjustment to the optimal capital structure. Following the methodology offered in the article [23] the research of influence of the deviation value and the company cash flows on the speed of adjustment is conducted using the following model:

$$L_{i,t} - L_{i,t-1} = \{\gamma_1(|Dev| - |CF|) + \gamma_2|CF|\} \cdot DevL\ arg\ er + \\ + [\gamma_3|Dev| + \gamma_4(|CF| - |Dev|)] \cdot (1 - DevL\ arg\ er) \cdot Sign + \tilde{\varepsilon}_{it}, \\ DevL\ arg\ er = 1, \text{ if } |Dev| > |CF|, \text{ otherwise } = 0,$$

$Sign = -1$  for companies with the excess leverage level, otherwise = 1.

Therein, this model comprises four different company states characterized by the following conditions:

$ExcessDev = (|Dev| - |CF|) \cdot DevL\ arg\ er$  – a part of the value of deviation of the actual financial leverage level from the optimal one which is not covered by the company cash flow;

$Overlap|Dev| > |CF| = |CF| \cdot DevL\ arg\ er$  – a part of the abovementioned deviation covered by the company cash flow;

$Overlap|CF| > |Dev| = |Dev| \cdot (1 - DevL\ arg\ er)$  – value of deviation from the optimal financial leverage when the company cash flow exceeds this value;

$ExcessCF = (|CF| - |Dev|) \cdot (1 - DevL\ arg\ er)$  – a part of the company cash flow which exceeds the value of deviation from the optimal leverage.

The first two criteria evaluate the speed of adjustment to the optimal capital structure for the case when the value of the company cash flow is less than the gap between the actual and optimal capital structures. A part of this deviation equal to the cash flows value may be covered at a higher speed because costs of the capital structure optimization decrease due to use of the company proprietary funds when it has positive cash flows or because the company needs additional fund raising when it has negative cash flows. In its turn the part of deviation exceeding the cash flows value should be covered at a lesser speed because the expenses of the capital structure change will be higher.

The last two criteria consider the case when the company cash flow exceeds the value of deviation from the target capital structure. In this case the company has an opportunity to cover the whole gap between the actual and target leverages, hence, the speed of adjustment should be significantly higher. Therein, the value of the cash flow part which exceeds the gap between the actual and target leverage should not influence the speed of adjustment inasmuch as it is no more necessary to optimize the capital structure. Thus, this model allows to decompose the effect caused by the ratio of the value of cash flow and deviation from the target capital structure into the capital structure.

The modified partial adjustment model with heterogeneous speed of adjustment: assessment of influence of financial indicators on the speed of adjustment taking into consideration the deviation distance and the company cash flows

The partial adjustment model taking into consideration the heterogeneity preconditioned by the company financial indicators shows a significant flexibility and allows to assess the extent of influence of determinants of the speed of adjustment not just in the whole interval of the gap between the actual and target leverages, but in its separate parts. In this case model (4) evaluating dependence of the speed of adjustment on financial determinants and model (10) evaluating the speed of adjustment at different ratios of cash flows and deviation values may be combined within one, more complex model.

$$L_{i,t} - L_{i,t-1} = \{[(\gamma_1 + \gamma_{1k} Z_{kt})(|Dev| - |CF|)] \cdot DevL \arg er + (\gamma_2 + \gamma_{2k} Z_{kt}) \cdot |CF| \cdot DevL \arg er + (\gamma_3 + \gamma_{3k} Z_{kt}) \cdot |Dev| \cdot (1 - DevL \arg er) \cdot ((\gamma_4 + \gamma_{4k} Z_{kt})(|CF| - |Dev|) \cdot (1 - DevL \arg er))\} \cdot Sign + \tilde{\varepsilon}_{it} \quad (11)$$

In this case the model helps to assess not only the way some financial indicators influence the speed of adjustment to the optimal capital structure, but also the extent to which they play a pivotal role at the stages of approaching the optimum.

### Dynamic Model of Panel Data Assessment with a Censored Dependent Variable – DPF

Significant problems impair assessment of the speed of adjustment to the target financial leverage. They turn up due

to imbalance of the data panel, introducing the dependent variable lag, presence of unobservable data heterogeneity and limitation of the range of the financial leverage values. Use of GMM proved to be an effective way of assessment of the speed of adjustment which takes into consideration heterogeneity and imbalance of the data panel, at the same time in no way it takes into account the fact that the dependent variable is limited by a certain range of values which may result in biased estimates [47].

