



## ARTYKUŁY W JĘZYKU ANGIELSKIM

### Basic assumptions and definitions in the analysis of financial leverage

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#### Abstract

The financial leverage literature has been in a state of terminological chaos for decades as evidenced, for example, by the Nobel Prize Lecture mistake on the one hand, and the global financial crisis on the other. A meaningful analysis of the leverage phenomenon calls for the formulation of a coherent set of assumptions and basic definitions. The objective of the paper is to answer this call. The paper defines leverage as a value neutral concept useful in explaining the magnification effect exerted by financial activity upon the whole spectrum of financial results. By adopting constructivism as a methodological approach, we are able to introduce various types of leverage such as capital and income, base and non-base, accounting and market value, for levels and for distances (absolute and relative), costs and simple etc. The new definitions formulated here are subsequently adopted in the analysis of the content of leverage statements used by the leading finance textbook.

**Keywords:** financial leverage, gearing, capital structure, leverage theory, DFL, MM.

#### Streszczenie

#### Podstawowe założenia i definicje w analizie dźwigni finansowej

W literaturze poświęconej dźwigni finansowej od wielu lat panuje chaos terminologiczny, czego najlepszymi przykładami są zarówno błąd popełniony w wykładzie noblowskim, jak i ostatni kryzys finansowy. Poprawne rozumienie procesów dźwigniowych wymaga zatem sformułowania spójnych założeń i podstawowych definicji. Taki jest też cel niniejszego artykułu. Dźwignia definiowana jest tu jako wywołane przez działalność finansową firmy, niewpływające na wartość, zwielokrotnienie jej (bardzo szeroko rozumianych) wyników finansowych. Stosując podejście metodologiczne zwane konstruktywizmem, możliwe było stworzenie wielu różnych rodzajów dźwigni: kapitałowych i dochodowych, bazowych i niebazowych, rynkowych i księgowych, dla poziomów i odległości (bezwzględnych i względnych), prostych i kosztowych itp. Stworzone w pracy definicje obiektów dźwigniowych zostały następnie zastosowane w analizie zawartości treściowej sformułowań dotyczących dźwigni finansowej, użytych w jednym z najbardziej prestiżowych podręczników akademickich w dziedzinie finansów.

**Słowa kluczowe:** dźwignia finansowa, lewarowanie, struktura kapitału, teoria dźwigni, DFL, MM.

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## Introduction

The objective of the paper is to propose a set of basic definitions indispensable in the coherent study of financial leverage. Thanks to a detailed analysis of different leverage objects, constructed based on carefully selected axiom-like assumptions using the methodological approach referred to as constructivism, we are able to identify and properly define numerous leverage effects. Many of them, e.g. those measured by the cost-driven DFL (degree of financial leverage), originate directly from accounting. Others become increasingly important to accounting as they may affect the fair value of assets reported in books. The precise definitions of leverage objects may in turn lead to an unambiguous theory of leverage<sup>1</sup>.

In the case of financial leverage, we are fortunate to have the sound, noble and indeed Nobel Award winning theory proposed by Modigliani and Miller. Despite a clear and coherent approach (even if somewhat old, currently neglected and in need of serious revitalization) provided by the authors in their seminal work on capital structure and financial leverage (1958, 1963)<sup>2</sup>, the academic and professional literature on financial leverage seems to have been in a state of „conceptual chaos” (Dilbeck, 1962) and „terminological confusion” (Zwirbla, 2007) for many decades now. Unfortunately, the MM model has never attracted much interest from finance practitioners. To make it worse, its importance is frequently downplayed, either deliberately or not, by finance academics, too. This happens every time the focus is laid on its unrealistic model assumptions (which, some claim, render the whole theory irrelevant to practice) rather than on its powerful, ingenious arbitrage argument and far reaching conclusions, i.e. *in the presence of debt, levered equity risk leads to a levered equity risk premium making financial leverage value neutral*. The simplicity of this claim seems to have been lost since its formulation. The Global financial crisis of recent years provides ample evidence of the one-sidedness of our understanding of financial leverage: we all agree that returns do indeed go up on average when debt is taken, yet the increase of equity risk that accompanies returns is hardly recognized. The huge corporate bonuses in the pre-2007 years which paid for higher ROE, leading clearly to global problems, are

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<sup>1</sup> The general theory of financial leverage has already been published in Polish (Berent, 2013b). In 2014, the book was awarded the Citi Handlowy and Kronenberg Foundation Award for Special Achievement in Theory of Economics and Finance – one of the most prestigious tokens of recognition granted to scientists and scholars in Poland.

