

## CHAPTER 1

# Corporate Financing Decisions and Related Tax Issues

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'...the distinction between debt and equity funds reduces largely to one of terminology.'

Modigliani and Miller, 1958

## I. INTRODUCTION

The value of a firm from the corporate finance perspective depends primarily on three essential decisions: its investment decisions, its financing decisions, and its decisions regarding dividend policy.<sup>1</sup>

Financing decisions, therefore, are a fundamental question that corporate managers must continuously face in order to maximize the value of their firm. These financing decisions ultimately consist of the choice between internal financing and external financing. Once internal financing is considered to no longer be feasible, the alternative of external financing requires making another fundamental decision: the option for debt financing or for equity financing.

These decisions are constantly assumed taking into account all of the consequences that each choice will bring to the ultimate value of the firm. In order to make the most appropriate decision for their own firms, corporate managers traditionally base them on an extensive number of factors. They review principles established by the theories of corporate finance and, furthermore, take into account all factors that could possibly affect their decisions.

One of the relevant factors when assuming financing decisions is represented by corporate taxes. Indeed, corporate taxes are expenses that all firms sustain and, consequently, the minimization of these expenses will contribute to the creation of value for the firm.

However, corporate taxes do not symmetrically affect the different forms of external financing. Traditionally, debt financing has a number of advantages over equity financing from a tax perspective. In order to limit the tax advantages of debt financing over equity financing, numerous countries have been increasingly introducing measures in their domestic CTLs aimed at either reducing the tax advantages of the former or increasing the tax advantages of the latter.

These measures, nevertheless, have often been designed in an arbitrary manner and often under misused aspects, which disregard the financial reasoning that could support an efficient corporate financing decision.

This chapter will analyse all of these issues with a systematic approach. Section II will illustrate the financing decisions from a corporate finance perspective. It will analyse the primary differences between the two forms of external financing and the relevant factors influencing the selection between debt financing and equity financing, both in theory and in practice.

Section III will subsequently analyse the tax issues related to financing decisions. It will analyse the measures currently adopted in forty different countries around the

1. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 2.



world in order to better balance the corporate tax advantages of debt financing and equity financing as well as the main advantages and disadvantages of these measures.

Finally, section IV will present several conclusions and possible proposals to bring domestic corporate tax rules more into compliance with efficient corporate financing decisions.

## II. FINANCING DECISIONS IN CORPORATE FINANCE

### II.1 An Introduction to Financing Decisions in Corporate Finance

Corporate finance theories have stated that one of the most relevant objectives of corporate managers should be the maximization of either the profits or the market value of a firm.<sup>2</sup>

If the final aim is the maximization of the firm's profits, an investment should be made only if it will increase the net profit of the firm. This increase in the net profit will only be possible if the expected rate of return on the investment (or yield) will be higher than the rate of interest.<sup>3</sup> If the final aim is, instead, the maximization of the firm's market value, an investment should be made only if it will increase the value of the firm's equity. This increase in the firm's equity will only be feasible if the cash flows generated by the investment and discounted by the market interest rate will be higher than the costs of that investment; otherwise stated, only if the yield of the investment exceeds the interest rate.<sup>4</sup>

Consequently, corporate finance theories attempt to determine solutions to three fundamental principles: the investment principle, the financing principle, and the dividend principle.

Based on the investment principle, an investment should only be made when it offers a return greater than the 'minimum acceptable hurdle rate', i.e., the minimum acceptable rate of return on an investment. Based on the financing principle, a firm should select financing resources that maximize the value of any investments and, therefore, minimize the 'minimum acceptable hurdle rate'. Based on the dividend principle, if there are no investments to be made, since there are no investments offering returns higher than the 'minimum acceptable hurdle rate', the cash in the firm should be returned to its shareholders.<sup>5</sup>

Therefore, investment decisions and financing decisions are cooperative: the role of corporate managers aimed at maximizing either the firm's profits or the firm's market value should be, at the same time, (i) investing in assets generating a higher return and (ii) finding the least expensive financing resources. The focus of the following sections will be concentrated on the second aim.

2. Modigliani, F. & Miller, M.H., 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review* 48 (June 1958), pp. 261-297.

3. In the case of debt financing.

4. Modigliani, F. & Miller, M.H., 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review* 48 (June 1958), p. 261.

5. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 2.

The research to discover these less expensive financing resources will depend on the mix between the various types of external financing choices. This mix is referred to as 'capital structure'.<sup>6</sup> Therefore, the question of finding the mix of financing resources that maximize the firm's value (or the firm's profits) has been specified as a question of the 'optimal capital structure'. Barclay and Smith<sup>7</sup> have summarized this question as follows:

A perennial debate in corporate finance concerns the question of optimal capital structure: Given a level of total capital necessary to support a company's activities, is there a way of dividing up that capital into debt and equity that maximizes current firm value? And if so, what are the critical factors in setting the leverage ratio for a given company?

The following sections will analyse the different external financing choices<sup>8</sup> and their advantages and disadvantages.<sup>9</sup> The next sections will then illustrate the relevant factors influencing these choices in theory,<sup>10</sup> in practice,<sup>11</sup> and based on the results of a number of surveys<sup>12</sup> and, finally, will attempt to answer the question of whether an optimal capital structure can be identified.<sup>13</sup>

### II.2 The External Financing Choices: Equity Financing versus Debt Financing

A firm can finance its investments mainly through primarily two sources: internal financing and external financing. Internal financing is derived from the use of cash flows generated by assets already belonging to the firm whereas external financing is derived from the use of cash flows generated by resources outside the firm.<sup>14</sup>

On the one hand, internal financing generally allows firms to finance their investments without incurring significant transaction costs and ensures that their shareholders do not lose control of ownership. On the other hand, external financing is typically easy to generate and allows shareholders to share the risk related to the firm.<sup>15</sup>

External financing can possibly be derived from two sources: debt and equity. These two sources differ from each other with several features.<sup>16</sup>

6. The 'capital structure' of a firm can be defined as 'the particular mixture of debt, equity, and other liabilities that the firm uses to finance its assets' (Caouette, J.B. et al, *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 182).

7. Barclay, M.J. & Smith, C.W., 'The Capital Structure Puzzle: Another Look at the Evidence', *Journal of Applied Corporate Finance* 12 (April 2005), pp. 8-20.

8. See s. II.2 (in this chapter), *below*.

9. See s. II.3 (in this chapter), *below*.

10. See s. II.4.1 (in this chapter), *below*.

11. See s. II.4.2 (in this chapter), *below*.

12. See s. II.4.3 (in this chapter), *below*.

13. See s. II.5 (in this chapter), *below*.

14. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 340.

15. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 341.

16. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 329; OECD, *OECD Report on Thin Capitalization*, adopted by the OECD Council on 26 Nov. 1986.



Overall, the main distinction between the two forms of financing relates to the trade-off between risk and return. Whereas debt financing is characterized by low risk and lower return requirements, equity financing is typically accompanied with high risk and requires higher returns.

The second difference refers to the legal rights and obligations related to the two forms of financing. The debt claims entitle debt-holders to contractually pre-determined cash flows generally in the form of interest payments and reimbursement of principal whereas the equity claims entitle equity owners to cash flows that are residual, i.e., they are paid after all the others claims related to other types of financing sources have been satisfied.

The third distinction refers to the periodicity of the payments that are made related to the two sources. Generally, the periodicity of payments deriving from debt holding (i.e., interest payments and reimbursement of principal) is contractually pre-determined on a quarterly, semi-annual, or annual basis whereas the periodicity of payments deriving from equity holding (i.e., dividends) is not contractually pre-determined.

The fourth feature that differentiates the two sources is the maturity. Debt usually has a fixed maturity date, and equity has an indefinite lifespan.

Fifth, equity holders are actively involved in the decision-making process of the firm whereas debt-holders generally play a passive role in the decision-making process.