The basis for the DPF methodology is the partial adjustment model similar to equation (4) above. The main difference is in specifying the values of the financial leverage variable: the latent unobservable variable defined on the basis of evaluation of equation (12) is used as the dependent variable

$$L_{it}^+ = \lambda L_{it-1} + \alpha X_{it} + n_i + n_t + \tilde{\varepsilon}_{it} \quad (12)$$

The latent variable  $L_{it}^+$  is a theoretical estimate of opportunities of getting a debt by a company and may be beyond the range of zero to one. At the same time, in effect the financial leverage level is usually confined within these limits and may violate this condition only in extreme cases. In view of this the values of the observable leverage level are subject to the following limitation:

$$0 \text{ if } L_{it}^+ \leq 0 \\ 1 \text{ if } 0 < L_{it}^+ < 1 \text{ and } L_{it}^+ \geq 1 \quad (13)$$

Moreover, use of this methodology for assessment of the speed of adjustment requires taking into consideration the unobservable data heterogeneity, it is done by the aid of specification of the company fixed effects as a variable dependable on the initial level of the financial leverage and mean values of the financial leverage determinants:

$$n_i = \omega_0 + \omega_1 L_{it-1} + \omega_2 E(X_i) + \omega_i \quad (14)$$

In this research the DPF method is the main method of assessment of the partial adjustment models. As the most reliable method of evaluation of the speed of adjustment to the optimal levels of the financial leverage it can replace generalized methods of moments used in other researches for the first step of the model assessment.

Evaluation of the abovementioned models implies adding determinants of the target capital structure. These determinants are financial characteristics of the company which influence its capital structure. Such characteristics are the company profitability, its size, opportunities for growth, tangible assets value, value of capital investments and depreciation, research and development expenses, amount of the company interest payments and tax rates in the economy [56]; [18]; [23]. Also the average or median level of the financial leverage in the industry, GDP and consumer prices growth rate, interest rate in the economy and various interest rate spreads may be taken into consideration. Indexes of shares liquidity may also be considered as the factors influencing the capital structure [57]. See the detailed list and methodology of calculation of each variable in the papers which study the speed of adjustment to the optimal capital structure in Table 6.

**Table 6.** List and Methodology of Calculation of Determinants of the Optimal Capital Structure in Various Researches

	Getzmann, Rangan, 2014	Etudaiye- Muhtar, Ahmad, 2015	Huang, Ritter, 2009	Rubio, Sogorb-Mira, 2012	Hovakimian, Li, 2011	Faulkender, Flannery, 2012	Flannery, Rangan, 2006
Profitability	EBIT/TA	OpInc/TA	OIBD/TA	ROA	OpInc/TA	EBIT/TA	EBIT/TA
Size	$\ln(TA)$	$\ln(Sales)$	$\ln(Sales)$	$\ln(TA)$	$\ln(TA)$	$\ln(TA)$	$\ln(TA)$
Market opportuni- ties	MV/BV	–	TQ	MV/BV	MV/BV	$(B\_liab+M\_equity)/$ TA	MV/BV
Tangibility	FixA/TA	$\Delta FixA/TA$	NetPP&E/ TA	$\Delta FixA/TA$	PP&E/TA	NetPP&E/ TA	PP&E/TA
D&A	D&A/TA	D&A/TA	–	D&A/TA	$D\&A/TA(t-1)$	D&A/TA	D&A/TA
Industry leverage	IndMeanLev	–	–	IndMean Market D/E	–	Median D/E	IndMedian B_debt/M_as sets (MDR)
CAPEX/ RetEarnings	Earnings retention rate	CAPEX/TA	CAPEX	–	–	–	–
R&D	–	–	R&D/R&DD	–	R&D/Sales and R&DD	R&D/TA and R&DD	R&D/TA and R&DD
Taxes	–	–	Tax rate	Eff tax rate	–	–	–

## Variables Description

The empiric study conducted in this research implicates assessment of the company financial leverage optimal level and influence of some determinants on the speed of adjustment to it. Thus, the variables considered in this research come under several categories, each of them will be analyzed below.

Here we consider the values of the book and market leverages as the financial leverage indexes, and they are defined as follows:

book leverage:  $Book\ Leverage = (STD + LTD) / TA$ ;

market leverage:

$Market\ Leverage = (STD + LTD) / (TA - BV + MV)$ ,

where  $STD$  – short-term debt;  $LTD$  – long-term debt;  $TA$  – total assets of a company;  $BV$  – book value of the joint-stock capital;  $MV$  – total market value of a company. We used the following indicators as determinants of the optimal capital structure:

profitability:  $Profit = EBIT / TA$ ;

size:  $Size = \ln(Sales)$ ;

market possibilities:  $MtoB = MV / BV$ ;

depreciation:  $DA = D \& A / TA$ ;

tangible assets:  $Tang = FixedAssets / TA$ ;

investments:  $CAPEX = CapitalExpenditures / TA$ ;

research and development:  $RD = R \& D / TA$ ;

$R \& DDummy = 1$ , if there is no  $RD$  value

$R \& DDummy = 0$ .