<sup>2</sup> Modigliani and Miller wrote two papers on capital structure and leverage. The 1958 paper is usually associated with the case of no taxes, while the 1963 paper deals, according to a popular view, with taxes. In fact, the irrelevance of capital structure was construed and proved in 1958 for cases both with and without taxes. It was subsequently discovered that the paper contained a mistake. This led to the 1963 article with a subtitle *Correction*, in which taxes were shown to matter. In our opinion, while the 1963 work is an excellent piece on capital structure theory, the 1958 paper is devoted to financial leverage.



testimony of this approach<sup>3</sup>.

Modigliani and Miller's work may constitute the quintessence of finance, yet its impact on the finance profession is currently, as noted above, rather limited. In our opinion, it is partly due to the fact that the leverage concept has been hijacked by managerial accounting and financial analysis. It is an accounting perspective, preoccupied with the explanation of the impact of (operating and financial) cost-driven leverage on accounting profitability, that is adopted today by financial textbooks. The lack of one clear capital structure theory, of which value-neutral financial leverage is merely a small component, does not help either.

The replacement of the finance perspective by that of accounting and the neglect of the MM heritage are, in our opinion, two major reasons for the chaos surrounding financial leverage. The vast conceptual capacity of the (colloquial, after all) term *leverage* may mean virtually anything is another one. Note, for example, that both the whole firm as well as merely one of its components, i.e. equity, may be levered<sup>4</sup>, but these statements surely do not mean the same thing. Risk, as well as reward for risk, can also be levered. The same may be said about the variance and beta of returns. Specific returns, profits, losses, EPS, ROE etc. or even the probability of financial distress may get levered, too. In some cases, financial leverage means simply indebtedness (like in phrases such as *debt, or leverage*), in others, it denotes any (of many potential) effects indebtedness leads to (like in phrases such as *debt creates leverage*). The statement *leverage creates leverage*, although amusing at first sight, ceases to be tautological if the designations of the term are properly understood. Consequently, financial leverage is measured by the increase in variance and/or the increase in beta, by the inflation of the specific profitability indexes (e.g. ROE, EPS), or by the increase in the probability of bankruptcy etc. It is also measured by the degree of financial leverage ratio, or DFL, and the coefficient of determination. In most empirical research papers, where financial leverage is used as a (dependent or independent) variable, it is usually measured by one of many formats of capital structure ratios, making the understanding of leverage virtually arbitrary (Berent, Jasinowski, 2012). The fact that many of these measures are not equivalents of each other, or often contradictory, does not seem to bother anybody.

The conceptual chaos surrounding leverage leads to what we call a *financial leverage paradox*. The paradox takes the form of a simple question that, despite its simplicity, does not produce one simple answer. The following question is but one of many versions of the paradox: *what would the change in the equity value of the geared company with a given debt-to-equity ratio be (in the frictionless market) if the value of an otherwise identical all equity firm increased by, say, 10%*? Having reviewed financial textbooks, one can quickly realize that the answer to the question (or

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<sup>3</sup> The crisis has not only highlighted the caveats of the excess leverage. It might also have helped reassess the validity of the MM model (cf. Haldane, 2009).

