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Contribution to the Theory of Capital Structure Optimization

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Abstract— Basic task of a liability management in a capital structure is to define the most appropriate alternative of a company capital structure. The objectives of this choice may vary depending on the selection of an optimization criterion. The liability management takes not only the benefits of an interest tax shield but also the costs of financial distress into account when optimizing the capital structure. Over the last 50 years several theories of capital structure have been formulated, their authors are mainly economists from Anglo-Saxon countries. Theories were extended to the whole world from these countries, where they were further elaborated, tested, simplified and adapted to correspondent with the particular context of national economies, industries and specific companies. The main problem associated with their practical application is that the validity of the various theories is not universal. These theories and their outcomes are valid only under certain conditions and with certain limitations. In this work we analyse the most famous theoretical model of the capital structure, the model of M.H. Miller and F. Modigliani and the compromising theory of Brealey and Myers which connects the MM approach with the real market conditions. The article attempts to define the point in which the ratio of these two parameters is the optimal considering the value of the company. It is particularly topical problem as a consequence of the ongoing financial crisis, which involves substantial increase in financial distress, e.g. insolvency and bankruptcy.

Index Terms— Cost of financial distress, agency costs, capital structure, MM model, compromising theory, market value of company, return on capital.

1 Introduction

Financial theory in the recent decades has gradually developed more complex theories of the capital structure optimization, which are necessary theoretical and methodological basis for the management of liabilities. In the literature, these theories are known as conditional theories of the company capital structure. The word "conditional" indicates the main issue, which is linked to their practical application. The reason is that the validity of the outcomes of the various theories is not universal. These outcomes are valid only under certain conditions and with certain limitations. The conflict arises also between the outcomes and recommendations of the various theories that are often mutually exclusive. Therefore, the emphasis should be given to the deep empirical research on individual theories. To assess the most appropriate alternatives in the context of the given requirements and criteria, simple and also more complex mathematical and statistical methods should be used. If we move to different economic systems, in economies with different degrees of the capital market development, with different traditions and ways of financing, it is difficult to find a universal model. In Anglo-Saxon countries the empirical verification of the various theories of the capital structure has been searched for several decades (e.g. Giner, Reverte, Rock), but in the Eastern European countries the empirical verification is on the very beginning.

However, we have to point out that the "cradle" of these theories is mostly the USA, where the optimization of the capital structure is a topic on which there is considerable theoretical debate, for instance on the pages of financial magazines[1]. The results of American research and publications are taken to the Europe. Slovak literature lags in the field of the management of liabilities and is usually associated only with the publication of the foreign publications outcomes, and very often only partially and superficially. Thus, the fact is that the domestic literature still lacks a summary of the theories of the company capital structure. The biggest problem in the management of liabilities is that the outcomes taken from the foreign publications and research have not been tested and verified in terms of transition economies[2] and so the usefulness of these outcomes is minimal in our conditions.

The conditional theoretical approaches can be divided into two groups. The first group, so called *static theories*, is primarily based on a search of an optimal capital structure using the general knowledge of economic theory. They are supported by the empirical studies of the actual behaviour of the companies. This group includes the MM model of *Franco Modigliani* and *Merton Miller*, the traditional approach represented by the work of *H. DeAngelo, L. Dodd, D. Durand, R.W. Masulis, B. Graham* and other classics of the capital structure. This group in-

[1] American Economic Review, Journal of Finance, Journal of Financial Economics, etc.

[2] The term "transition economy" understands the economy changing the central planning to the market economy. They are mostly economies of the former socialist bloc, including Slovakia. The term "transition economies" started to be used at the turn of the 80s and 90s of the last century, when all these countries decided to leave the path of building socialism. The transitive phase begun - the transition of these countries from state-run to the market economy. The list transition economies includes Albania, Latvia, Armenia, Mongolia, Belarus, Lithuania, Azerbaijan, Russia, Bosnia and Herzegovina, Macedonia, Tajikistan, Bulgaria, Poland, Georgia, Turkmenistan, Croatia, Romania, Kazakhstan, Ukraine, Czech Republic, Slovakia, Kyrgyz Republic, Uzbekistan, Estonia, Slovenia, Moldova, Hungary, Serbia and Montenegro.

cludes also the compromise theory (the trade-off model), represented by *J.B. Warner, H. DeAngelo* and the others. Despite the fact that the findings of these theories differ, their goal is the same. They are trying to find the answer to the question if there is any objective balanced state of the company (therefore static theory) considering the relation between the market value and the chosen capital structure, and if so, how to achieve it by specific financial decisions.

The second group, *dynamic theories,* is represented by Stewart Myers and his pecking order theory, based on the empirical research of *Gordon Donaldson*. It is based on the idea that every business is a unique organism active in specific circumstances of their inner and outer environment, and therefore any generalization of the optimization efforts and their transfer to another company can be misleading.

We decided to analyse the most famous theoretical model of the capital structure, the model developed by M.H. Miller and F. Modigliani and the compromising theory of Brealey and Myers which connects the MM approach with the real market conditions.

2 Theory of the Capital Structure by M. H. Miller and F. Modigliani

It is the best known and most widely discussed model of the Nobel Prize receivers in Economics - Franco Modigliani and Merton Howard Miller, also known as MM model[3]. The basic thesis is the ***argument I***: under certain assumptions the total costs of the company capital, and therefore the market value of the company, are independent of capital structure. They depend only on the return on total capital (as considering the perfectly functioning market, all combinations of securities are equally good and investments have the same earnings). The argument can be redefined in a way that the composition of the capital structure of the company has no influence on the value of the company, and it does not make any sense to consider the volume of internal and external sources of the company[4]. The most important condition is that it is a tax-free environment[5]. Modigliani and Miller (1963) later formulated another argument which takes the impact of taxes[6] on the company capital structure into account.