Among determinants of the optimal capital structure this research considers the industry value of the financial leverage  $IndLev$  defined as the financial leverage median value in each industry group for each separate year and country; the company effective tax rate represented by the variable  $Tax$  as well as macroeconomic factors: nominal GDP growth rate and inflation rate in percent represented by the variables  $GDP$  and  $Inflation$  respectively. Introducing of the dummy variable indicating absence of research-and-development expenses is explained by the fact that for the majority of companies there is no information as regards these expenses. However, in order to preserve the completeness and representativeness of the selection the value of research-and-development expenses is placed with zero for these companies while introducing the dummy variable prevents the possible bias of the influence estimate preconditioned by this replacement.

The financial indicators of a company can influence not just the value of the optimal financial leverage, but also the speed at which the company strives to attain it. The inducements to optimize the capital structure may differ for companies of various sizes, profitability or different opportunities to economize using the tax shield. Thus, the determinants of the speed of adjustment analyzed in this research are represented by the same financial and economic indicators which are used to define the optimal financial leverage.

At the same time in addition to the abovementioned indicators we considered various states of deviation from the target capital structure and their correlation with the company cash flows. In this case the additional indicator is the cash flow which value is defined in accordance with the methodology offered in the paper [23]:

$$CF = \frac{EBITDA - TaxExpenses - InterestExpenses}{TA} - Industry \frac{Capex}{TA} \quad (15)$$

The first part of this equation is the definition of the company financial deficit analyzed in the article [58]. At the same time following this methodology it is more relevant to consider instead of capital expenditures the capital investment level in the industry sector in general, inasmuch as unlike the companies' special indicators the industry sector value depicts better the investment opportunities inherent in this business and it is not susceptible to the influence of company decisions as regards raising additional capital. In the last case there is a high probability of facing the problem of endogeneity of the choice between capital expenditures and financial leverage change, hence, use of industry sector indicators as a proxy for the company investment opportunities is justified.

## Selection

The selection studied in this paper is represented by public companies of the BRICS countries which do not belong to the financial sector or the basic services sector. The selection comprises data for 2,795 companies within the period of 2005 to 2015 which constitutes 30,745 observations. Taking into consideration the necessity to use lag variables this selection covers effectively a decade of the company financial indicators. Therein, the selection was restricted to the companies with the total assets exceeding 150 million dollars as well as shares marketing quotations - at least by the middle of the observed period, i.e. as of 2010. These criteria are to a greater extent preconditioned by technical constraints which expand over the available selection size, at the same time the objectives set in the paper are not linked to the types of the companies represented in the selection and may be studied for companies of any size (Table 7).

Dispersion of the number of companies over countries is irregular, and the overwhelming majority of observations is represented by Chinese companies. One fifth of the selection is composed of Indian companies while the other BRICS countries comprise a little over 10%.

Dispersion of companies over industry sector groups in the selection corresponds to the standard of global industry sector classification and the industry average indicators were calculated in accordance with this classification.

Dispersion of companies over industry sectors is more regular, at the same time the majority of companies is concentrated in the basic industry sectors such as manufacture of materials, basic goods and production sector (Table 8).

**Table 7.** Dispersion of the Selection of Companies and Number of Observations over Countries

Country	Number of companies	Number of observations	Share in the selection, %
Brazil	118	1,292	4.2
China	1,923	21,138	68.8
India	563	6,187	20.1
Russia	88	966	3.1
Republic of South Africa	103	1,131	3.7
Total	2,795	30,714	100

**Table 8.** Dispersion of the Selection of Companies and Number of Observations over Industry Sectors

Sector	Code	# of observations	Share, %
Power industry	10	1,154	3.88
Materials	15	6,493	21.83
Production sector	20	7,531	25.32
Selective demand consumer products	25	5,671	19.07
Staple consumer products	30	2,723	9.16
Healthcare	35	2,199	7.39
Information technology	45	3,650	12.27
Communication services	50	317	1.07

**Table 9.** Descriptive Analysis of Variables in the Whole Studied Selection

Variable	Obs	Mean	Median	Std. Dev.	
BLEV	27 713	0.2558	0.2398	0.1975	
MLEV	27 710	0.2142	0.1536	0.2037	
Profit	27 666	0.0717	0.0605	0.1082	
MtoB	25 042	2.1433	1.5951	2.2872	
Sales	27,952	1,606.04		265.65	9,879.47
DA	26,872	0.0287		0.0246	0.0216
Tang	27,696	0.3374		0.3119	0.2051
CAPEX	27,107	0.0693		0.0502	0.0669
RD	30,721	0.0099		0	0.6397
RDD	30,721	0.4700		0	0.4991
Book IndLev	30,659	0.2432		0.2290	0.0923
Market IndLev	30,515	0.1780		0.1529	0.1064

Variable	Obs	Mean	Median	Std. Dev.
IndCAPEX	30,627	0.0538		0.0484
Tax	23,982	24.41%		19.78%
GDP	30,721	14.88%		13.83%
Inflation	30,721	4.25%		2.80%