<sup>4</sup> Or even *leveraged* as some claim.

a similar one) depends on the way the question is understood. Indeed, depending on the way the question is interpreted, the answers, all legitimate, may be completely poles apart. Sometimes the question may be viewed as talking about risk (returns volatility), in different interpretations it is the question about the reward for the risk taken (the change mentioned in the question is then interpreted as the expected value appreciation between  $t = 0$  and  $t = 1$ ), in yet other cases it can be viewed as relating to the mix of the two. In most cases, however, the question does not have any useful meaning at all, even if the answer given is algebraically correct. In addition, some may argue that, given the data available, the answer is not forthcoming at all. The disagreement may also occur on what information is actually missing. Paradoxically, in some interpretations, the knowledge of a debt to equity ratio is not necessary at all. In other interpretations, the scale of the value change analyzed is of little importance. Some may even claim that the question is unanswerable no matter what additional data is provided. Some interpretations produce answers only marginally higher than 10%, other suggest answers close to plus infinity. Lower than, including negative, or equal to 10% answers are also feasible. To repeat, the paradox is lethal not only because of the multitude of potential answers but because of the fact that this multitude is rarely recognized.

To conclude, the simplicity and coherence of the MM model has long been lost, and in fact it has been traded for an obscure web of almost limitless and often contradictory usage of the leverage term. Based on the study of top finance textbooks, Berent (2013b) formulates no fewer than 40 questions on financial leverage of different caliber and methodological status. The questions point to many specific inconsistencies or even errors in the way financial leverage is described in the literature. Needless to say, the list is merely a small sample of potential queries.

The mistake made by Merton H. Miller, a Nobel Prize laureate who wrote all his life on leverage, is the ultimate illustration of the chaos encountered in the leverage literature. The mistake could not have been made in a more unfortunate place and time as it did during Miller's Nobel Memorial Prize Lecture presented at the Royal Swedish Academy of Sciences in 1990. The mistake was not corrected (as evidenced by the dual publication of the lecture text, first in 1991 by the *Journal of Finance*, and then in 2005 by the *Journal of Applied Corporate Finance*, in both cases under a simple, yet much telling title *Leverage*), until quite recently (cf. Berent, 2013a). In short, Miller confuses the results of sensitivity with elasticity analysis and, hence, mistakenly identifies the DFL coefficient with the increase in Markowitz's standard deviation and Sharpe's beta.

We believe the state of the conceptual chaos surrounding leverage justifies the appeal for a new theory of financial leverage to be formulated. Although in this paper we are not presenting a fully-fledged theory, we elaborate on the methodology and theoretical assumptions necessary to formulate it (section 2). In section 3 we formulate basic yet indispensable, usually novel, definitions of the leverage objects created.



In section 4, with the help of the examples taken from one of the most reputable corporate finance textbooks, we illustrate how the new concepts introduced in this paper may help steer the reader through the rough waters of the leverage literature.

## 1. Methodological approach and basic assumptions

The ultimate objective of leverage analysis is to pack into one coherent system as many approaches to financial leverage as possible. In addition, within such a system, the relationships between all various types and measures of leverage should be clearly defined. For this to happen, we have applied a novel methodological approach we call constructivism. This approach consists in building (step-by-step) on a very basic, introductory and hence wide definition of financial leverage. Thanks to this, all potential types of leverage are first identified and then incorporated into the system. In contrast to what we call the normative approach, in which a clearly defined, very specific and usually narrowly construed definition of financial leverage is adopted<sup>5</sup>, constructivism does not discriminate against any (however idiosyncratic) treatment of leverage. In the process of constructing new leverages, and hence discovering their features, the very general, introductory definition of leverage may evolve eventually into a more detailed one. The gradual construction of various financial leverages and leverage objects is designed to result in the formulation of several, possibly ever-more precise theories of leverage. From this perspective, the new general theory of financial leverage may yet prove to be not a single theory but, using the language of Lakatos (1970), a web of partial studies.

The formulation of the theory begs first the set of assumptions underpinning it. Below are the most important:

1. Leverage is studied in the context of one period.
2. Only two types of a firm's capital, i.e. debt and equity, are allowed.
3. Capital structure decisions do not affect either operating activity nor the firm's valuation.
4. Debt carries no risk of default.
5. There are no taxes.
6. There is no bankruptcy risk.