The basic conditions of the model functioning are:

• The capital market is perfect, the information is fre and available to all investors, transaction costs are not considered, investors behave rationally.

• All current and future investors expect the same future profits of the company characterized by so called homogeneous expectations of future profits and their risk.

• Companies are funded only by stocks and bonds.

• The debt of the company is not risky, the interest rate is also considered risk-free. But the volume of the debt used by the company is not searched.

• The costs of financial distress are not considered.

• The taxation of profits is not taken into account, i.e. there is no benefit of the tax shield.

• The management of the company tries to maximize shareholders´ wealth. When optimizing the capital structure the aspect of the owner is preferred.

• Businesses can be incorporated into several groups. Each group includes companies with the same degree of operational risk and as a consequence of this also with the same return on invested capital. Risk and return on invested capital differs among the groups.

• Net income (profit and interest) does not change over the time and the probability of return is the same for all investors of the same class.

• The possibility of getting the credit and the conditions of its obtaining is the same for all subjects of the capital market (for businesses and individuals).

Brealey and Myers (1992) in the context of the argument I of the MM model discuss the simplicity of the idea on which this claim is based (this is called the law of value conservation or the principle of value additivity). The value of assets is maintained irrespective of the nature of their demands. The argument I of the MM model says that the company value is determined by real assets on the left side of the balance sheet and not by the ratio between debt and equity. So if there are two flows of cash flows A and B in the company, and one of them is a flow of equity (stocks) and the other of debt (bonds), then the mathematical equation is applied that the sum of the present value of the cash flows A + B must equal to the present value of the cash flow of equity A (issued stocks) plus the present value of the cash flow of debt B (issued bonds). Modigliani and Miller (1958) expressed this fact also mathematically:

$$V_j \equiv (S_j + D_j) = \overline{X}_j / \rho_k \quad \text{or} \quad \frac{\overline{X}_j}{(S_j + D_j)} \equiv \frac{\overline{X}_j}{V_j} = \rho_k \qquad (1)$$

for each j- company in the class k where[7]:

V_j market value of a company (market value of all stocks),

S_j market value of equity (issued stocks),

D_j market value of debt (issued bonds),

$\overline{X}_j$ expected earning of assets (expected earning before interest),

ρ_k market realization rate of expected earning made by the company in its class.

Based on these equations, Modigliani and Miller simply came to the economic conclusion that the average cost of capital of any company is independent of the capital structure (i.e.

[3] Firstly published in: F. Modigliani, - K. H. Miller: The Cost of Capital, Corporation Finance and the Theory of Investment. American Economic Review, June 1958, pp. 251 – 297. Outcomes of this article were anticipated in1938 by J. B. Williams and to some extend by D. Durand in 1952.

[4] In the work of Miller and Modigliani the internal sources are represented by the issued stocks, so called common stock and external ones by issued bonds.

[5] The issue of taxation was discussed in their first work *The Cost of Capital, Corporation Finance, and the Theory of Investment* from 1958, and soon after they admitted that their argument about taxation had not been accurate and they corrected it.

[6] In this case, tax means the tax of the company profit (in the conditions of the Slovak Republic it is the income tax of businesses).

[7] Modigliani and Miller divide all companies into classes according to their earnings per stock. They assumed that the development of stocks issued by any companies in the same class is directly proportional to the earning of stocks issued by any company in the same class. The difference in the earning was caused only by the number of issued stocks. Stocks of the companies in the same class are therefore homogeneous, t. j. perfectly substitutable and at market equilibrium in the perfect capital market the stock price per monetary unit is the same for all the stocks in the class.

of the combination of the issued securities). Based on this argument, the managers do not need to pay attention to the right side of the balance sheet (liability), but only to assets, because the value of the company can be derived from their value.

As reported by Brealey and Myers, the law of value conservation can be also applied to select between the issue of preferred stocks, ordinary stocks or any combinations thereof. According to the valid legislation the choice is not important as long as the capital markets perfect and as this option does not affect the investment or operating policies of the company. *"If the total value of the stock "cake" (preferred and ordinary stocks together) is fixed, the owners of the company (usually shareholders) do not care of how the cake is cut."* (Brealey and Myers, 1992)

They also claim that the combination and allocation of capital does not affect the value of the company, provided that the combination does not influence the investment choices of investors. That arises from the assumption that companies and individuals can borrow at the same risk-free interest rate. If this is so then individuals can eliminate the effect of any change in the capital structure. But in reality the company debt is not risk-free and the company does not have the same interest rate as the government securities. According to some experts this fact degrades the argument of the MM model because one of the basic preconditions of the argument (all bonds have constant earnings over the time and these earnings are the same regardless of the issuer) is not met. Brealey and Myers consider this to be a natural reaction, but they point out that the capital structure does not need to change even if the debt is risky. The company lending the money does not guarantee its repayment in advance; it pays its debt only if its assets are worth more than the liabilities. And thus the company shareholders have limited liability.[8]

The definition of the **argument II** of the MM theory: the expected rate of return on the common stock equals to the realization rate of return of the class plus premium derived from the financial risk which equals to the ratio of debt to equity multiplied by the difference between the realization rate of return of the given class and the interest rate of the debt (Miller and Modigliani, 1958). Mathematical expression of this statement is expressed by the following equation:

$$i_j = \rho_k + (\rho_k - \tau) D_j / S_j \qquad (2)$$

where

i_j expected rate on return of a common stock of j- company in k- class,

ρ_k market realization rate of expected return made by the companies of the given class,

τ interest rate of the debt,

S_j market value of equity (issued stocks),

D_j market value of debt (issued bonds).

The expected rate of return on ordinary stock of the company in debt is directly proportional to the ratio of debt to equity capital expressed by the market value, while at the same time it is dependent on the difference between the expected return of the portfolio and all stocks (capital structure) of a particular company and expected return from the debt.[9]

We can simply reformulate the argument II as follows: the requirements of shareholders for higher return on their capital, increasing the portion of the debt, do not appear until some degree of the debt, but they grow steadily. From a certain degree of the debt the interest rate of the debt increases. Rising demands of shareholders cover the financial benefits of increasing portion of the debt, so that the average costs of the company to get and bind the capital remains the same by any capital structure.