**Table 10.** Descriptive Analysis of Mean Values of Variables Broken Down by Countries

	Brazil	China	India	Russia	Republic of South Africa
BLEV	0.2937	0.2379	0.3301	0.2942	0.1683
MLEV	0.2548	0.1891	0.3072	0.3101	0.1245
Profit	0.0770	0.0609	0.0939	0.1172	0.1296
MtoB	1.7269	2.3088	1.7445	1.3154	2.1777
Sales	3,580.31	1,299.76	1,277.93	6,976.25	2,320.63
DA	0.0366	0.0266	0.0299	0.0433	0.0405
Tang	0.3018	0.3305	0.3604	0.4276	0.3304
CAPEX	0.0650	0.0645	0.0887	0.0790	0.0691
RD	0.0020	0.0081	0.0208	0.0008	0.0010
RDD	0.4374	0.4592	0.4803	0.6553	0.4960
Book IndLev	0.2903	0.2234	0.3128	0.2801	0.1514
Market IndLev	0.2336	0.1460	0.2710	0.2976	0.1007
IndCAPEX	0.0520	0.0482	0.0695	0.0718	0.0605
Tax, %	30.46	21.58	31.46	32.05	34.71
GDP, %	10.84	17.23	10.57	9.72	3.43
Inflation, %	5.89	2.80	7.72	9.65	6.00

All financial indicators considered in this research were taken from the *Bloomberg* database, therewith each value was nominated in million dollars and presented for a calendar year in order to provide data comparability.

The macroeconomic data used in the research have been obtained from the databases of the International Monetary Fund and represent a percentage change of nominal GDP in US dollars and growth rate of consumer prices in each country.

As we see from table 9 the mean value of the book leverage in the selection amounted to approximately 26% of the total value of the company assets which is about 4 pp less than the market leverage value. Therein on the average the book debt load in India, Russia and Brazil is at the comparable level of 29–33% which is higher than that of

companies from China approximately by 6 pp and almost twice as large as that of companies from the Republic of South Africa. There is also a larger gap between the market leverage values of these countries' groups which indicates a comparatively greater debt load of companies from India, Brazil and Russia. Comparison of companies by financial indicators is also of a particular interest. So, Chinese companies on the average are less profitable than those of the other BRICS countries, therewith the ratio of their market capitalization to the book value of the joint-stock capital shows that their opportunities for growth are evaluated significantly higher than in other countries.

Analysis of table 10 shows that the average size of a company in Russia is several-fold larger than in the other BRICS countries which indicates a strong concentration

of companies' market share in the economy. India demonstrates the largest share of research and development expenditures among the analyzed economies and Russia, in its turn, is characterized by the largest share of tangible assets in the general structure of company assets. Proximity of values of the effective tax rate for all economies except for the Chinese one where the effective tax rate is approximately one third lower is of interest.

It should be noted that individual companies or years of observations with extreme or inadequate values of variables were excluded from the selection. Keeping of these exclusions in the selection could have influenced significantly the accuracy of the obtained results, in consideration of that we analyzed dispersion of variables' values and their exclusion in case of their serious deviation from the main dispersion interval and absence of a large-scale deviation.

## Research Results

### Comparative Analysis of Methodologies of Assessment of the Speed of Adjustment to the Optimal Capital Structure

In the first instance within this research we considered the issue of susceptibility of the results of assessment of the speed of adjustment to the methodology used. A review of researches evaluating the speed of adjustment showed that methodology influences significantly the assessed value, what is more, the difference for comparable countries and observation periods may be extremely high.

At the same time the issue of the selection homogeneity and possibility to assess companies from different countries within one general model rises. In this relation we verified the possibility to consolidate data concerning the BRICS countries into one selection using the Chow test. The test results showed that it is impossible to consolidate all countries into one selection either for specification with the book leverage, or for the specification with the market leverage. At the same time a paired analysis of the possibility of consolidation of some countries' sub-selections showed that in some considered countries influence of explicative variables on the financial leverage values is comparable and may be assessed within one model. Thus, for the book leverage model the data for Brazil, Russia and India are comparable against each other in each pair

and Chinese data may be evaluated together with the data for Brazil and Russia. The paired Chow test showed that the only exclusion is the Republic of South Africa which data cannot be assessed with any other country in the selection and the estimates of the model for Chinese companies are not comparable to the conclusions of the model for Indian companies. Similar results were also obtained for the specification of the model assessing the market leverage value. Thus, test results indicate a clear separation of the selection into two groups: data for Russia, India and Brazil may be evaluated within one selection while data for Chinese companies are comparable to data for South African companies.