Some of these assumptions are critical to the theory pursued, others are less important. The first two define the decision on a capital structure (consisting of debt and equity only) as being made at  $t = 0$ , while the impact of this decision is recorded at  $t = 1$ . It is immaterial what happens in-between. The length of the period between  $t = 0$  and  $t = 1$  is also unimportant. The existence of one type of debt is assumed for simplicity. The assumption of no correlation between financial and operating activity of the firm

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<sup>5</sup> The definition of the financial leverage based on the portfolio and asset pricing theory, and hence able to explain the magnification of standard deviation and beta, would probably be an ideal candidate for the definition using the normative approach.

is fundamental. All potential impacts the financing decision may have on operations is assumed not to be a part of a leverage analysis. Similarly, it is assumed that financing decisions do not affect valuation. Taxes and bankruptcy costs are just two examples of the potential impact financing may have on operations/valuation. The assumption of no bankruptcy, which secures model linearity, helps to significantly simplify the analysis. Regarding taxes, they are not in our opinion a constituent part of a leverage story. True, the market valuation of the firm may significantly change if taxes are allowed, but the issue seems to be a part of a broader research area, i.e. capital structure, rather than that of financial leverage. Similarly, the change in the market value of debt may also significantly affect the costs and benefits of being indebted, but again this is not deemed to be a part of leverage. Riskless debt assumption that implies no value change of the debt is not necessary. It vastly simplifies the leverage analysis in areas such as the analysis of variance or the beta coefficient.

To sum up, financial leverage is assumed to be value-neutral affecting both the equity risk and risk-reward to an equity holder. Similar in nature to those used in the MM model, the assumptions made here are expected to yield results (on leverage) far exceeding those formulated by Modigliani and Miller. In particular, the assumptions made here should eventually allow us to table all or most of the types of leverage in the form of one clear coherent system.

## 2. Basic definitions

It is commonly agreed that financial leverage, however defined, has something to do with the impact of a firm's financial activity on its financial results. Hence, the first definitions provided below relate to the very basic notions such as financial activity or financial results.

A. **Financial activity** is defined here as the presence of either debt in a firm's capital structure ( $D > 0$ ) or financial costs ( $FC > 0$ ) or both. The **financial activity state** is defined as an ordered pair ( $D \geq 0, FC \geq 0$ ), so three distinct states of financial activity are possible: ( $D > 0, FC > 0$ ) when both debt and financial costs are present; ( $D > 0, FC = 0$ ), when debt is cost-free; and ( $D = 0, FC > 0$ ), when the presence of financial costs is accompanied by no debt. In contrast to the standard definition of **the cost of debt** ( $i = FC / D$ ), there is also **the cost of financial activity** defined as  $i^* = FC / (E + D)$ , where  $E$  stands for equity. The introduction of the financial activity cost (on top of the cost of debt) as well as the definition of financial activity in the form of an alternative (debt and/or financial costs) allows a separate analysis of the impact of either debt or financial costs on the firm's financial results. In particular, this setting allows for the analysis of leverage caused by fi-



nancial costs in the absence of debt (sic!)<sup>6</sup>.