The graphical illustration of the **MM model** is depicted in the figure 1.

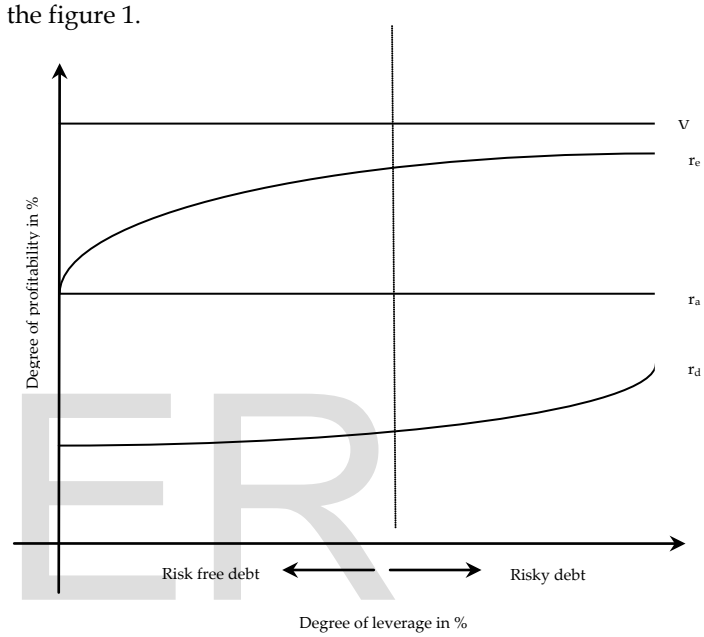


Fig. 1. MM model
Source: Own-processing
where

V company market value in monetary units,

r_e costs of equity (profit of shareholders in %),

r_d costs of debt (profit of creditors in %),

r_a total costs on capital (profit of total capital in %),

$\frac{D}{E}$ ratio of debt to equity (degree of leverage in monetary units).

In the figure we can see that the company bonds are risk-free at low levels of the debt. This explains why the expected return on debt is independent of the ratio of debt to equity in the first phase. It is also true that the expected return on equity increases linearly with increasing proportion of the debt to equity ratio. In a situation where the company borrows more than the safety margin, the owners of bonds (creditors) begin to ask for higher interest rates, leading to an increase in the expected return on the debt because proportionally increases the risk of not meeting the liabilities of the company increases proportionally, too.

In the zone of the risky debt, the return on equity increases

[8] It can then be concluded that the capital structure is also irrelevant on a situation when each investor owns a fully diversified portfolio. In this case the investor owns all risky securities (bonds and obligations) offered by the company. If an investor holds all risky securities, of course, he does not care how the cash flows are divided among the securities.

[9] If a certain company does not use external sources, then the expected return on equity equals to the expected return on total assets.

$$PV\ TS = \frac{C_d \cdot R \cdot T}{i} = C_d \cdot T$$

more slowly (curve is curving down) because the expected return is less and less sensitive to the further increase of debt. And vice versa, the rate of return on debt increases (curve is curving down). The reason is that the creditors overtake a part of the business risk, i.e. the more the company borrows, the more risk is transferred from shareholders to creditors. And so the expected return on debt increases for creditors and this increased risk has to be compensated by the increase of the debt instrument interest rate and it finally leads to the slower pace of growth of the expected return for shareholders. Linked to the next fact, and that increases the expected return on the debt to the creditor, which is necessary to compensate for the increased risk of increases in interest rates on debt instruments, but this leads to the reduction in the growth rate of expected return for shareholders.Then:

$$r_e = r_a + \frac{C_e}{C_d} \cdot (r_a - r_d) \qquad (3)$$

where

C_d debt in monetary units,
C_e equity in monetary units,
r_d costs of debt in %,
r_e costs of equity in %,
r_a total costs of capital in monetary units (costs of company capital funded only by equity).

The relation can be interpreted as follows: the expected rate of return on equity in the company with the participation of the debt increases directly to the ratio of debt to equity expressed by the market value. The rate of this growth depends on the difference between the expected return on the total capital and the return on debt (interest rate) (Bartosova, 2005).

MM theory is based on the assumptions which do not correspond with real conditions. For this reason, the authors admitted the **influence of income taxation** on the average cost of capital and the market value of the company. They changed their idea in 1963 in their work "Corporate Income Taxes and the Cost of Capital" A Correction ", published in the American Economic Review, pp. 433-443 (June 1963). According to this work, the growing debt causes that the average cost of capital decreases under the influence of the interest tax shield, the return on equity and market value also increase and therefore the company should increase its debt portion considering its capital structure.

This outcome is mathematically expressed in the following equation:

$$X^{\tau} = (1-\tau)(X - R) + R = (1-\tau)X + \tau R = (1-\tau)\overline{X}Z + \tau R \qquad (4)$$

where

X^{τ} earning after taxation in monetary units,
τ margin tax rate of the company in % multiplied by 1/100,
X earning before interest and taxes, can be expressed also by $\overline{X}Z$ (multiplication of expected earning and random factor) in monetary units,
R interest rate of debt in % multiplied by 1/100.

This does not mean that the company has to maximize the amount of its debt at all costs, without consideration of other relevant facts. The authors themselves encourage the financial managers not to seek the maximum debt as in certain circumstances the other forms of funding may be cheaper. They took the impact of personal income tax, the increased requirements of creditors and the other costs associated with the operation of the company into account that cannot be included in the static balanced model.