Assessing the possibility to consolidate various countries within one selection it is necessary to take into consideration the specification of the regression model used to evaluate the selection. The result of the Chow test implicates use of *ESS* values obtained when assessing the through model of the least square method, however, introducing lag variables and impossibility of taking into consideration unobservable special effects of a company within one model results in biased and inconsistent estimates, hence, this test cannot show reliably whether the assessment results for different sub-selections are comparable. In this case inconsistency and bias of estimates lead to the fact that the results of the least square method assessment for different sub-selections may be far apart or even contradict each other, hence, one cannot assert for sure that it is impossible to assess some countries within one group. Analysis of the Chow test validity for dynamic models including those with short time periods and a large number of explicative variables conducted in the articles [59] [60] also indicates that there is a possibility of a significant positive bias of the Chow test and its susceptibility to endogeneity of explicative variables. However, the actual results of evaluation of the speed of adjustment and influence of the capital structure determinants on the financial leverage in this paper are indeed indicative of significant differences between the selection countries, therefore each used model was assessed applying sub-selections of companies from the same country.

Getting back to the comparison of applicability of various models, analysis of the results obtained by using different methodologies shows significant differences in the value of the estimate of the speed of adjustment (Table 11 and 12).

**Table 11.** Evaluation of the Speed of Adjustment of the Book Leverage for Various Methodologies

BLEV	OLS	FE	AB	BB	DPF	LD(5)	LD(2)
Brazil	13.9	50.4	73.5	33.5	31.1	17.4	25.0
China	24.4	57.5	61.4	49.4	45.1	21.0	11.8
India	16.1	58.3	57.2	38.1	33.2	24.8	39.1
Russia	12.6	46.1	59.4	28.3	9.4	18.2	-0.8
Republic of South Africa	17.6	63.4	61.9	48.4	45.6	26.6	24.9

**Table 12.** Evaluation of the Speed of Adjustment of the Market Leverage for Various Methodologies, %

<i>MLEV</i>	<i>OLS</i>	<i>FE</i>	<i>AB</i>	<i>BB</i>	<i>DPF</i>	<i>LD(5)</i>	<i>LD(2)</i>
Brazil	30.9	70.5	98.8	60.9	59.1	-6.9	25.2
China	54.6	84.2	100.0	91.6	79.1	30.9	23.9
India	25.6	74.3	105.0	63.9	59.0	23.7	48.8
Russia	40.1	81.7	100.7	90.8	73.9	24.5	22.7
Republic of South Africa	24.0	71.1	81.9	60.4	62.9	-1.9	35.1

Hypothesis *H1* on undervaluation of the estimates obtained by the least square method and overestimate of the estimates obtained by the least square method with fixed effects is confirmed for both specifications of the financial leverages. On the average the difference in the assessed speed of adjustment is almost three-fold for the book leverage (16.9 against 55.1%) and two-fold – for the market leverage (35 against 76.3%). Moreover, the estimates obtained using the least square method are also sometimes inconsistent. The estimates obtained by Arellano-Bond GMM are, on the average, 7.6 pp higher for the book leverage and 20.9 pp higher for the market leverage than the estimates of the least square method with fixed effects. The estimates obtained by Blundell-Bond GMM in general demonstrate a high stability for the book leverage: they are in the range of the estimates obtained by the least square method and the least square method with fixed effects and are very close to the mean values in all methodologies, however for the market leverage Blundell-Bond GMM showed the estimates beyond this range for China and Russia assessing the speed of adjustment approximately as 90%. The *DPF* method used in this research showed the most stable and reliable results: the speeds of adjustment obtained by this method are the most close ones to the mean values and are in the range between the estimates of the least square method and the least square method with fixed effects which may be considered top-bottom landmark values for reliable values of the speed of adjustment estimates. The only exception is the market leverage model for Russian companies where this method assessed the speed of adjustment at a very low level which, probably, is indicative of susceptibility of the method to the selection size because for Russian companies the number of effective observations turned out to be the smallest. Estimates of the speed of adjustment of the book leverage obtained by Blundell-Bond GMM and *DPF* methods are very close and may be considered equivalent while for the market leverage the only applicable method is the *DPF* method. Estimates of the system GMM with longer lags (in this research two- and five-years lags were used) considered in a series of papers as the most reliable ones in comparison with Blundell-Bond GMM showed the most unstable results, in some cases indicating distancing of companies from the leverage target value which makes them inapplicable for this selection. All considered models have been assessed taking into consideration temporal ef-

fects, and all obtained estimates of the speed of adjustment except for some specifications of Arellano-Bond GMM are of relevance even at the 1% level.

### **Analysis of Influence of the Direction of Deviation from the Target Capital Structure on the Speed of Adjustment to the Optimal Capital Structure**

The speed of adjustment to the optimal capital structure should depend to a great extent on the value of deviation from the target level as well as on the direction of deviation. The resolution on optimization of the capital structure is taken in accordance with the evaluated benefits and expenditures of such adjustment. If the existing company structure is close to the optimal one the company benefits from its optimization may be significantly lower than the expenditures incurred when raising new capital and often comprising a fixed part. If the deviation from the optimal capital structure is serious the company benefits from its optimization are significantly larger, hence, the speed should be higher. Moreover, the benefits balance may differ significantly for companies with the debt level higher than the optimal one than for companies which need to increase their debt load. Differences in the speed of adjustment for companies with the debt load exceeding the optimal one and for companies with a lower debt level were assessed using the partial adjustment model with dummy variables. Its general specification is represented by equation (9).