- B. Financial activity and financial leverage triggered by it affect **financial results**. They are defined as almost any form of financial outcome conceivable, e.g. accounting profit, EPS, book return on capital, the total book value of capital, book value per share etc. They also include the market value substitutes of the aforementioned outcomes e.g. a share price or market value change. Financial results are defined either as **the level** of variable  $X$  or as **the distance** between any two outcomes of this variable. The distance may be defined as **absolute**  $\Delta X = X - X_B$  or **relative**  $\Delta\%X = (X - X_B) / X_B$ . The absolute distances can be calculated for any two levels, relative distances only for non-zero base value  $X_B$ . The distances, both absolute and relative, can be either positive, negative or zero. The definition of the financial result is very general and as such allows the analysis of leverage impact in the context of almost any variable. One can also treat measures such as betas or earnings variances etc. as a type of a „financial result” that can be subject to leverage.
- C. **Financial leverage** is defined as the magnification of the sign of the financial result analyzed, be it the levels (including magnitudes such as equity betas) or distances, by the financial activity so that the negative (positive) values before the introduction of financial activity:  $X_U < 0$ ,  $\Delta X_U < 0$ ,  $\Delta\%X_U < 0$  ( $X_U > 0$ ,  $\Delta X_U > 0$ ,  $\Delta\%X_U > 0$ ) become even more negative (positive) after the introduction of the financial activity:  $X_G < X_U < 0$ ,  $\Delta X_G < \Delta X_U < 0$ ,  $\Delta\%X_G < \Delta\%X_U < 0$  ( $X_G > X_U > 0$ ,  $\Delta X_G > \Delta X_U > 0$ ,  $\Delta\%X_G > \Delta\%X_U > 0$ )<sup>7</sup>. Hence, there are **financial leverages for levels**, **financial leverages for absolute distances** and **financial leverages for relative distances**. For example, leverage is diagnosed when profits rise, losses deepen, capital value goes up, variance of returns swells, negative distances (absolute or relative) from the base become more negative etc. When the levels are used as the base in the analysis of the deviations from them, then the leverages diagnosed for such levels are referred to as **base leverages (for levels)**. Otherwise, the leverages are referred to as **non-base leverages (for levels)**. Financial leverage always refers to a given category of financial results (defined as levels or distances). Financial leverage can therefore be spotted in any given firm for some type of financial results (e.g. for return on capital or relative distances from the given base value of equity) and at the same time not spotted for others (e.g. nominal profits or the absolute distances between profits per share). Financial leverage spotted for a given category of financial results may be present within only a certain range of financial results: e.g. for negative (in contrast to positive) returns on capital. The definition of the leverage that focuses on the „magnification” of the sign of financial result, referred to as a **deterministic definition of financial leverage**, is an example of a real definition in that it describes the essence of the object defined rather than the way it is

<sup>6</sup> The case where  $D = 0$  and  $FC > 0$  is only possible in the accounting analysis. In the market value analysis, the existence of financial costs implies the presence of  $D$ , understood as the present value of these costs.

<sup>7</sup> U stands for ungeared, G stands for geared.

measured. It is this magnification rather than how it is spotted that matters<sup>8</sup>. **Financial results are said to be levered** when the financial leverage is diagnosed.

- D. The comparison between financial results before and after the introduction of a financial activity is defined as a **financial effect**<sup>9</sup>. The financial effect has a sign and a leverage value. The **sign of a financial effect** is measured by **(full) financial addends**:  $S_F = X_G - X_U$  for levels,  $S_{F\Delta} = \Delta X_G - \Delta X_U$  for absolute differences, and  $S_{F\Delta\%} = \Delta\%X_G - \Delta\%X_U$  for relative distances. When the financial addend is negative then the **financial effect is negative**, when the financial addend is positive then the **financial effect is positive**, when it is zero then the **financial effect is neutral**. When the financial effect for levels is negative (positive), the financial activity makes financial results worse (better). The **leverage value of a financial effect** detects the presence of the financial leverage. The leverage effect is measured by **(full) financial multiples**:  $M_F = X_G / X_U$  for levels,  $M_{F\Delta} = \Delta X_G / \Delta X_U$  for absolute differences, and  $M_{F\Delta\%} = \Delta\%X_G / \Delta\%X_U$  for relative distances<sup>10</sup>. When financial leverage is diagnosed (the financial multiple is greater than 1) then a financial effect becomes a **leverage effect**, when the financial leverage is not diagnosed (the financial multiple is not greater than 1 or it cannot be calculated), it is a **non-leverage effect**. Financial addends and multiples are collectively called **financial leverage measures**. As there can be both positive and negative leverage effects as well as positive and negative non-leverage effects, the distinction between the sign and the leverage value of a financial effect vastly simplifies the analysis and helps avoid unnecessary confusion.
- E. Financial analysis using market values leads to **market-value leverages**, while financial analysis using book values leads to **book-value, or accounting leverages**. The distinction between the market and book value leverages is important as the popular view that the book-value leverages are simply proxies for market-value leverages is not necessarily correct, e.g. there are cases where some leverages are present only in the book-value context and absent in the market value analysis.
- F. When leverage analysis refers to the (market or book) value of capital employed, we call it **capital analysis**. When it refers to changes in capital value, we call it **in-**

<sup>8</sup> A different **probabilistic definition of financial result** is also possible (Berent, 2011), according to which, financial leverage implies the increase in the probability of getting extreme values of financial results. By **extreme value** one should understand results higher than those determined by the cost of the debt.