As the interest tax shield is repeated every year, it is possible to determine its value by the capitalization. Capitalised tax shield increases the market value of the company using the external sources. The interest rate of the debt is used to measure the market capitalization. Then:

(5)

where

PV TS present value of the interest tax shield in monetary units,
C_d debt capital in monetary units,
R^d interest rate of debt in % multiplied by 1/100,
T income tax rate in % multiplied by 1/100.

The market value of the company with debt is mathematically expressed:

$$V_Z = V_N + PV\,TS \qquad (6)$$

where

V_d value of the company with debt in monetary units,
V_e value of the company funded only by equity in monetary units.

Also this equation claims that the theory is the best for the company in the terms of maximizing its value and the use of a high proportion of debt, because it is the way how to maximize the present value of the tax shield and thus to maximize the value of the company.

Taking the income tax into consideration, the equation is then:

$$r_e = r_a + \frac{C_e}{C_d} \cdot (r_a - r_d) \cdot (1 - T) \qquad (7)$$

Financial practice did not accept the revised theory of Miller and Modigliani arguing that this conclusion does not take another important factor, costs of financial difficulties, into account.

Miller himself wanted to include not only the corporate taxes (corporate income tax) into the theory of the capital structure optimization but also the individual taxes (personal income tax). He presented his idea in *Debt and taxes* in 1976. After the introduction of personal taxes the main aim of the company is not to minimize the tax shield of the company itself, but to minimize the present value of all taxes which are paid by the company.[10] "All taxes" include personal taxes paid by holders of shares and bonds.

Thus, the aim of the company should be to choose the capital structure that maximizes the total earnings after taxati Tax rate and minimizes the overall taxation not only of companies b of individuals. This fact can be depicted by the indicator of t relative tax advantage of debt to equity:

[10] The taxation of the profits of the company (legal entity) and the taxation of income of individuals related to the securities holding (stocks, bonds). The earning of investors holding the bond is interest, or dividend-holding the stock.

Relative tax advantage of debt $= \dfrac{(1-T_p)}{(1-T_{pE})(1-T_c)}$ (8)

where

T_p rate of personal tax of interest in %,
T_{pE} effective rate of personal tax of stocks profit in %,
T_c corporate tax rate in %.

Assessment of Miller model was made Brealey and Myers (1992). According to them Miller wanted to show how the corporate income tax and personal tax may disturb each other and how the company value may be independent of its capital structure. But there is one needed precondition- the effective tax rate of income deriving from stocks holding (dividends) is significantly lower than from the interest.[11] The authors also state that it is difficult to determine how the model can work in opposite conditions.

The compromise theory of Brealey and Myers combines the MM approach with real market conditions. The authors combine the best of the theory of the MM model and Miller model.

3 The compromising theory of capital structure (TradeOff Theory)

The compromising theory of Brealey and Myers, which connects the MM approach with the real market conditions - the authors combine the best of theories of the MM and Miller models. The mentioned theory is depicted in the following picture:

Fig. 2. Combination of MM theory and Miller model considering the optimal amount of debt

Source: Brealey, R. A., Myers, S. C.: The theory and practice of corporate finance, McGraw-Hill Inc., Victoria Publishing, 1992, p. 462.

Curve M: expresses an extra tax paid by a creditor from the additional euro (Miller model),

Curve MM: expresses an extra tax paid by a creditor from the additional euro of debt (MM model),

Curve D: expresses a tax shield of a ccompany from the additional euro of debt considering the actual rate of revenue tax of legal persons in SR, i.e. 22 %.

MM theory and also Miller himself admits that there is a tax shield of the corporate debt. Companies are worth overuse the debt until the amount of the tax shield exceeds the personal tax cost of the creditor. This tax cost is understood as the difference between the personal tax rate of the interest creditor T_p and the effective tax rate T_{pE}, the creditor would pay for income of shares. The MM and Miller models have a different approach to personal taxes. The MM model implicitly assumes that taxes from foreign sources (interest, bonds) equal to taxes on income of equity (dividends, shares). In this case, the corporate tax shield always exceeds the additional tax paid by the creditor so the companies could go into unlimited debt. Miller, however, assumes that investors are taxed by different tax rates. Therefore, if the debt of the corporation is growing, investors with a higher tax rate must be forced to invest in bonds. That fact is portrayed in Fig. 2. by the rising curve M[12].. While the MM model considers the highest level of debt to be the optimal, according to Miller the optimum is achieved when the benefits of the debtor equal to the personal tax cost of the creditor. If all companies are taxed by the same rate of tax it is not important which company offers the debt (bonds). It is clear, from the perspective of both theories, that achieving economies of tax shield is seen as certain.

The compromising theory makes this assumption more realistic, as it says that the tax savings from the tax shield are

[12] Although in Figure 2. there is a smooth curve, in practice it has sections of steep ascent and sections of descent.

uncertain. According to this theory, there are few companies that can be sure that in the future they will have the taxable profit. If the company is in the loss, its interest tax shield cannot be used in a given year. Its use is possible in the following taxing period when taxable profit will be achieved. This is a loss for the company because of the time value of money. If the enterprise does not have any the accounting profit, it will lose the tax shield completely[13].