Finally, debt and equity generally differ in regard to the tax treatment of payments that are derived from them. In most cases, interest payments are deductible for tax purposes, however, dividends are not.<sup>17</sup>

Therefore, a firm can externally finance its investments through three instruments: debt (e.g., bank debts, bonds, and leases), equity (e.g., owner's equities, venture capitals, common stocks, and warrants), and hybrid securities. Hybrid securities are instruments that share a number of characteristics of debt and equity, e.g., convertible debts, preferred stock, and option-linked bonds.

### II.3 Advantages and Disadvantages of Debt Financing Compared to Equity Financing

As explained in the previous section,<sup>18</sup> debt financing is one of the primary sources of a firm's external financing. The choices related to debt financing, therefore, must consider all of the advantages and disadvantages related to this source of financing when compared to equity financing. The main advantages of debt financing over equity financing are twofold: tax benefits and discipline over the management of the firm, which is also known as 'agency benefits'.

For income tax purposes, interest payments deriving from debt financing are generally deductible from the tax base of a firm whereas dividend payments obtained

17. For a more in-depth analysis of this issue, see s. II.3 in this chapter, below.

18. See s. II.2 in this chapter, above.

from equity financing are not.<sup>19</sup> This difference from a tax perspective between the two forms of financing generates the so-called 'tax shield of debt'.<sup>20</sup>

The second primary advantage of debt is the 'agency advantage', i.e., the fact that it disciplines the managers of a firm.<sup>21</sup> Indeed, there is often a conflict of interest between managers and shareholders of a firm. One of the shareholders' main objectives is the maximization of the firm's value whereas managers aim at achieving a higher personal salary that is not always obtained from the value of the firm they are managing. Therefore, managers of firms with a low level of debt and high level of equity have a significant safeguard against future entrepreneurial risk and potential mistakes and, consequently, could make decisions that are not intended at maximizing the value of their firm. Debt generates the commitment of paying interest and repaying the principal, hence, it 'disciplines' managers to make decisions that are more balanced so as to avoid the risk of the firm's bankruptcy.

On the other side, debt financing has certain disadvantages compared to equity financing. Indeed, debt increases the probability of bankruptcy, creates agency costs, and reduces a firm's flexibility. Regarding the first point, debt financing,

19. Lewis, C.A., 'A Multiperiod Theory of Corporate Financial Policy under Taxation', *Journal of Financial & Quantitative Analysis* 25 (March 1990), pp. 25-43; Hanlon, M. & Shane, H., 'A Review of Tax Research', *Journal of Accounting & Economics* 50 (December 2010), pp. 127-178; Feld, L.P., Heckemeyer, J.H. & Overesch, M., 'Capital Structure Choice and Company Taxation: A Meta-study', *Journal of Banking & Finance* 37 (August 2013), pp. 2850-2866; Cordes, C.J. & Sheffrin, S.M., 'Estimating the Tax Advantage of Corporate Debt', *Journal of Finance* 38 (March 1983), pp. 95-105; Blouin, J., Core, J.E. & Guay, W., 'Have the Tax Benefits of Debt Been Overestimated?', *Journal of Financial Economics* 98 (November 2010), pp. 195-213; Graham, J.R., 'How Big Are the Tax Benefits of Debt?', *Journal of Finance* 55 (October 2000), pp. 1901-1941; Delia, C. & Dragota, M., 'Is Taxation a Determinant of Capital Structure? An Analysis of the Impact of Interest Systems on Tax Laws', *Annals of the University of Oradea, Economic Science Series* 17 (2008), pp. 160-164; Wrightsman, D., 'Tax Shield Valuation and the Capital Structure Decision', *Journal of Finance* 33 (May 1978), pp. 650-656; Yue, C. & Green, C.J., 'Taxes and Capital Structure: A Study of European Companies', *Manchester School* 76 (September 2008), pp. 85-115; Maßbaum, A. & Sureth, C., 'Thin Capitalization Rules and Entrepreneurial Capital Structure Decisions', *Business Research* 2 (2009), pp. 147-169; Vintilă, N., Filipescu, O. & Lazăr, P., 'Value of Tax Shields from Debt Financing of Investment Projects', *Annals of the University of Oradea, Economic Science Series* 17 (2008), pp. 612-616. For an extensive view of this issue, see s. III.2 (in this chapter), below.

20. See s. II.4 in this chapter, below.

21. Jensen, M.C., 'Agency Costs of Free Cash Flows, Corporate Finance and Takeovers', *American Economic Review* 76 (May 1986), pp. 323-329; Jensen, M.C. & Meckling, W., 'Theory of the Firm: Managerial Behaviour, Agency Costs and Capital Structure', *Journal of Financial Economics* 3 (1976), pp. 305-360; Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 362-363; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 528-531; Warner, J.B., Watts, R. & Wruck, K., 'Stock Prices and Top Management Changes', *Journal of Financial Economics* 20 (1988), pp. 461-492; Morck, R., Shleifer, A. & Vishny, R., 'Management Ownership and Market Valuation', *Journal of Financial Economics* 20 (1988), pp. 293-315; Malmendier, U. & Tare, G., 'CEO Overconfidence and Corporate Investment', *Journal of Finance* 60 (2005), pp. 2661-2700; Heaton, J., 'Managerial Optimism and Corporate Finance', *Financial Management* 31 (2002), pp. 33-45; Roll, R., 'The Hubris Hypothesis of Corporate Takeovers', *Journal of Business* 59 (1986), pp. 197-216; Harris, M. & Raviv, A., 'Capital Structure and the Informational Role of Debt', *Journal of Finance* 45 (June 1990), pp. 321-349; Perotti, E. & Spier, K., 'Capital Structure as a Bargaining Tool: The Role of Leverage in Contract Renegotiation', *American Economic Review* 83 (1993), pp. 1131-1141.



compared to equity financing, increases the probability that a firm may be unable to pay the above-mentioned<sup>22</sup> contractually pre-defined cash outflows, i.e., interest and principal.<sup>23</sup> Consequently, the firm will incur direct costs (e.g., legal and administrative expenses) as well as indirect costs (e.g., the loss of trust from customers, suppliers, and investors) related to the bankruptcy.<sup>24</sup>

Another disadvantage of debt financing compared to equity financing relates to the fact that debt creates agency costs.<sup>25</sup> Shareholders' interests do not always correspond with the debt-holders' interests, and this could increase the cost of debt for the firm. Shareholders are interested in maximizing the value of the firm even with risky investments whereas debt-holders' are essentially concerned that the firm pays back the borrowed debt. Since shareholders prevail over the decisions of investments of the firm, debt-holders will, consequently, protect their interests by asking for a higher interest rate (and/or restrictive and expensive covenants) on the money lent to the firm.

Finally, debt financing reduces the financial flexibility of a firm.<sup>26</sup> If a firm accumulates a significant level of debt in order to finance its current investments, it is plausible that it will be unable to raise resources in the future to survive periods of crisis or to take future investment opportunities.

## II.4 Relevant Factors in Financing and Defining Capital Structures

### II.4.1 Factors Influencing Capital Structures Decisions (in Theory)

Considering the above-mentioned options that are available to a firm to facilitate raising external financing resources (i.e., debt and equity) and all of the advantages and disadvantages between these resources, the relevant dilemma that managers must face is determining the mix of resources that maximizes the value of the firm. In order to answer this question, different theories have been developed in the past. In the following sections, the main theories will be presented, specifically, (a) the Modigliani-Miller Theorem,<sup>27</sup> (b) the Trade-off Theory,<sup>28</sup> and (c) the Pecking Order Theory.<sup>29</sup> Additionally, several other relevant theories will be introduced.<sup>30</sup>

22. See s. II.2 in this chapter, above.

23. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 363-366.

24. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 512-517.

25. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 367-368; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 523-527; Myers, S.C., 'Determinants of Corporate Borrowing', *Journal of Financial Economics* 5 (1997), pp. 147-175; Johnson, S., 'Debt Maturity and the Effects of Growth Opportunities and Liquidity on Leverage', *Review of Financial Studies* 16 (March 2003), pp. 209-236; Smith, C. & Warner, J.B., 'On Financial Contracting: An analysis of Bond Covenants', *Journal of Financial Economics* 7 (1979), pp. 117-161.

26. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 368-369.

27. See s. II.4.1.1 in this chapter, below.

28. See s. II.4.1.2 in this chapter, below.

29. See s. II.4.1.3 in this chapter, below.

30. See s. II.4.1.4 in this chapter, below.

### II.4.1.1 The Modigliani-Miller Theorem

The most famous theory on capital structure choices is the Modigliani-Miller Theorem<sup>31</sup> ('MM Theorem'). Based on this theory, under perfect capital markets, the value of a firm does not depend on the combination of debt and equity, but simply on the value of its assets; therefore, the value of a firm is independent from capital structure decisions. In other words, based on its Proposition 1, the MM Theorem states that the value of a leveraged firm is the same as the value of an unleveraged firm. Consequently, 'the market value of any firm is independent from its capital structure'<sup>32</sup> and is equal to the market value of the total cash flows generated by the firm's assets.

The simple argument of the MM Theorem was based on the so-called 'law of one price'<sup>33</sup> whereby, with no taxes or other transaction costs, the total cash flow paid to the investors of a firm corresponds to the total cash flow generated by the firm's assets. Consequently, a firm's securities and assets should have the same market value, which means that, if the firm's choices of securities do not modify the total cash flow generated by its assets, they will not change the total value of the firm.

Additionally, the MM Theorem based its concept on the 'law of conservation of value': 'the value of an asset is preserved regardless of the nature of the claims against it'.<sup>34</sup> This concept had already been formulated many years before by Williams:<sup>35</sup>

31. Modigliani, F. & Miller, M.H., 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review* 48 (June 1958), pp. 261-297. Some authors (Cheremushkin, S.V., 'Capital Structure Irrelevance: The Modigliani-Miller Model' in: Baker, H.K. & Martin, G.S. (eds) *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 152; Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), p. 448) underline that their basic argument was already anticipated by Williams in 1938 (Williams, J.B., *The Theory of Investment Value* (Cambridge, MA: Harvard University Press, 1938)) and by Duran in 1952 (Duran, D., 'Cost of Debt and Equity Funds for Business: Trends and Problems of Measurement' in: *Conference on Research in Business Finance* (New York, NY: National Bureau of Economic Research, 1952)). For some literature on the Modigliani-Miller theorem, see also Cheremushkin, S.V., 'Capital Structure Irrelevance: The Modigliani-Miller Model' in: Baker, H.K. & Martin, G.S. (eds), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 151-169; Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), pp. 446-463; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 450-544; Miller, M., 'The Modigliani-Miller Propositions After Thirty Years', *Journal of Economic Perspectives* 2 (Autumn, 1988), pp. 99-120; Ross, S.A., 'Comment on the Modigliani-Miller Propositions', *Journal of Economic Perspectives* 2 (Autumn, 1988), pp. 127-133; Bhattacharya, S., 'Corporate Finance and Legacy of Modigliani and Miller', *Journal of Economic Perspectives* 2 (Autumn, 1988), pp. 135-147; Modigliani, F., 'MM - Past, Present, Future', *Journal of Economic Perspectives* 2 (Autumn, 1988), pp. 149-158; Rubinstein, M., 'Great Moments in Financial Economics: II. Modigliani-Miller Theorem', *Journal of Investment Management* 1 (2003), pp. 7-13; Titman, S., 'The Modigliani-Miller Theorem and the Integration of Financial Markets', *Financial Management* 31 (Spring 2002), pp. 101-115.
32. Modigliani, F. & Miller, M.H., 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review* 48 (June 1958), p. 268.
33. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 455.
34. Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), p. 449. See also Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 470.



If the investment value of an enterprise as a whole is by definition the present worth of all its future distributions to security holders, whether on interest or dividend account, then this value in no wise depends on what the company's capitalisation is. Clearly, if a single individual or a single institution investor owned all bonds, stocks and warrants issued by the corporation, it would not matter to this investor what the company's capitalisation was (except for details concerning the income tax). Any earnings collected as interest could not be collected as dividends. To such an individual it would be perfectly obvious that total interest- and dividend- paying power was in no wise dependent on the kind of securities issued to the company's owner. Furthermore, no change in the investment value of the enterprise as a whole would result from a change in its capitalisation. [...] Such constancy of investment value is analogous to the indestructibility of matter or energy; it leads us to speak of the Law of the Conservation of Investment Value, just as physicists speak of the Law of the Conservation of Matter, or the Law of the Conservation of Energy.

The MM Theorem, moreover, suggests that not only is the mix of debt and equity irrelevant, but also the choices of the financial instruments (i.e., debt, equity, or hybrid securities) that are issued by the firm.<sup>36</sup>

Expressed in formulas, the value of the equity of an unlevered firm ( $E_U$ ) is equal to the total value of the firm ( $V_U$ ). At the same time, the value of the equity of a levered firm ( $E_L$ ) is equal to the value of the firm ( $V_L$ ) minus the value of the debt ( $D_L$ ). The three values equal each other in the MM Theorem:<sup>37</sup>

$$E_U = V_U = V_L - D_L = E_L$$

However, as previously mentioned, these conclusions are applicable under the conditions of 'perfect capital markets'. Otherwise stated, the MM Theorem assumes the following conditions:<sup>38</sup>

- Investors and firms can trade the same set of securities at competitive market prices equal to the present value of their future cash flows.
- There are no taxes, transaction costs, or issuance costs associated with security trading.
- A firm's financial decisions do not change the cash flows generated by its investments nor do they reveal new information about them.

Obviously, these assumptions do not reflect reality. Proposition 1 of the MM Theorem did not consider the two crucial factors of taxes and bankruptcy costs influencing financing decisions in the real world.<sup>39</sup> Indeed, under many tax systems, payments related to debt financing (i.e., interest expenses), are deductible from the corporate income tax base which generates the tax shield of debt. Also referred to as the

35. Williams, J.B., *The Theory of Investment Value* (Cambridge, MA: Harvard University Press, 1938), p. 72.

36. See s. II.2 in this chapter, above.

37. Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), p. 448.

38. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 455.

39. See s. II.3 in this chapter, above.

'interest tax shield', this tax shield of debt is commonly defined as 'the additional amount that a firm would have paid in taxes if it did not have leverage',<sup>40</sup> i.e.:

$$\text{Interest tax shield} = \text{Corporate tax rate} \times \text{Interest payments}$$

Consequently, the MM Theorem, at a later stage, included the value of the tax shield as a relevant factor influencing the capital structure decisions.<sup>41</sup> At this later stage, the value of a levered firm increased with the amount of debt that the firm was borrowing. Therefore, the revised Proposition 1 of the MM Theorem stated that 'the total value of the levered firm exceeds the value of the firm without leverage due to the present value of the tax savings from debt',<sup>42</sup> i.e.:

$$V_L = V_U + PV(\text{Interest tax shield})$$

where:

$$PV(\text{Interest tax shield}) = t_c \times D$$

assuming that the firm's marginal tax rate ( $t_c$ ) is constant and the debt ( $D$ ) is riskless. This tax shield could be reduced by the inclusion of personal income taxes,<sup>43</sup> but generally remains positive.

The intuitive consequence of this correction is that, the more a company borrows, the higher its value will be. In other words, the ideal capital structure that maximizes the value of a firm will be the structure with 100% debt or the one in which the level of debt generates the same amount of interest as the Earnings Before Interest and Taxes ('EBIT').<sup>44</sup> Figure 1.1 depicts such an assumption.

40. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 480.

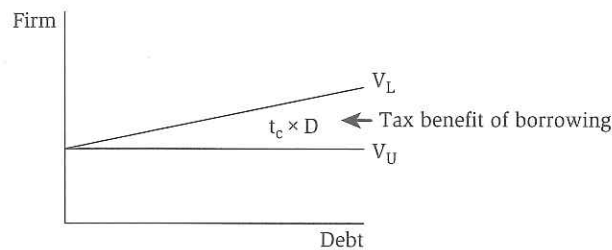
41. Modigliani, F. & Miller, M., 'Corporate income taxes and the cost of capital: a correction', *American Economic Review* 53 (June 1963), pp. 433-443. See also King, M., 'Taxation and the Cost of Capital', *Review of Economic Studies* 41 (1974), pp. 21-35; Stiglitz, J., 'Taxation, Corporate Financial Policy, and the Cost of Capital', *Journal of Public Economics* 2 (1973), pp. 1-34.

42. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 481.

43. Miller, M., 'Debt and Taxes', *Journal of Finance* 32 (1977), pp. 261-275; Miller, M. & Scholes, M., 'Dividends and Taxes', *Journal of Financial Economics* 6 (1978), pp. 333-364; Graham, J.R., 'Do Personal Taxes Affect Corporate Financing Decisions?', *Journal of Public Economics* 73 (1999), pp. 147-185.

44. Indeed, when personal taxes are introduced, the optimal level of debt is the one that generates the same amount of interest as the EBIT. In other words, since interest payments constitute a tax disadvantage for investors, they will pay higher personal taxes on them; such a disadvantage will not be compensated by the tax shield of debt at the corporate level since the firm, without a positive EBIT, will be unable to deduct the interest expenses of the excessive debt, assuming that there is no reduction in the corporate tax for excess interest payments (Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 497-499; Graham, J.R., 'How Big Are the Tax Benefits of Debt?', *Journal of Finance* 55 (October 2000), pp. 1901-1941). Moreover, since firms could have tax shields deriving from other tax deductions and tax credits (e.g., depreciation, investment tax credits, carry-forwards of losses, etc.) which may already reduce the taxable earnings, the value of the interest tax shield might be reduced (DeAngelo, H. & Masulis, R.W., 'Optimal Capital Structure Under Corporate and Personal



Figure 1.1 MM Theorem Including the Tax Shield<sup>45</sup>

However, this conclusion does not take into account the second above-mentioned relevant factor related to debt financing, the existence of bankruptcy costs. Indeed, one of the already discussed<sup>46</sup> disadvantages of debt financing is the fact that, the higher the amount of debt a firm accumulates, the greater the probability will be that the firm will not be able to manage the payments of interest expenses and principal related to it. The probability of default, however, did not necessarily change the conclusions reached by Proposition 1 of the MM Theorem since, under its assumptions, no transaction costs (therefore, no bankruptcy costs) exist in perfect capital markets. This indicates that, in perfect capital markets, the risk of default is not a disadvantage since the bankruptcy will only shift the ownership of the firm from the equity holders to the debt-holders without modifying the value of a firm's assets.<sup>47</sup>

#### II.4.1.2 The Trade-Off Theory

The conclusions presented in the previous section are applicable when assuming perfect capital markets.<sup>48</sup> One of these assumptions is the absence of bankruptcy costs. In reality, nevertheless, firms do incur direct and indirect costs related to bankruptcy.<sup>49</sup> The trade-off theory takes into account such costs and balances the interest tax shield advantages with the direct and indirect costs of financial distress generated by leverage.<sup>50</sup> Indeed, based on this theory, 'the total value of a levered firm equals the

Taxation', *Journal of Financial Economics* 8 (1980), pp. 3-29; Graham, J.R., 'Proxies for the Corporate Marginal Tax Rate', *Journal of Financial Economics* 42 (1996), pp. 187-221.

45. Source: Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 373 (Copyright © 2011 John Wiley & Sons, Inc. All rights reserved. Reproduced with permission of the copyright owner).

46. See s. II.3 in this chapter, above.

47. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 512.

48. See s. II.4.1.1 in this chapter, above.

49. See s. II.3 in this chapter, above.

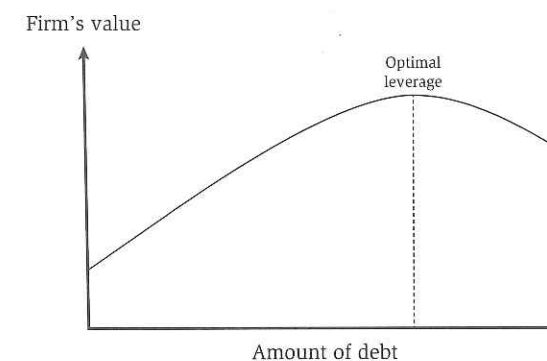
50. Scott, J.H., 'The Theory of Optimal Capital Structure', *Bell Journal of Economics* 7 (1976), pp. 33-54. See also Miglio, A., 'Trade-Off, Pecking Order, Signaling, and Market Timing Models' in: Baker, H.K. & Martin, G.S. (eds), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 170-189; Korteweg, A., 'The Net Benefits to Leverage', *Journal of Finance* 65 (2010), pp. 2137-2170; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011),

value of the firm without leverage plus the present value of the tax savings from debt, less the present value of financial distress costs',<sup>51</sup> i.e.:

$$V_L = V_U + PV(\text{Interest tax shield}) - PV(\text{Financial distress costs})$$

The current value of financial distress costs depends on three factors: the probability of default of the firm, the direct and indirect costs related to the default, and the appropriate discount rate of these costs.<sup>52</sup> These three factors are, in reality, very difficult to estimate since they depend on a number of elements that are not predictable with certainty and are often specifically related to the type of firm, market conditions, etc.<sup>53</sup> Figure 1.2 illustrates the conclusions of the trade-off theory.

Figure 1.2 Illustration of the Trade-Off Theory



Consequently, a firm should increase its degree of leverage to the point where the income tax shield advantages are offset by the probability of financial distress disadvantages.

p. 520-533; Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), pp. 486-491; Chirinko, R.S. & Singha, A.R., 'Testing Static Tradeoff against Pecking Order Models of Capital Structure: A Critical Comment', *Journal of Financial Economics* 58 (2000), pp. 417-425; Fama, E.F. & French, K.R., 'Testing the Trade-off and Pecking Order Predictions about Dividend and Debt', *Review of Financial Studies* 15 (2002), pp. 1-34; Shyam-Sunder, L. & Myers, S.C., 'Testing Static Tradeoff Against Pecking Order Models of Corporate Structure', *Journal of Financial Economics* 51 (1999), pp. 219-244; Fama, E.F. & French, K.R., 'Financing Decisions: Who Issues Stocks?', *Journal of Financial Economics* 73 (2005), pp. 549-582.

51. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 520.

52. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 520.

53. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 520-521 and Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 363-365.



Nevertheless, there are other factors that must be taken into account. Two previously mentioned factors<sup>54</sup> are the agency costs and the agency benefits of debt financing. The trade-off theory, therefore, may be extended to the following formula in order to take into account these elements:<sup>55</sup>

$$V_L = V_U + PV(\text{Interest tax shield}) - PV(\text{Financial distress costs}) \\ - PV(\text{Agency costs of debt}) + PV(\text{Agency benefits of debt})$$

In conclusion, the ideal level of debt should be the one that maximizes the interest tax shield and the agency benefits of debt while also minimizing the financial distress costs and the agency costs of debt.<sup>56</sup>

#### II.4.1.3 The Pecking Order Theory

Another famous theory regarding firms' preferred capital structure is the Pecking Order Theory.<sup>57</sup> Based on this theory, firms select their financing structure based on an order of preferences. First, they prefer to finance themselves with retained earnings; second, they use debt financing; and, finally, they issue new equity.