<sup>9</sup> The comparison between the financial results of two levered firms (investors) first requires a comparison of the results of each company (investor) with the results of the otherwise ungeared company (investor).

<sup>10</sup> The differences (quotients) of financial results after and before the introduction of financial activity are referred to as addends (multiples) because the financial results with financial activity is just the addition (multiplication) of the results without financial activity and the appropriate addend (multiple). As the functions linking financial results after and before the inclusion of financial activity are linear, financial multiples:  $M_{F\Delta}$  for absolute and  $M_{F\Delta\%}$  for relative distances can be shown to be identical to **sensitivity SEN and elasticity ELA coefficients** defined by first derivatives as  $SEN = dX_G / dX_U$  and  $ELA = dX_G / dX_U \times X_U / X_G$  respectively.





**come analysis.** The examination of profits, EPS, and return on investment are but a few examples of income analysis; the examination of the book value of capital or market share price are examples of capital analysis. Financial leverages diagnosed in the capital analysis are called **capital leverages** while financial leverages diagnosed in the income analysis are called **income leverages**. As capital and income financial leverages behave differently, the distinction between them is important.

- G. The consequences of taking debt are different from those which come from bearing financial costs. The **simple leverage effect** in the income approach is defined as a financial leverage effect that results from taking cost-free debt. The **cost effect** in the income approach is defined as the outcome of adding financial costs into the analysis. In the capital approach, simple leverage assumes that debt is not returnable. The analysis of the simple leverage effect focuses on the impact of debt on financial results, while the analysis of the cost effect focuses on the impact of financial costs<sup>11</sup>. The definitions of simple leverage and cost effects, collectively known as **partial effects**, secure the additivity of them to a **(full) financial effect**<sup>12</sup>. The partial effects exhibit both the sign, measured by the **simple leverage** and **cost addends**, as well as the leverage value, diagnosed by the **simple leverage** and **costs multipliers**, known, in contrast to **full leverage measures**, as **partial leverage measures**. The simple leverage (cost) effect may lead to a **simple (cost) leverage**. In contrast to **full financial leverages**, diagnosed for the full financial effects, simple and cost leverages are examples of **partial leverages**. The novel decomposition of the full financial effect into the simple leverage and cost effects allows a detailed analysis of the distinct role debt and financial costs play in financial leverage analysis.
- H. Financial analysis can be performed from various interpretation perspectives. If the analysis focuses on the comparison between operating and net results of the same firm, then the financial leverage is studied from the **GF perspective**. If the analysis focuses on the comparison between the net results of the geared versus ungeared firm, then the financial leverage is studied from the **GUF perspective**. If, in addition, the geared and ungeared firms compared are identical in size so they differ in capital structure only, then the perspective is called the **GUF<sub>R</sub> perspective**<sup>13</sup>. If, however, the presence of debt in the geared firm implies a size increase (*SI*), then the analysis is performed from the **GUF<sub>SI</sub> perspective**. The financial leverage analysis can also be performed from the perspective of an investor – the **GUI perspective** (geared vs. ungeared investor). Such an analysis consists in the comparison of the financial results achieved by the geared investor in comparison to the ungeared one of the same size who instead of debt uses the equity provided by another equity holder. A clear specification of the interpretation

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<sup>11</sup> Simple leverage effect takes its name from the fact that the presence of debt leads always to leverage. Cost effect takes its name from the fact that for levels it always implies the deterioration in financial results.

<sup>12</sup> An alternative and intuitive definition of simple leverage and cost effects as financial effects respectively for  $D = 0$  and  $FC = 0$  does not secure the additivity of the partial effects to the full financial effect.

<sup>13</sup> R stands for recapitalization.

perspective adopted helps eliminate potential interpretation confusion of the results received, as the different perspectives may lead to different results. The adoption of the **GUI perspective** may be shown to be particularly attractive<sup>14</sup>.