The compromising theory further depicts that businesses have, despite the loans, also other options which can reduce the tax base, for example tax depreciation, contributions to the company pension fund etc. The more the company will use these alternative methods of reducing the base of the income tax, the lower the expected tax shield from borrowing[14]. The expected tax shield will be also lower if there is a possibility that the company will be in a loss, i.e. when the tax shield is considered to be certain (in the Slovak Republic must be lower than 22%). Furthermore, we can conclude that the more the company borrows, the greater the likelihood of the loss as a result of higher interest costs and thus lower expected tax shield. The compromising theory is then described in the following figure:

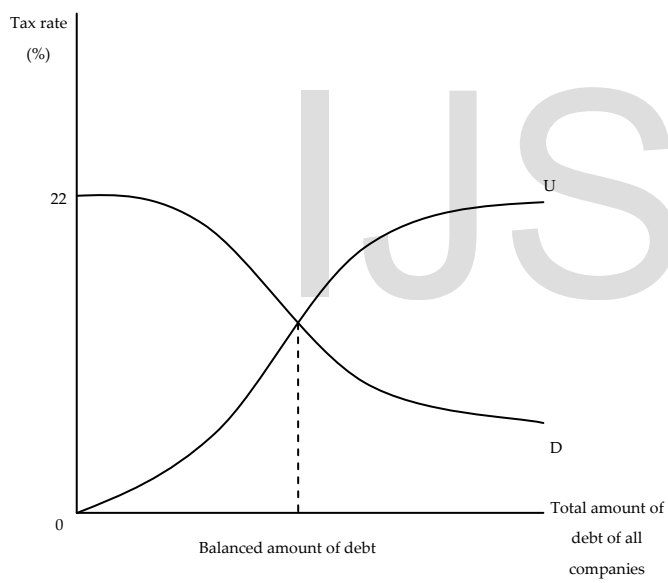


Fig. 3. The compromising theory
Source: modified, by Brealey, R. A., Myers, S. C.: The theor
of corporate finance, McGraw-Hill Inc., Victoria Publishing, 1992, p. 463.

Curve U: an extra tax paid by a creditor from the additional euro of interest,

Curve D: expected tax shield of a company from the additional euro of interest.

Fig 3. shows that if a company cannot be certain of its future taxable profit, their expected tax savings will be smaller and they will have less debt. The curve of the tax shield D decreases with increasing probability of tax loss (due to the indebtedness of the company). The expected tax shield in Slovakia is close to the 22% rate. An additional payment of the personal tax from the debt is captured by the growing curve, but it also reaches a maximum value at the maximum tax rate for individuals, i.e. in Slovakia again 22%. Brealey and Myers were thinking of different taxation of natural and legal persons, but in Slovakia there is an equal taxation of 22%. The equilibrium of the total debt is again the point in which the tax benefit to the debtor equals to the tax rate of the creditor.

The equilibrium differs from the Miller's equilibrium in three ways:

1. If a company cannot be certain of the full realization of the benefits of the tax shield, the total amount of debt for all companies will be lower than in Miller's model (i.e. the optimal amount of debt is located more to the left in the Fig. 3. than in Fig. 2.)

2. As the companies cannot be sure of using its tax shield, they will not be willing to pay such a high interest rate for external sources (i.e. the intersection of the optimal amount of debt is positioned lower in Fig. 2. than in Fig. 3.)

3. And it is also true that the tax shield is for some businesses worth more than for the other. Companies with a range of non-interest tax shields and uncertain prospects for the future should borrow less than profitable company. Businesses that have huge accumulated tax losses, should not have any debt. In that case, there is disserviceable for the company to pay interests to investors willing to invest in debt securities, as it will never able to use the interest tax shield.

The authors of the compromising theory tried to show that it is possible to find the position of the middle - between the MM model and Miller theory. In the view of Brealeyho and Myers, debts bring businesses a single advantage, especially if they can use the tax shield reasonably. And vice versa, for the companies that cannot expect the use of the tax shield, the debt is a disadvantage [15].

This theory emphasizes the amount and stability of the corporate profit and the nature of assets which a company uses in its business. Companies with high and stable profits and secure tangible assets can afford a higher proportion of debt to total capital compared to companies which profits are low or moderate, or companies that have in their assets a large share of risky assets (e.g. intangible assets).

Brealey and Myers define the optimal capital structure as a compromise between the advantages of an interest tax shield and the costs of financial distress [3, p.464]. They took not only the impact of taxes but also the costs of financial distress into account.[16] The given theory accepts the justification of individual distresses among companies in the debt level and admits that companies should have only the volume of debt they can cope with.

[13] In terms of tax treatment in Slovakia let´s note that the tax shield is applicable under the Act on income taxes as deductions from the income tax base, but the longest in seven subsequent tax periods following the period for which a tax loss is assessed. If no, the company loses the possibility of the potential tax savings from the application of the interest tax shield.

[14] Analysis of the effect of other types of tax shields on debts of companies is discussed by H. De Angelo R. Masulis, "Optimal Capital Structure Under the Corporate and Personal Taxation," Journal of Financial Economics, 8: 5-29 (March 1980).

[15] BREALEY, R. A., MYERS, S. C.: *The theory and practice of corporate finance,* McGraw-Hill Inc., Victoria Publishing 1992, p. 463.

[16] As cited in KRÁLOVIČ, J., VLACHYNSKÝ, K.: Financial Management, IURA Edition, Bratislava, 2002, p. 126, the costs of financial distress of a company arisen by a high level of debt (the company is not able to pay its interests and payments to its creditors) create all direct and indirect costs related to default. It includes various types of fees and increased interests required by creditors as a compensation for the risk they bear.

The company value is then expressed as follows:

$$V_D = V_E + PV\ ITS - PV\ CFD \qquad (9)$$

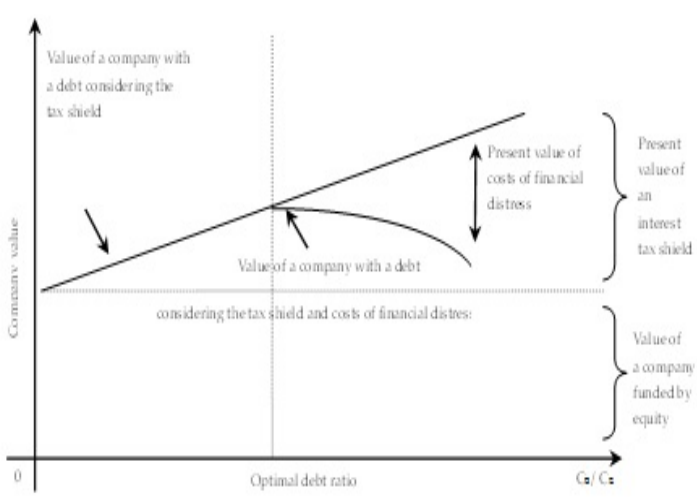
where

V_D value of a company with a debt in monetary units,
V_E value of a company funded only by equity in monetary units,
PV ITS present value of an interest tax shield in monetary units,
PV CFD present value of costs of financial distress in monetary units.