This theory finds its reasoning in the existence of asymmetric information<sup>58</sup> and adverse selection<sup>59</sup> in the capital markets. In general, insiders of a firm, such as

54. See s. II.3 in this chapter, above.

55. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 532.

56. Berk, J. & DeMarzo, P., *Corporate Finance*, 3rd edition (Boston, MA: Pearson Education, 2014), p. 563.

57. Myers, S.C., 'The Capital Structure Puzzle', *Journal of Finance* 39 (July 1984), pp. 575-592. See also Miglio, A., 'Trade-Off, Pecking Order, Signaling, and Market Timing Models' in: Baker, H.K. & Martin, G.S. (eds), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 170-189; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 539; Leary, M.T. & Roberts, M., 'The Pecking Order, Debt Capacity, and Information Asymmetry', *Journal of Financial Economics* 95 (2010), pp. 332-355; Fama, E.F. & French, K.R., 'Testing the Trade-off and Pecking Order Predictions about Dividend and Debt', *Review of Financial Studies* 15 (2002), pp. 1-34; Frank, M. & Goyal, V., 'Testing the Pecking Order Theory of Capital Structure', *Journal of Financial Economics* 67 (2003), pp. 217-248; Shyam-Sunder, L. & Myers, S.C., 'Testing Static Tradeoff Against Pecking Order Models of Corporate Structure', *Journal of Financial Economics* 51 (1999), pp. 219-244; Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011), pp. 486-491; Chirinko, R.S. & Singha, A.R., 'Testing Static Tradeoff against Pecking Order Models of Capital Structure: A Critical Comment', *Journal of Financial Economics* 58 (2000), pp. 417-425; Fama, E.F. & French, K.R., 'Financing Decisions: Who Issues Stocks?', *Journal of Financial Economics* 73 (2005), pp. 549-582.

58. Meza, D.D. & Webb, D.C., 'Too Much Investment: A Problem of Asymmetric Information', *Quarterly Journal of Economics* 102 (1987), pp. 281-292; Leland, H. & Pyle, D., 'Information Asymmetries, Financial Structure and Financial Intermediation', *Journal of Finance* 32 (1977), pp. 371-387; Myers, S.C. & Majluf, N., 'Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have', *Journal of Financial Economics* 13 (1984), pp. 187-221.

59. Akerlof, G., 'The Market for Lemons: Quality, Uncertainty, and the Market Mechanism', *Quarterly Journal of Economics* 84 (1970), pp. 488-450.

managers, will have more information than outsiders like shareholders and other stakeholders. Consequently, there will normally be asymmetric information between the former and the latter which generates a problem of adverse selection. When the seller has more information than the buyer, the latter will attempt to discount the purchase price in order to account for this asymmetric information. In other words, when a firm issues new equity, capital markets will interpret this event as an indicator that the managers of that firm possess internal information to predict that the value of that firm will decrease in the future and, consequently, the shares of that firm will be considered as overpriced.

The problem of adverse selection has three important implications on capital markets:<sup>60</sup> the price of the stock declines when a new equity issue is announced,<sup>61</sup> the price of the stock increases before a new equity issue is announced;<sup>62</sup> firms prefer to issue new equity when asymmetric information is minimized, e.g., after earnings announcements.<sup>63</sup>

However, asymmetric information generates the 'signaling theory of debt'.<sup>64</sup> As previously mentioned,<sup>65</sup> debt disciplines the actions of managers. Consequently, when a firm acquires new debt financing, markets and investors will perceive that the managers of those firms have such positive outlooks on the future value of that firm that they are willing to obligate themselves to additional interest payments. Therefore, capital markets and investors will perceive the debt as a signal of prosperity.<sup>66</sup>

Due to the existence of asymmetric information and adverse selection as well as the relevant consequences they have on debt financing and equity financing, the Pecking Order Theory and the managers' preferences for the different forms of financing are valid.<sup>67</sup>

60. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 537-538.

61. Asquith, P. & Mullins, D., 'Equity Issues and Offering Dilution', *Journal of Financial Economics* 15 (1986), pp. 61-89; Masulis, R.W. & Korwar, A., 'Seasoned Equity Offerings: An Empirical Investigation', *Journal of Financial Economics* 15 (1986), pp. 91-118; Mikkelson, W. & Partch, M., 'Valuation Effects of Security Offerings and the Issuance Process', *Journal of Financial Economics* 15 (1986), pp. 31-60.

62. Lucas, D. & McDonald, R., 'Equity Issues and Stock Price Dynamics', *Journal of Finance* 45 (1990), pp. 1019-1043.

63. Korajczyk, R.A., Lucas, D. & McDonald, R., 'The Effect of Information Releases on the Pricing and Timing of Equity Issues', *Review of Financial Studies* 4 (1991), pp. 685-708.

64. Ross, S.A., 'The Determination of Financial Structure: The Incentive-Signalling Approach', *The Bell Journal of Economics* 8 (Spring 1977), pp. 23-40. See also Myers, S.C. & Majluf, N.S., 'Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have', *Journal of Financial Economics* 13 (1984), pp. 187-221; Miglio, A., 'Trade-Off, Pecking Order, Signaling, and Market Timing Models' in: Baker, H.K. & Martin, G.S. (eds), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 170-189; Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 534-535.

65. See s. II.3 in this chapter, above.

66. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), pp. 534-535.

67. Berk, J. & DeMarzo, P., *Corporate Finance*, 3rd edition (Boston, MA: Pearson Education, 2014), p. 570.



## II.4.1.4 Other Theories on Capital Structure

Apart from the theories presented in the previous sections,<sup>68</sup> there are numerous other theories that have attempted to explain capital structure choices.<sup>69</sup> The most famous ones are the Market Timing Theory and the Management Entrenchment Theory.

According to the Market Timing Theory, managers' preferences between debt and equity depend on the market timing rather than on the benefits and costs of one form of financing over the other.<sup>70</sup> Indeed, whenever managers believe that the firm's stocks are overvalued, they will issue new equity. On the contrary, when they think that the firm's stocks are undervalued, they prefer to use debt financing.

According to the Management Entrenchment Theory, the capital structure of a firm is selected by managers primarily intending to avoid the agency benefits of debt and maintain their own entrenchment. Consequently, managers will attempt to decrease the amount of debt financing; however, this reduction in debt financing cannot be excessive. If the level of debt financing does not maximize the value of the company, the shareholders of the firm may possibly decide to replace the managers or to sell the company. In the end, based on this theory, the leverage of a firm will be below its ideal level and will only increase in response to the threat of takeovers or shareholders' activism.<sup>71</sup>

68. See s. II.4.1.1, II.4.1.2, and II.4.1.3 in this chapter, above.

69. Javed, I.S.M. et al., 'A Critical Review of Capital Structure Theories', *Information Management & Business Review* 11 (November 2012), pp. 553-557; Titman, S. & Tsyplakov, S., 'A Dynamic Model of Optimal Capital Structure', *Review of Finance* 11 (September 2007), pp. 401-451; Lewis, C.M., 'A Multiperiod Theory of Corporate Financial Policy under Taxation', *Journal of Financial & Quantitative Analysis* 25 (March 1990), pp. 25-43; Popescu, L. & Visinescu, S., 'A Review of the Capital Structure Theories', *Annals of the University of Oradea, Economic Science Series* 18 (2009), pp. 315-320; Scott, J.H. & Bell, H., 'A theory of optimal capital structure', *Journal of Economics* 7 (Spring 1976), pp. 33-54; Van Binsbergen, J.H., Graham, J.R. & Yang, J., 'An Empirical Model of Optimal Capital Structure', *Journal of Applied Corporate Finance* 23 (Fall 2011), pp. 34-59; Killian, T.W., 'Designing an (Optimal) Capital Structure', *U.S. Banker* 115 (September 2005), pp. 54-58; Ghosh, S.K. & Sinha, P.C., 'Is there Optimality in Firm's Capital Structure? An Empirical Study', *Finance India* 23 (September 2009), pp. 867-888; Bradley, M., Gregg, J.A. & Han, K.E., 'On the Existence of an Optimal Capital Structure: Theory and Evidence', *Journal of Finance* 39 (July 1984), pp. 857-878; Brick, I.E. et al., 'Optimal Capital Structure', *Journal of Banking & Finance* 7 (1983), pp. 45-67; Hackbarth, D. & Mauer, D.C., 'Optimal Priority Structure, Capital Structure, and Investment', *Review of Financial Studies* 25 (March 2012), pp. 747-796; Nurdin, A., 'Towards Optimal Capital Structure: Sharing Risks of High Leverage', *International Journal of Innovations in Business* 2 (April 2013), pp. 373-394.