The obtained results indicate that companies with the debt load lower than the optimal one approximate the optimal capital structure at a significantly higher speed than companies with excessive debt load. The speed of adjustment of the leverage book values for companies with excessive debt load amounts approximately to 14–18% which is 2–3 times slower than for companies with insufficient debt load. Differences in the speed of adjustment for market values are less obvious and on the average amount to about 60%. The greatest differences between the considered categories of companies are observed for Chinese companies when assessing the book leverage model where the difference in the speeds of adjustment is almost five-fold while the speed of adjustment of the market leverage for Brazilian companies of various categories is almost equal.

**Table 13.** Evaluation of the Speed of Adjustment of the Book Leverage for Companies with the Debt Level Higher and Lower than the Optimal One (Equation (9))

BLEV	Brazil	China	India	Russia	Republic of South Africa
<i>Overlevered</i>	0.1467***	0.1801***	0.1499***	-0.2722**	0.1822***
<i>Underlevered</i>	0.3615	0.8532***	0.4019**	0.2592	0.6288***
<i>_cons</i>	0.0343***	0.0165***	0.0294***	-0.0414*	0.0175***
<i>N</i>	669	14,067	3,364	540	815
$R^2_{adj}$	0.0817	0.278	0.0999	0.1316	0.1261

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Table 14.** Evaluation of the Speed of Adjustment of the Market Leverage for Companies with the Debt Level Higher and Lower than the Optimal One (Equation (9))

MLEV	Brazil	China	India	Russia	Republic of South Africa
<i>Overlevered</i>	0.3987***	0.5724***	0.3469***	-0.2740***	0.2628***
<i>Underlevered</i>	0.4558**	0.8173***	0.5850***	0.1897**	0.5547***
<i>_cons</i>	0.0358***	0.0065***	0.0324***	-0.0457***	0.0112***
<i>N</i>	669	13,972	3,364	540	815
$R^2_{adj}$	0.3073	0.5742	0.3053	0.0418	0.2234

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

This difference in the speeds of adjustment rejects suggested hypothesis *H.3a* stating that deviation from the target capital structure towards excessive debt load is assessed by a company as a more unfavourable state, hence, the speed of adjustment to the optimum will be higher. The obtained result stems from the fact that companies can increase the debt load rather easily while the debt load is lower than their optimal level. In this case creditors are ready to provide loans much easier, hence, companies are able to increase debt up to the optimal value at a rather high speed. At the same time at excessive debt load it may be difficult to raise funds from an investor and debt repayment using the cash flows generated by the company usually takes plenty of time. In this case the assessment results once again indicate that the speed of adjustment depends not just on the company wish to optimize its capital structure on the basis of the balance of benefits and expenditures caused by deviation, but also on external constraints imposed both by the opportunity to use equity or debt capital and by the speed of converting such an opportunity (Table 13 и 14).

At the same time assessment of the model for Russian companies demonstrates conflicting results: companies with excessive debt load level move away from the optimal capital structure rather than approach it, and this contradicts the hypothesis on a company striving to optimize the capital structure. It should be noted that this effect is

observed solely for companies with excessive debt level which may occur due to a large-scale decrease of the company assets' cost or of their market capitalization while debt liabilities stay unchanged. There is a high probability that the economic shock of the end of 2014 influenced reliability of the obtained results. As a consequence of the shock, a drop in the market capitalization and in asset value denominated in roubles caused a dramatic discrete leap of the financial leverage for the companies which obligations were nominated in foreign currency. This could result in wrong conclusions as regards companies' moving away from the optimal capital structure. However, limitation of observations to the period ending in 2013 for this model yields no substantial results. It indicates that temporal effects taken into consideration when assessing the model at the previous step could not take into complete account the influence of the domestic currency devaluation on dynamics of the company financial leverage values, and assessment of data for Russian companies requires application of the model specifications adapted for this objective.

All in all the considered models showed a significant explanatory power which varies within the range of 22–57% for the market leverage, however, for the book leverage model the values of  $R^2_{adj}$  amounted to just 8–13% except for Brazil where this indicator equaled 28%.