- I. If the leverage analysis uses currency denominated financial variables such as profits, losses, capital value levels, change in capital values etc., then the leverage analysis is performed using what we call **EAT-type** profitability (**T-EAT**). If, however, these variables are presented in the per share format as e.g. EPS or share price, then **EPS-type** profitability (**T-EPS**) is used. If, instead, they are presented as a percentage of capital invested, then the profitability used is referred to as **ROE-type** (**T-ROE**)<sup>15</sup>. The clear distinction between various profitability formats helps avoid many potential misunderstandings resulting from comparing different financial results.

### 3. Leverage analysis – textbook examples

By leverage analysis we understand the study of the consequences of a firm's engaging in financial activity rather than mere acknowledgment of the presence of debt or the measurement of its scale (in the phrase *leverage creates leverage*, we concentrate on the latter use of the word). In particular, we study various types of financial leverage as magnification forces: market vs. book value leverages; capital vs. income leverages; leverages for levels and distances; for absolute and relative distances; base and non-base leverages; full or partial leverages; simple and costs leverages etc.

Before entering into leverage analysis, one should determine if it is about market or book values, capital or income; operating vs. net results of one company, or performance of two companies/investors, of which one is geared (the interpretation perspective); nominal, per share, or per unit of capital variables (the type of financial results).

In this section we present four different leverage statements taken (almost arbitrarily) from the classical textbook in corporate finance (Brealey et al., 2011). In each case, we try to identify how the financial leverage mentioned is understood. In particular, we analyze how financial activity (debt and or financial costs) is perceived, what financial results actually get levered; what the measures of the leverage strength are etc. We also determine, where possible, the type of financial leverage the statement relates to.

**Example 1.** *Financial leverage refers to the firm's fixed costs of finance* (p. 407)

Although not explicitly stated, by mentioning fixed costs the authors are almost

<sup>14</sup> There is also another interpretation perspective denoted as **GGF** (geared vs. geared firm), which calls for the comparison of the financial results of two geared companies. As mentioned before, the analysis using this perspective is equivalent to the analysis using the **GUF perspective** twice, one for each of the geared firms separately.

<sup>15</sup> Despite an obvious contextual discomfort, the profitability types listed above, clearly derived from a book-value analysis, are also used in market-value leverage studies.



certain to allude here to the so called degree of financial leverage index, or DFL. The size/existence of debt is not critical, as a result as financial activity is associated here with the size/existence of financial costs only (note, the same amount of financial costs can be generated by different debt volumes; paradoxically, a debt-free firm may have financial costs related to past or future indebtedness). Financial leverage will not be spotted for a firm with even massive debt which pays no interest (indeed,  $DFL = 1$  in such a case). This suggests that the financial leverage invoked here is what we call cost (rather than simple) leverage. As DFL measures percentage changes in net profitability resulting from a 1% change in operating profitability, the financial leverage here relates to relative, against a predetermined base, distances (percentage changes) in profitability. However, no explicit effort is made here to explain if the financial results affected by this fixed-costs-driven leverage are in the form of nominal profits (T-EAT), profits per share (T-EPS) or returns on capital (T-ROE). The leverage statement is made from the perspective of one geared firm GF, where the leverage analysis focuses on the operating vs. net results of a geared company. Although not obvious from the context, the statement describes book (rather than market) value financial leverage and most probably income (rather than capital) leverage.

**Example 2.** *The equity beta of a levered firm will always be greater than the equity beta of the otherwise identical all-equity firm* (p. 408)

The statement here is about the financial leverage of equity beta. Financial leverage analysis is no longer pursued from the GF perspective. It is quite clear that the perspective of two firms, identical in all aspects but capital structure, i.e.  $GUF_R$ , is adopted (although the shift from GF to  $GUF_R$  between the two adjoining paragraphs has never been acknowledged). In addition, it is no longer book value analysis, as can be inferred from the accompanying statements („*market value of firm's debt*”). Having referred to some regressions performed earlier, it is possible to establish that the leverage analysis done here, as it usually is when beta is mentioned, is the income analysis performed with the help of rates of returns. Hence, the leverage invoked here uses the T-ROE type of profitability.