70. Wurgler, J. & Baker, M., 'Market Timing and Capital Structure', *Journal of Finance* 57 (2002), pp. 1-32. See also Miglio, A., 'Trade-Off, Pecking Order, Signaling, and Market Timing Models' in: Baker, H.K. & Martin, G.S. (eds), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 170-189; Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 415.

71. Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011), p. 532; Zwiebel, J., 'Dynamic Capital Structure Under Managerial Entrenchment', *American Economic Review* 86 (December 1996), pp. 1197-1215; Zingales, L. & Novaes, W., 'Capital Structure Choice When Managers Are in Control: Entrenchment versus Efficiency', *Journal of Business* 76 (January 2003), pp. 49-82; Morellec, E., 'Can Managerial Discretion Explain Observed Leverage Ratios?', *Review of Financial Studies* 17 (Spring 2004), pp. 257-294.

## II.4.2 Factors Influencing Capital Structures Decisions (in Practice)

As demonstrated in the previous section,<sup>72</sup> capital structure decisions could be affected, in theory, by different factors: interest tax shield, financial distress costs, agency costs and benefits of debt, asymmetric information, market timing, and management entrenchment are among the most representative. Nevertheless, in practice, capital structure decisions are influenced by a tremendous number of factors.

Indeed, many studies have determined that one of the most influencing factors on financing decisions are the specific characteristics of the firm such as the uniqueness of the firm's product,<sup>73</sup> the tangibility of the firm's assets,<sup>74</sup> the liquidity of the firm,<sup>75</sup> the size of the firm,<sup>76</sup> the profitability of the firm,<sup>77</sup> and the growth opportunities of the firm.<sup>78</sup>

72. See s. II.4.1 in this chapter, above.

73. Bradley, M., Jarrell, G.A. & Kim, E.H., 'On the Existence of an Optimal Capital Structure: Theory and Evidence', *Journal of Finance* 39 (1984), pp. 857-878; Kovenock, D. & Phillips, G., 'Capital Structure and Product-Market Rivalry: How Do We Reconcile Theory and Evidence?', *American Economic Review* 85 (1995), pp. 403-408; Long, M.S. & Malitz, I.B., 'The Investment-Financing Nexus: Some Empirical Evidence', *Midland Corporate Finance Journal* 3 (1985), pp. 53-59; Titman, S., 'The Effect of Capital Structure on a Firm's Liquidation Decision', *Journal of Financial Economics* 13 (1984), pp. 137-151; Titman, S. & Wessels, R., 'The Determinants of Capital Structure Choice', *Journal of Finance* 43 (March 1988), pp. 1-19.

74. Titman, S. & Wessels, R., 'The Determinants of Capital Structure Choice', *Journal of Finance* 43 (March 1988), pp. 1-19; Frank, M. & Goyal, V., 'Testing the Pecking Order Theory of Capital Structure', *Journal of Financial Economics* 67 (2003), pp. 217-248; Rajan, R.G. & Zingales, L., 'What Do We Know about Capital Structure? Some Evidence from International Data', *Journal of Finance* 50 (December 1995), pp. 1421-1460.

75. Gryglewicz, S., 'A Theory of Corporate Financial Decisions with Liquidity and Solvency Concerns', *Journal of Financial Economics* 99 (February 2011), pp. 365-384; Sibilkov, V., 'Asset Liquidity and Capital Structure', *Journal of Financial & Quantitative Analysis* 44 (October 2009), pp. 1173-1196; Morellec, E., 'Asset Liquidity, Capital Structure, and Secured Debt', *Journal of Financial Economics* 61 (August 2001), pp. 173-206; Udomsirikul, P., Jumreornvong, S. & Jiraporn, P., 'Liquidity and Capital Structure: The Case of Thailand', *Journal of Multinational Financial Management* 21 (April 2011), pp. 106-117.

76. Brav, O., 'Access to Capital, Capital Structure, and the Funding of the Firm', *Journal of Finance* 64 (2009), pp. 263-306; Wijst, van der N. & Thurik, R., 'Determinants of Small Firm Debt Ratio: An Analysis of Retail Panel Data', *Small Business Economics* 5 (1993), pp. 55-65; Titman, S. & Wessels, R., 'The Determinants of Capital Structure Choice', *Journal of Finance* 43 (March 1988), pp. 1-19.

77. Titman, S. & Wessels, R., 'The Determinants of Capital Structure Choice', *Journal of Finance* 43 (March 1988), pp. 1-19; Baker, M. & Wurgler, J., 'Market Timing and Capital Structure', *Journal of Finance* 57 (2002), pp. 1-32; Jensen, M.C., 'Agency Costs of Free Cash Flows, Corporate Finance and Takeovers', *American Economic Review* 76 (May 1986), pp. 323-329; Myers, S.C. & Majluf, N., 'Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have', *Journal of Financial Economics* 13 (1984), pp. 187-221; Rajan, R.G. & Zingales, L., 'What Do We Know about Capital Structure? Some Evidence from International Data', *Journal of Finance* 50 (December 1995), pp. 1421-1460; Welch, I., 'Capital Structure and Stock Returns', *Journal of Political Economy* 112 (2004), pp. 106-131.

78. Baker, M. & Wurgler, J., 'Market Timing and Capital Structure', *Journal of Finance* 57 (2002), pp. 1-32; Barklay, M.J. & Smith, C.W.Jr., 'The Maturity Structure of Corporate Debt', *Journal of Finance* 50 (1995), pp. 609-631; Kamath, R.R., 'Long Term Financing Views and Practices of Financial Managers of NYSE Firms', *Financial Review* 32 (1997), pp. 331-356; Kim, S.W. & Sorensen, E.H., 'Evidence on the Impact of the Agency Costs of Debt on Corporate Policy', *Journal of Financial and Quantitative Analysis* 21 (1986), pp. 131-143; Long, M.S. & Malitz, I.B., 'The Investment-Financing Nexus: Some Empirical Evidence', *Midland Corporate Finance Journal* 3 (1985), pp. 53-59; MacKey, P., 'Real Flexibility and Financial Structure: An Empirical Analysis', Working Paper, Center for Economic Studies, U.S. Bureau of the Census (1999).