**Table 15.** Evaluation of Influence of the Value of Deviation of the Book Leverage from the Optimal Value and the Company Cash Flow on the Speed of Adjustment to the Optimal Capital Structure (Equation (10))

<i>BLEV</i>	Brazil	China	India	Russia	Republic of South Africa
<i>Higher than the Optimal Level</i>					
<i>ExcessDev</i>	0.2270***	0.3072***	0.2427***	-0.1579**	0.2343***
<i>Overlap  Dev  &gt;  CF </i>	0.1665	0.6706***	0.6884***	-0.8161**	0.4125***
<i>Overlap  CF  &gt;  Dev </i>	0.3624**	0.6023***	0.5477***	-0.4936***	0.2862***
<i>ExcessCF</i>	0.0419	0.1536***	0.2992***	-0.0839	-0.0192
<i>_cons</i>	0.0568***	0.0684***	0.0799***	-0.0565**	0.0443***
<i>N</i>	537	9,997	2,870	436	635
$R^2_{adj}$	0.1091	0.2226	0.1682	0.2442	0.1354
<i>Lower than the Optimal Level</i>					
<i>ExcessDev</i>	1.097	1.0244***	0.8462***	0.199	0.9314**
<i>Overlap  Dev  &gt;  CF </i>	-0.4269*	0.5763***	0.3879	-0.3647	1.0675***
<i>Overlap  CF  &gt;  Dev </i>	0.1434	0.8250***	0.6632***	-0.0017	1.1499***
<i>ExcessCF</i>	0.1356*	0.1985***	0.1378***	-0.2447	0.1717***
<i>_cons</i>	-0.0097	-0.0252***	-0.0193***	0.0177	-0.0319***
<i>N</i>	68	2,946	474	62	157
$R^2_{adj}$	0.7006	0.7141	0.4174	0.0154	0.4537

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

### Analysis of Influence of the Value of Deviation from the Target Capital Structure and the Company Cash Flow on the Speed of Adjustment to the Optimal Capital Structure.

Studying benefits and expenditures of capital structure optimization it is necessary to take into consideration the absolute value of the company cash flows which influence significantly expenditures of adjustment. If a company has high positive cash flows they may be a cheap source of debt repayment or shares redemption which reduces expenditures of the financial leverage significantly. On the other hand, if a company has negative cash flows it faces the necessity to finance them, hence, it may optimize its capital structure by choosing a corresponding source of raising capital: borrowed or equity one.

Analysis of the ratio of the gap amount to the company cash flows showed that the value of deviation from leverage optimal level also influences significantly the speed of adjustment to the optimal capital structure. Alongside this, the estimates obtained for the considered companies selection in some cases differ from the ones obtained when assessing a similar model for American companies.

The results also differ for various countries within the considered selection which suggests different interrelations between the speed of adjustment and the ratio of the company cash flows to the deviation from the optimal leverage.

The considered models show the values of the speed of adjustment comparable to the estimates obtained at earlier stages of the research. Therein for companies from the majority of countries the obtained estimates coincide with the expected interrelations between the value of flows and the capital structure to the speed of adjustment gap. However, as in the previous step the estimates for Russian companies show contradicting results and may not be interpreted true to fact within analysis of the model we consider. Exceedance in some cases of coefficients of unit values is not a critical contradiction to the logic of the partial adjustment model and is most probably an inaccuracy which occurred when assessing the coefficients close to one (Table 15).

In case the gap between the current leverage and the optimal one exceeds the absolute value of the cash flow, companies from China, India and the Republic of South Africa strive to cover the gap value quicker within the amount of their cash flow ( $\gamma_2 : \text{Overlap} |Dev| > |CF|$ ), while they

cover the remaining part ( $\gamma_1$ : *ExcessDev*) at a significantly lower speed, and this accords with suggested hypothesis H.4. For companies from Brazil this effect is observed exceptionally for the market value of the financial leverage while for the book leverage the coefficient ( $\gamma_2$ ) turned out to be insignificant. At the same time this conclusion suits only companies with excessive debt load, and for companies with the debt level lower than the optimal one influence of the cash flow value in case of a greater deviation from the optimal leverage, analysis shows weaker and more unstable interrelations. Conclusions of Chinese companies with the leverage level lower than the optimal one to some extent contradict the logic which asserts that companies cover the gap up to the amount of the cash flow at a greater speed than in case of the deviation which exceeds the cash flow. This result indicates that in case of deviation of the financial leverage from its optimal value for the value exceeding the cash flow, companies, in the first place, tend to cover the gap which exceeds the value of their cash flows, and for the gap within this value the

speed of adjustment slows down. All in all, it shows that companies, most probably, are not prone to use all their cash flow to optimize the capital structure in case the debt level exceeds the optimal one. It stems from the necessity to use a part of the flow for the purposes not related to the capital structure optimization. Moreover, in case of a positive cash flow companies may have no need to raise additional debt and shares redemption is substantially restricted if they are overestimated in the market, hence, a company, most likely, will not cover the gap in the capital structure for the whole cash flow amount. On the other hand, if it is necessary to finance negative cash flows a company may be significantly restricted in its choice of the financing sources, which may adversely affect the value of the speed of adjustment. Moreover, these companies may choose the capital sources not just on the basis of the purpose of the capital structure optimization, but probably, on the basis of other considerations, such as retaining control, share of ownership or other motives not related to the considered task (Table 16).