Modigliani and Miller in their original work from 1958 [10, pp. 261-297] paid some attention to the costs of financial distress. Furthermore, this issue was also discussed in Miller´s article from1976 [11, pp. 261-275]. Although, Miller in his reasoning does not deny the existence of the costs of financial distress, but he claims that they do not reach such a volume that they can be a counterweight to tax savings. He also claimed that it is not necessary to emphasize this issue in discussions about the optimal capital structure. But he admits that there is some impact of the costs of financial distress on the creation of an optimal capital structure of a company. Miller argued that the costs of financial distress can be avoided by adequate financial management decisions, for instance by issuing of "yield" bonds that promise interest payments only if the company profits.

Optimal capital structure is determined by the mutual relation between the tax advantages and the costs of financial distress. The increasing debt causes the increase in the present value of the interest tax shield. In a moderate debt level, the likelihood of financial distress is negligible and the advantages of the interest tax shield dominate. Reaching a specific debt point, the likelihood of financial distress grows rapidly and the costs of financial distress begin to reduce a substantial part of the company value. Moreover, if the company is not sure whether it is be able to utilize the tax shield (due to the tax loss), the growing debt starts to minimize the value of tax savings from the tax shield and is gradually being lost.

The company reaches its theoretical optimum in the moment when the present value of tax savings from the additional debt is compensated by the increase of the present value of the costs of financial distress.[17] The situation is graphically depicted in Fig. 4.



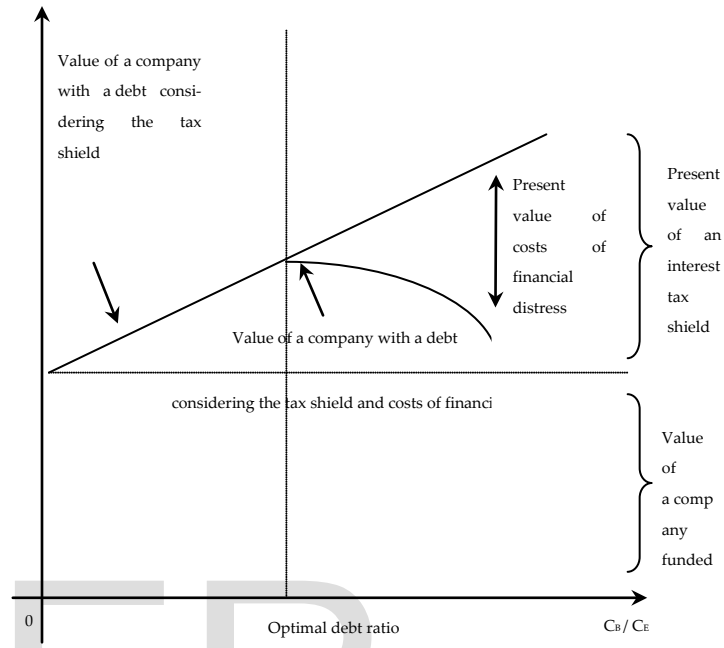


Fig. 4. Optimal debt
Source: Bartošová, V.: Optimalization of the financial structure of the enterprise. University of Zilina, 2005, p. 71

Costs of financial distress are caused mainly by the high level of debt (an inability of a company to pay interests and debt payments to its creditors) and they can be divided into the costs of default (bankruptcy), direct and indirect, and the agency or contracting costs.[18]

Direct costs include various fees paid to lawyers or experts which a company has to pay in case of its default.[19] Direct costs of default can grow fast. Fees paid to lawyers and experts by the bankruptcy of large corporations represent relatively high numbers but they do not create a large part of the company assets value. Direct costs of default tend to be higher in small companies as economies of scale occur.

J.B. Warner [23, pp. 227-348] in his study publishes legal and administrative costs of 11 railway companies in bankruptcy. The average costs were 2 million dollars. But they presented only 5.3% of the total market value of debt and equity of the company estimated just before the bankruptcy. Considering the value of the company five years ago, before the bankruptcy, when the companies were healthier, these costs

[18] Approaches based on an existence of contractual costs represent the other important theory and model solutions in the field of a capital structure and they started to be applied in the second half of the 70- ties of the 20th century.
[19] This issue is in details processed in the Slovak Act on bankruptcy and settlement and its amendments.

would have represented only 1.4%.

Indirect costs are mainly costs resulting from the complexity of managing of a company in default. As a result of financial problems managers are forced to accept suboptimal (non-profit) decisions[20]. These steps may result in the adoption of various loans under disadvantageous conditions, the procurement of property on leasing, although the direct procurement would be more advantageous, or reducing the amount of dividends which sends a negative impulse to the financial market and it can finally lead to the decline of the company shares value.

Costs of financial distress depend largely on the type of assets. Most studies indicate that some assets may not be harmed by bankruptcies and reorganizations but their value may drop very significantly. The highest losses are linked with intangible assets that are tied to the well-working company (technology, human capital, brand). This could explain why highly profitable growing companies (Microsoft, Digital Equipment Corporation) prefer to use financing by shares. Long and Malitz in their empirical research proved that companies with a predominance of intangible assets have less debt [8].

"*Do not think only of how likely the borrowing will bring you into trouble. Think also of the value that can be lost if problems occur.*" [3, p. 475]

Quantification of direct and indirect costs of possible financial distresses caused by high level of debt was processed, for instance by E. Altman [1]. The detailed analysis was used to estimate that these costs were on average in the range of 12-17% of the market value of the US industrial companies.