## CHAPTER 3

# Assessing the Arm's Length Nature of Intra-Group Financing: A New Approach

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*'The grand aim of all science is to cover the greatest number of empirical facts by logical deduction from the smallest number of hypotheses or axioms.'*

Albert Einstein

## I INTRODUCTION

As suggested in Chapter 1, one of the more appropriate solutions that could better balance the tax advantages of debt financing over equity financing would be the application of the arm's length principle to limit the deductibility of interest expenses. However, under the current OECD approach and the proposals within the BEPS project, the use of the arm's length principle will be applied appropriately without distortion only when reference can be made to third-party behaviours.<sup>1</sup>

As illustrated in Chapter 2, the comparison to third-party behaviours could be a difficult task when employed in practice. Indeed, despite the work produced by the OECD to provide guidance and certainty to the application of the arm's length principle, the current approaches and methodologies that have been implemented still do not seem to be able to overcome all of the relevant issues.<sup>2</sup>

Hence, the current situation could encompass distortions and manipulations of the arm's length principle and, ultimately, of the transfer pricing rules. However, it appears that the solution to the issues generated by the complexities deriving from the application of the arm's length principle should originate from an improvement of this application itself rather than from the implementation of an alternative principle.<sup>3</sup> This improvement would require a review of the current methodologies used in this area and an analysis of new approaches that can assist in reaching an improved assessment of the arm's length principle.

One of the innovative approaches that could be adopted to overcome the current issues with the application of the arm's length principle to intra-group financing (i.e., the lack of third-party comparability and/or its efficient application in practice) could be the assessment of this principle based on a risk-based approach (i.e., on the assessment of the credit risk of the tested entities and the risks embedded in the tested transactions),<sup>4</sup> rather than on a comparability-based approach (i.e., comparability with third-party behaviours).

Additionally, in this context, the utilization of safe harbours and APAs can be helpful to simplify the answer to the questions of the applicability of the arm's length principle to intra-group financing. Nevertheless, when these instruments are imple-

1. See Ch. 1, above.

2. See Ch. 2, above.

3. See Ch. 2, above.

4. Some comparability is embedded also in this approach, since this comparability is a necessary element in the assessment of the arm's length nature of a transaction. The relevance of the 'risk' factor has also been emphasized by the OECD within the principles developed under the BEPS Project (OECD, *Aligning Transfer Pricing Outcomes with Value Creation, Actions 8-10 - 2015 Final Reports*, OECD/G20 Base Erosion and Profit Shifting Project (Paris: OECD Publishing, 2015)).



mented, they should take into account all of the specific recommendations provided by the OECD<sup>5</sup> and should respect certain ‘standards of quality’.<sup>6</sup>

This chapter will provide a number of ideas and suggestions for the implementation of these new approaches. The ultimate outcome will provide solutions that could possibly strengthen the application of the arm’s length principle to intra-group financial transactions and minimize the risk of distortions and manipulation to the transfer pricing systems of the individual countries.

Section II will illustrate the concept of credit risk in corporate finance and several of the most commonly employed methodologies that are utilized to measure this risk. Section III will explain how to assess the arm’s length nature of intra-group financing (such as loans, financial guarantees, and cash pooling) based on the assessment of the credit risk of the tested entities and the risks embedded in the tested transactions. Finally, some conclusions will be derived from this analysis.

## II CREDIT RISK IN CORPORATE FINANCE

### II.1 An Introduction to Credit Risk in Corporate Finance

As illustrated in Chapter 1, a firm’s financing decisions ultimately consist in the choice between internal financing or external financing. Once internal financing is not considered to be feasible, the choice of external financing requires another fundamental decision to be made: the option for equity financing or for debt financing.

Therefore, a company generally has two types of investors: equity investors (e.g., shareholders) and debt investors (e.g., debt-holders and banks). When these investors are required to decide whether or not to invest in a firm and the amount of compensation required to make their investments, one of the most important factors they must consider is the estimation of the risks embedded in such investments. However, the definition of risk is not the same for the two categories of investors. Equity investors, on the one hand, will focus their attention on the equity risk of the firm. The equity risk is, indeed, the financial risk originated by holding equity in a specific investment.<sup>7</sup> Debt investors, on the other hand, will focus their analysis on the credit risk of the firm. As previously mentioned in Chapter 2, the ‘credit risk’, or ‘credit

5. See Ch. 2, above.

6. See s. III.5 in this chapter, below.

7. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 58-87. For some contributions on this topic, see David, A. & Hoogerheide, L.F., ‘Worldwide Equity Risk Prediction’, *Applied Economics Letters* 20 (October 2013), pp. 1333-39; Favara, G., Schroth, E. & Valta, P., ‘Strategic Default and Equity Risk across Countries’, *Journal of Finance* 67 (December 2012), pp. 2051-2095; Dibartolomeo, D., ‘Equity Risk, Credit Risk, Default Correlation, and Corporate Sustainability’, *Journal of Investing* 19 (Winter 2010), pp. 128-133; Feuerman, K., ‘Managing Equity Risk: Some Rules for the Road’, *Institutional Investor* 47 (June 2013), pp. 115-115; Ben-Zion, U. & Shalit, S., ‘Size, Leverage, and Dividend Record as Determinants of Equity Risk’, *Journal of Finance* 30 (September 1975), pp. 1015-1026; Favara, G., Schroth, E. & Valta, P., ‘Strategic Default and Equity Risk Across Countries’, *Journal of Finance* 67 (December 2012), pp. 2051-2095.

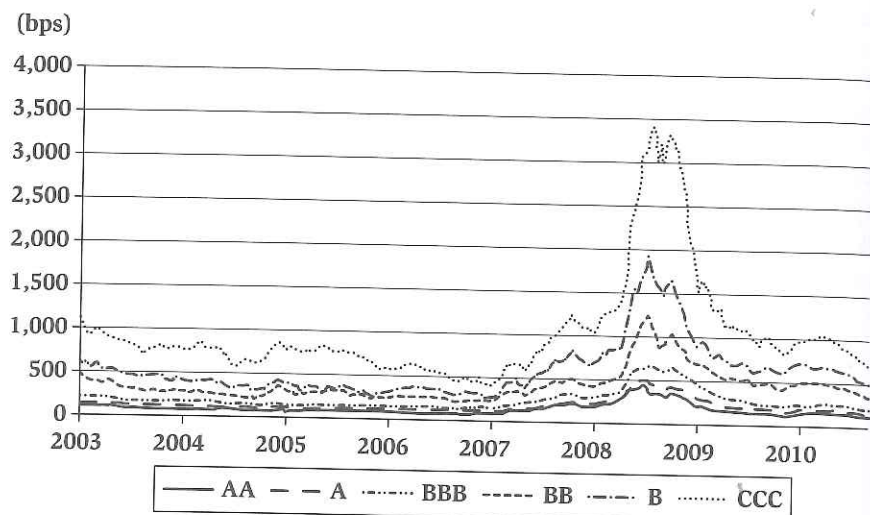
default risk’, can be defined as ‘the risk of loss arising from a counterparty’s failure to perform on a contractual obligation (credit default risk) or from credit deterioration (credit spread risk)’.<sup>8</sup>

Credit risk is a discipline ‘as old as lending itself, which means that it dates back as far as 1800 BCE’<sup>9</sup> and is one of the most important factors to be considered when debt financing decisions must be made.<sup>10</sup> Figure 3.1 illustrates the strong correlation between the credit rating of companies (expression of their credit risk)<sup>11</sup> and the interest rates that those companies need to pay on their borrowings. It is evident that the better the companies’ credit risk and credit rating, the lower the interest rate is that they will bear on their financing that they receive.