**Example 3.** *The effect of financial leverage depends on the company's earnings before interest* (p. 467)

In the section this statement is taken from, it is the level of ROE and EPS that get levered. Hence, T-ROE and T-EPS types of results (rather than T-EAT) are used. By studying earnings, this is explicitly an income (rather than capital) and book (rather than market) value financial leverage analysis. The analysis compares two different capital structures (*current* and *proposed*), hence, it implicitly adopts the  $GUF_R$  perspective. Financial activity is construed as the exposure to both debt and financial costs, hence, the financial leverages studied are so called full (rather than partial, i.e. simple and costs) leverages. A careful scrutiny of the numerical examples provided allow the analysis of financial leverage for  $D > 0$  and no financial costs (simple lever-

ages), as well as the incremental impact analysis of adding financial costs (cost leverages) to be performed separately. The financial activity may lead to an increase in EPS and ROE, i.e. a positive financial effect, when the financial addend ( $ROE_G - ROE_U$ ) is positive and the financial multiplier ( $ROE_G / ROE_U$ ) greater than 1. Consequently, the financial leverage for levels (of ROE and EPS) is successfully diagnosed. Alternatively, it may happen that the financial activity may depress EPS and ROE, i.e. the financial effect is negative. The financial addend ( $ROE_G - ROE_U$ ) is negative and the financial multiplier ( $ROE_G / ROE_U$ ) lower than 1. Consequently, no financial leverage for levels (of ROE and EPS) is diagnosed.

**Example 4.** *Greater range for the EPS of the levered firm implies greater risk* (p. 471)

This statement is the continuation of the numerical example mentioned in example 3. Hence, the leverages here are studied from the  $GUF_R$  perspective (in the discussion of the results, the authors no longer talk about the comparison between *current* and *proposed* capital structures but explicitly about two firms: geared and ungeared). However, emphasis is no longer on the levels of EPS but on the absolute distances between extreme outcomes (the range). The range does increase, so the financial effect (for absolute distances) is positive, i.e. the financial addend for absolute distances ( $\Delta EPS_G - \Delta EPS_U$ ) is positive and the financial multiplier ( $\Delta EPS_G / \Delta EPS_U$ ) is greater than 1. The financial effect is therefore a leverage effect diagnosing the presence of the leverage for the absolute distances in EPS. In contrast to the financial effect for levels in EPS presented in example 3, the financial effect for absolute distances in EPS can never be negative. A careful analysis of this leverage reveals that, in contrast to the leverage mentioned in example 3, the existence of the financial costs is not important here. Hence, the (full) financial leverage for absolute distances in EPS is identical to the simple leverage (resulting from the very presence of debt) for those distances. No cost leverage (resulting from the presence of financial costs) is diagnosed here. The full financial addend is identical to the partial, simple leverage addend. The cost addend is zero, making the (cost) partial effect – neutral.

## Conclusions

Based on the assumptions introduced in this paper, we have been able to formulate numerous prime definitions of different constituents of a value-neutral financial leverage analysis. This includes, for example, the novel definitions of such basic terms as financial activity and financial results. We have also been able to propose a new definition for financial leverage itself and, having adopted rigidly the step-by-step methodological approach called constructivism, we have been able to identify numerous different types of leverage. Indeed, we can now accurately tell the difference between capital and income leverages; base and non-base leverages, leverages for levels and leverages for distances, for absolute and relative distances, accounting and market



value leverages etc. This, in turn, should help in constructing a detailed, well arranged map of all conceivable leverages.

The introduction of a completely new range of instruments, such as financial addends and multiples for levels and distances, allows the systematic analysis of the impact that financial activity exerts on a firm's financial results. Financial leverage effects can be positive, negative or neutral (as measured by the leverage addends), and they may be leverage or non-leverage effects (as diagnosed by the leverage multiples). The impact of the presence of debt and the presence of financial costs can also be separated.

The examples (chosen arbitrarily from the leading finance textbook) briefly described in this paper show the diversity of the way the financial leverage concept can be used. Some financial leverages lever profits, others lever EPS or ROE, and some lever distances, absolute or relative, between these variables; other leverages lever equity betas. Some leverages describe risk, others – risk reward, yet others can be shown to describe the combination of the two. More effort to show this diversity would certainly help avoid many misunderstandings and diminish the unnecessary confusion.

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