Also L. Weiss [24, pp. 285-314] in his empirical studies deals with the costs of financial distress (i.e. costs of default). He studied 31 companies that were in bankruptcy in the years 1980 to 1986. According to his analysis, the average costs of bankruptcy of these companies were 3% of the total book value of their assets and 20% of the market value of the shares of these companies in the last year before the bankruptcy.

Authors, H. Levy and M. Sarnat [7, pp. 561-563], give an example of how to calculate the impact of financial distress on the company. They assume that the companies can insure themselves against the bankruptcy and the amount of the annual insure was matched with the costs of financial distress.

Agency costs represent the costs of a potential conflict of opposing interests among the different groups involved in the business operation. These costs can be divided into:

- costs to minimize the potential conflicting interests of *managers of the company and its shareholders,*
- costs to minimize the potential conflicting interests of *shareholders of the company and its creditors* (holders of bonds, banks, suppliers, etc.)
- costs to minimize the potential conflicting interests of *managers of the company and its owners.*[21]

In the case of bankruptcy the creditors are threatened by the loss of investments (loans) that they invested in the company. In an effort to save their funds they are forced to undertake the company and try to save it themselves. Due to the fact that the liability of shareholders for the company obligations is limited creditors must reckon with the possibility of losing their investments due to the default of the company and must also assume that in the case of the bankruptcy, they will likely bear the largest part of the cost of default and so they require to compensate this risk in the form of higher interests. The interest increases with an increasing level of debt due to the likelihood of financial distress costs occurrence. The higher interest paid to creditors has the impact on the reduction of yields that remain available to shareholders which may lead to an increase in the value of shares and company itself.

While it is true that shareholders and creditors usually have the same interest in a company being in economic difficulties to stabilize it they often disagree about how to achieve it. Financial distresses are more expensive, the more conflicts between shareholders and creditors disrupt the business activity.

The main interest of creditors is to protect their investments in the company. In the case of bankruptcy, however, a conflict of interest arises because shareholders often abandon their usual objective- to maximize the market value of their shares and in some cases they begin to "play a game" in their favour, regardless of the interests of creditors[22]. These conflicts are often caused also by the fact that shareholders and creditors do not have the same information about the company financial situation. Shareholders usually have more accurate information and they can easily find out that the company is heading to the bankruptcy. They can therefore apply some risky projects that they do not consider very risky from their point of view. They can lose only their investments which are before the implementation of low value or they can obtain high yields. And thus shareholders risk only the money of creditors. If the project fails, the costs of financial distress increase and it can have fatal nature.

Brealey and Myers state that if the business risk remains constant, any increase in the company value is allocated between the shareholders and creditors (holders of bonds and shares). The value of investment opportunity for shareholders is lower of the part of the project which must be shared with creditors. Therefore, it may not be in the interest of shareholders to invest new capital in the company and it can thus lead to the rejection of investment opportunities with the positive net present value due to the lack of capital for its implementation. This problem affects all companies with some volume of debt. But it has the biggest impact on companies in financial distress. The greater the likelihood of bankruptcy, the more the creditors can get from the investment projects that increase the value of the company [3, p. 472].

The answer to the question: "Why businesses do not use the maximum debt financing?" can be found in the paper of W. Megginson [9, p. 336-337]. The answer of the author reads as

[20] To sell the company assets at disadvantageous prices to get cash; to reject the realization of profitable projects which do not offer cash nowadays or to reduce the expenses on employees training, research and development.

[21] There are costs of two type: *agency costs on equity* (as a results of opposing interest of managers and owners of a company) and *agency costs on debt* (arising from the opposing interests of owners and creditors or managers and creditors).

[22] Brealey a Myers describe the types of „games", shareholders apply on creditors in the moment when the company is heading to the bankruptcy. There are: risk shifting, refusal to invest share capital, take money and go, time game, bait and tug a bridle. For more details: BREALEY, R. A., MYERS, S. C.: *The theory and practice of corporate finance,* McGraw-Hill Inc., Victoria Publishing, 1992, pp. 470 - 472.

follows: "Because there are the agency costs of debt.[23]" This is the reason why the company capital structure is important and that there is some optimum amount of debt that a company can borrow in a particular situation. If the impact of taxes and costs of financial distress are included in the optimal capital structure consideration then there is a certain amount of debt, which is considered to be optimal and so it can be said that the particular structure of the company capital structure is important.

The optimal capital structure is, in terms of the agency costs on equity capital and the agency costs on debt, at the point where the agency cost of the marginal unit of debt equals to the agency cost of the equity unit. Then a modern compromise model of the capital structure, enhanced by the costs arising from the conflict of interests, has the following form:

$$V_D = V_E + PV\ ITS - PV\ CFD + PV\ ACE - PV\ ACD \quad (10)$$

where

V_D value of a company with a debt in monetary units,
V_E value of a company funded only by equity in monetary units,
PV TS present value of an interest tax shield in monetary units,
PV FD present value of the costs of financial distress in monetary units.
PV ACE present value of the agency costs on equity in monetary units,
SH ACDpresent value of the agency costs on debt in monetary units.

Despite the complexity of the model individual components quantification, the results of the USA research on the capital structure confirm that in many cases the model provides a clear explanation of how companies determine their capital structure.

4 Conclusion

When making decisions about an optimal capital structure the liability management has to consider not only the mentioned theoretical models and approaches with their practical modifications but also many other factors. It must also identify potentially important determinants. These are: income taxation, risk, costs of financial distress, agency costs, financial freedom of business risk, company size, profitability, asset structure (the portion of tangible assets on total assets), non-debt tax shield, growth opportunities, sector of activity and a country in which the company is traded on the stock exchange (mostly the same country as the company seat), rate of inflation, rate of the tax burden, level and fluctuations of cash flow, need of some financial security and financial freedom, etc.