**Table 16.** Evaluation of Influence of the Value of the Market Leverage Deviation from the Optimal Value and the Company Cash Flow on the Speed of Adjustment to the Optimal Capital Structure (Equation (10))

#### Higher than the Optimal Level

MLEV	Brazil	China	India	Russia	Republic of South Africa
<i>ExcessDev</i>	0.5821***	0.8072***	0.5024***	-0.2531***	0.3397***
<i>Overlap</i> $ Dv  >  CF $	0.6475***	0.8319***	0.7459***	-0.4820***	0.4519***
<i>Overlap</i> $ CF  >  Dev $	0.3988	1.1963***	0.8115***	-0.5320***	0.3954***
<i>ExcessCF</i>	0.3897***	0.4991***	0.4988***	-0.0399	0.0696**
<i>_cons</i>	0.0946***	0.0972***	0.1130***	-0.0544***	0.0418***
<i>N</i>	447	7,412	2,428	390	558
$R^2_{adj}$	0.3593	0.5375	0.2658	0.0442	0.1814

#### Lower than the Optimal Level

MLEV	Brazil	China	India	Russia	Republic of South Africa
<i>ExcessDev</i>	0.8745**	1.0047***	0.6795***	-0.1881	1.0554***
<i>Overlap</i> $ Dev  >  CF $	-0.1166	0.1868**	0.183	-0.2684	-0.3383*
<i>Overlap</i> $ CF  >  Dev $	0.239	0.9825***	0.5829***	-0.291	0.2398*
<i>ExcessCF</i>	0.2213	0.3301***	0.2105***	-0.027	0.1150***
<i>_cons</i>	-0.0308	-0.0396***	-0.0281***	0.0468	-0.0105
<i>N</i>	158	5,461	916	108	234
$R^2_{adj}$	0.339	0.6498	0.2354	-0.027	0.5664

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

When the cash flow exceeds the gap amount in the capital structure companies are potentially capable to cover this gap virtually instantaneously by repaying the debt or redeeming shares when the flow is positive and by using equity or borrowed capital when the flow is negative. The results of assessment for the book leverage indicate that the speed of adjustment ( $\gamma_3 : \text{Overlap}|CF| > |Dev|$ ) for these companies is comparable to the case of adjustment for the cash flow amount when the latter is lower than the gap amount ( $\gamma_1$ ), hence, optimization is of the same importance for the book capital structure of these companies as for the companies which do not cover this deviation with their cash flow. At the same time considering the capital structure assessed for market values, companies from China and India with the excessive debt load level indeed demonstrate the highest speed of adjustment, and this confirms the hypothesis that companies with the cash flow exceeding the gap amount in the capital structure should have the highest speed of adjustment. For a company with insufficient debt level the speed of adjustment is also rather high but comparable to the coefficient ( $\gamma_1$ ) as in the case of the book leverage analysis.

Coefficients of the last indicator ( $\gamma_4 : \text{ExcessCF}$ ) are rather low and often insignificant. This confirms the assumption that a company strives to preserve the optimal capital structure when it attains it. Differences in the speed of adjustment for companies with the debt load higher and lower than the optimal one in general are not high, it is indicative of equal significance of the optimization objective irrespective of the necessary direction of change.

All in all the analyzed models demonstrate a high explanatory power, therewith models for market leverage values on the average explain a greater variation than models for the book leverage. It is interesting that with a significant amount of insignificant variables models for companies with the debt level below the optimal one on the average have a higher value of  $R_{adj}^2$ , hence, exceedance of the deviation value over the flow value or exceedance of the flow over the deviation which is of significance in the absolute majority of cases plays an important part in taking decisions as regards optimization of the capital structure.

## Conclusion

The research results indicate that companies in developing economies are prone to adjust quicker to the optimal capital structure at the financial leverage below the optimal one while companies with excessive debt load conduct optimization much slower.

Also, the cash flow of a company influences significantly the speed of adjustment. Thus, for companies with the deviation from the target capital structure exceeding the cash flow absolute value the speed of adjustment is significantly higher when the gap is covered up to the amount of the cash flow, while the deviation exceeding this value is covered at a much slower speed. At the same time for companies with the cash flow exceeding the deviation from the

target leverage the speed of adjustment is the same as for the abovementioned companies when they cover the gap up to the cash flow value. Additionally, during the research we conducted a comparative analysis of various methodologies of assessment of the speed of adjustment to the optimal capital structure and this enabled us to choose the most applicable and effective assessment methods. Analysis of the results for various specifications of the partial adjustment model and time sub-selections also showed a significant sustainability of results. At the same time in some cases the assessed model prevents us from obtaining reliable results for the selection of Russian companies. Analysis of the speed of adjustment, depending on the direction of deviation and its ratio to the company cash flows showed unstable results for the selection of Russian companies, and this means that it is necessary to review models of determinants of the optimal capital structure and assessment of the deviation value from it for analysis of the speed of adjustment for Russian companies.

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