A traditional optimization criterion regarded as the starting point in the creation of the optimal capital structure is to minimize the costs of capital. In the recent years, however, the efforts to minimize the importance of this criterion has been observed, because a new criterion has been preferred- unconventional view on the structure of equity and debt together - the concept of shareholder value.

[23] The higher the debt, the higher risk creditors bear but the power is in the hands of managers. That is why there are clauses in contracts determining the limitation of the company business activities, dividend payments, issues of bonds, adoption of extra credits. It means that the costs on debt increase and the company value decrease.

There is not an unambiguous manual of how to create an optimal capital structure (but there are numbers of theoretical models). There is no solution in the form of a universal "formula" just to substitute the needed values and thus to calculate the real optimal capital structure of the company. The success of solution depends on several skills and knowledge of financial managers which include theoretical preparedness, talent and managerial intuition.

Nowadays, modern financial economists have to say that on the basis of the empirical and theoretical studies there is no universally valid theory of the company capital structure. The validity of any existing theory is done by meeting the given conditions, which are in the case of individual theories formulated as their fundamental validity conditions. For that reason the company cannot make a decision about the capital structure only on the basis of just one criterion, but the optimal volume of debt has to be decided after the analysis of all crucial factors which influence the company and its capital structure. As Miller (1988) said, "Showing what does not matter can also show, by implication, what does."

We also have to note that a deeper analysis of the practical usage of the various theories of the capital structure in the specific conditions of the Slovak and the Czech Republics has not been done yet and so the validity of their outcomes was neither confirmed nor refused. This is the reason of lacking the conclusions and recommendations considering the various theories of capital structure. The result is also a lack of definition of the management of liabilities in the system of the company management of the Slovak companies and the application of theoretical and methodological approaches which could belong to the management of liabilities, considering their content, are carried out only within the financial analysis.

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References

[1] ALTMAN, E.: A Further Empirical Investigation of the Bankruptcy Cost. Question Journal of Finance, No 39/1984.

[2] BARTOŠOVÁ, V.: Optimalizácia finančnej štruktúry podniku, [Optimalization of the financial structure of the enterprise]. University of Zilina/EDIS 2005, pp. 71. ISBN 80-8070-404-X

[3] BREALEY, R. A., MYERS, S. C.: Teorie a praxe firemních financí. [The theory and practice of corporate finance]. Praha : Victoria Publishing, 1992. ISBN 80-85605-24-4.

[4] GRUNWALD, R.: Finanční analýza pro oceňování podniku. [Financial analysis for evaluating enterprise]. Praha:, 2000, ISBN 80-245-0032-9

[5] GINER, B., REVERTE, C., 2001. Valuation Implications of Capital Structure: a Contextual Approach. *The European Accounting Review,* pp. 291 – 314.

[6] KRÁĽOVIČ, J., VLACHYNSKÝ, K.: Finančný manažment. [Financial management]. Bratislava: IURA Edition, 2002, ISBN 80-89047-17-3

[7] LEVY, H., SARNAT, M.: Kapitálové investice a finanční rozhodování, [Capital investment and financial decision]. Grada 1999, ISBN 80-7169-504-1

[8] LONG, M., MALITZ, I.: The Investment Financing Nexus: Some Empirical Evidence, Midland Corporate Finance Journal, 3: 53 – 59 (Fall 1985).

[9] MEGGINSON, W. L.: Corporate Finance Theory, pp. 336 – 337, Addison-Wesley, 1997.

[10] MILLER, M., MODIGLIANI, F.: The Cost of Capital, Corporation Finance, and the Theory of Investment. American Economic Review, 1958. pp. 261 – 297.

[11] MILLER, M. H.: Debt and Taxes. *The Journal of Finance*, 1976, vol. 32, No 2, pp. 261-275.

[12] MILLER, M. H., 1988. The Modigliani-Miller Propositions After Thirty Years. The Journal of Economic Perspectives, vol. 2, No. 4, pp. 99 - 120.

[13] MODIGLIANI, F., MILLER, M. H., 1963. Corporate Income Taxes and the Cost of Capital: A Correction. The American Economic Review, vol. 53, No. 3, pp. 433 - 443.

[14] MYERS, S. C., 1977. Determinants of Corporate Borrowing. Journal of Financial Economics, pp. 147 – 175.

[15] MYERS, S. C., 1984. The Capital Structure Puzzle. Journal of Finance, pp. 581 – 582.

[16] MYERS, S. C., MAJLUF, N. S., 1984. Corporate Financing and Investment Decisions when Firms have Information the Investors do not have. Journal of Financial Economics, pp. 187 – 221.

[17] LEVY, H., SARNAT, M.: Kapitálové investice a finanční rozhodování, [Capital investment and financial decision]. Grada 1999, ISBN 80-7169-504-1

[18] LONG, M., MALITZ, I.: The Investment Financing Nexus: Some Empirical Evidence, Midland Corporate Finance Journal, 3: 53 – 59 (Fall 1985).

[19] MEGGINSON, W. L.: Corporate Finance Theory, pp. 336 – 337, Addison-Wesley, 1997.

[20] MILLER, M., MODIGLIANI, F.: The Cost of Capital, Corporation Finance, and the Theory of Investment. American Economic Review, 1958. pp. 261 – 297.

[21] MILLER, M. H.: Debt and Taxes. *The Journal of Finance*, 1976, vol. 32, No 2, pp. 261-275.

[22] ROSS, S. A., 2005. Capital Structure and the Cost of Capital. Journal of Applied Finance. Vol. 15, Iss. 1; pp. 5-24.

[23] WARNER, J. B.: Bankruptcy Costs: Some Evidence. *Journal of Finance*, May 1977, pp. 227 – 348.

[24] WEISS, L. A.: Bankruptcy Resolution: Direct Costs and Violation of Priority Claims. *Journal of Financial Economics*, October 1990, vol. 27, pp. 285-314.