8. Banks, E., *The Palgrave Macmillan Dictionary of Finance, Investment and Banking* (New York, NY: Palgrave Macmillan, 2010), p. 129.
9. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. XV.
10. For contributions on this topic, see Jones, S. & Hensher, D.A., *Advances in Credit Risk Modelling and Corporate Bankruptcy Prediction* (Cambridge: Cambridge University Press, 2008); Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011); Baker, H.K. & Martin, G.S. (eds) *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (Hoboken, New Jersey: John Wiley & Sons, 2011); Berk, J. & DeMarzo, P., *Corporate Finance*, 2nd edition (Boston, MA: Pearson Education, 2011); Altman, E.I. & Hotchkiss, E., *Corporate Financial Distress and Bankruptcy*, 3rd edition (New York, NY: John Wiley & Sons, 2006); Gregory, J., *Counterparty Credit Risk: The New Challenge for Global Financial Markets* (Chichester, United Kingdom: John Wiley & Sons, 2010); Duffie, D. & Singleton, K.J., *Credit Risk: Pricing, Measurement, and Management* (Princeton, New Jersey: Princeton University Press, 2003); Bielecki, T.R., Brigo, D. & Patras, F., *Credit Risk Frontiers: Subprime Crisis, Pricing and Hedging, CVA, MBS, Ratings, and Liquidity* (Hoboken, New Jersey: John Wiley & Sons, 2011); Saunders, A. & Allen, L., *Credit risk measurement: New approaches to value at risk and other paradigms*, 2nd edition (New York, NY: John Wiley & Sons, 2002); Löffler, G. & Posch, P.N., *Credit Risk Modeling using Excel and VBA* (Chichester, United Kingdom: John Wiley & Sons, 2007); Ammann, M., *Credit Risk Valuation: Methods, Models, and Applications*, 2nd edition (Heidelberg, Germany: Springer-Verlag, 2001); Fabozzi, F.J., *Fixed Income Analysis*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2007); Ross, S.A., Westerfield, R.W. & Jordan, B.D., *Fundamentals of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2013); Caouette, J.B. et al. *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008); Fabozzi, F.J., Mann, S.V. & Choudhry, M., *Measuring and controlling: interest rate and credit risk*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2003); Brealey, R.A., Myers, S.C. & Allen, F., *Principles of Corporate Finance*, 10th edition (New York, NY: McGraw-Hill/Irwin, 2011).
11. See s. II.2.1 in this chapter, below.



Figure 3.1 Corporate Bond Yield Spreads by Rating Category<sup>12</sup>



The recent increase in the amount of debt in the market has exponentially encouraged the relevance of this topic.<sup>13</sup> Based on the general concepts that debt assists in fuelling the economy and creating growth and business prosperity,<sup>14</sup> this increase has concerned not only the amount of private debt, but also the amount of public debt (as shown in Figure 3.2 and Figure 3.3).

12. Source: Vazza, D., Miller, C., 'The Relationship Between Corporate Credit Ratings And Debt Cost Across The Maturity Curve And Through Stress Periods: 1945-Present', *Standard & Poor's Financial Services LLC* (24 February 2011), p. 3 (Chart 1, Corporate Bond Spreads by Ratings Category). Data as of 21 February 2011 (Source: S&P's Global Fixed Income Research) (Copyright © 2011 Standard & Poor's Financial Services LLC. All rights reserved. Reproduced with permission of the copyright owner). S&P's corporate bond indices by rating category display the portfolio option-adjusted spread for a group of corporate bonds that are in the same rating category.  
 13. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 2.  
 14. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 7.

Figure 3.2 Long-Term External Debt, Public and Publicly Guaranteed (USD Billion)<sup>15</sup>

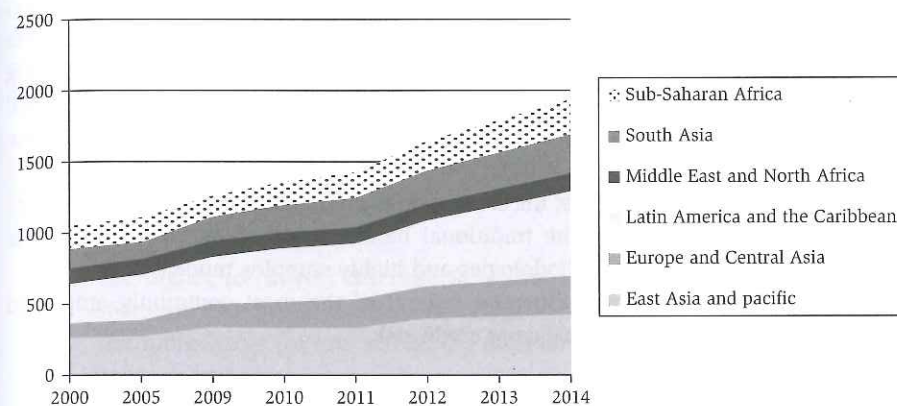
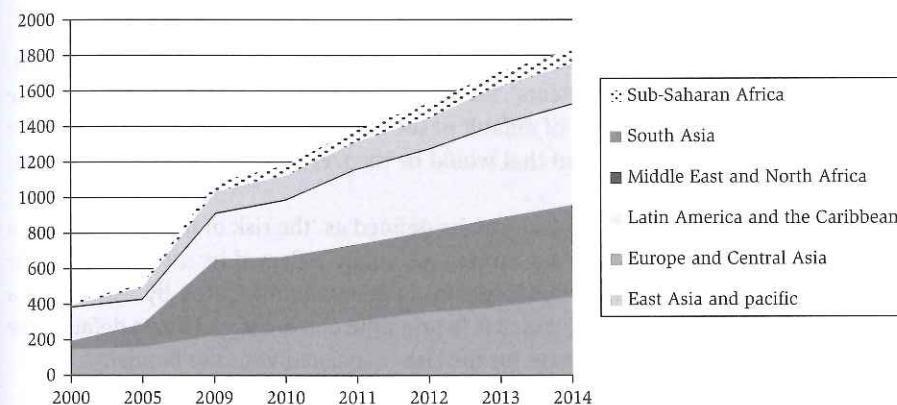


Figure 3.3 Long-Term External Debt, Private Nonguaranteed (USD Billion)<sup>16</sup>



The relevant factors at the fundament of this increase have been identified as: (a) financial deepening, i.e., the extension of credit to those who were not previously eligible; (b) the normal structural upturns, i.e., the fact that the growth in the global

15. Data source: World Bank Group, *International Debt Statistics* (Washington, DC: International Bank for Reconstruction and Development/The World Bank, 2016). Data collected and elaborated by the author. 'Long-term external debt' is debt that has an original or extended maturity of more than one year and that is owed to non-residents by residents of an economy and is repayable in foreign currency, goods, or services.  
 16. Data source: World Bank Group, *International Debt Statistics* (Washington, DC: International Bank for Reconstruction and Development/The World Bank, 2016). Data collected and elaborated by the author. 'Long-term external debt' is debt that has an original or extended maturity of more than one year and that is owed to non-residents by residents of an economy and is repayable in foreign currency, goods, or services.



economy inflates the volume of debt; and (c) the excessive structural movements, i.e., the credit boom due to a 'bubble' in the economy.<sup>17</sup>

However, in mid-2007, this rapid increase in the volume of debt in the market ultimately generated the beginning of a financial crisis that has radically changed the perception on credit risk. The increase of new financial transactions and new lending institutions together with the losses that this financial crisis has caused to the real economy have finally created a new understanding of the value of credit risk and new approaches to the measurement of risk.<sup>18</sup>

As an ultimate consequence, the estimation of credit risk is no longer the result of the application of an 'art' by the traditional bankers, but rather the result of the application of sophisticated methodologies and highly complex models.

The section below<sup>19</sup> will illustrate several of the most commonly employed methodologies that are used to measure credit risk.

## II.2 Measuring Credit Risk

As previously mentioned in Chapter 2, there are three types of credit risk:<sup>20</sup> default risk (or probability of default), credit spread risk, and downgrade risk.

The 'default risk' can be defined as 'the risk of loss arising from a counterparty's failure to perform on its contractual obligations including derivatives, loans, bonds, and other credit sensitive instruments'.<sup>21</sup> This loss can be estimated by quantifying the default rate (i.e., the probability of default of the counterparty) and the recovery rate (i.e., the percentage of investment that would be recovered in the event of the default of the counterparty).<sup>22</sup>

The 'credit spread risk', instead, can be defined as 'the risk of loss arising from a deterioration in an entity's creditworthiness, generally reflected by a widening in the credit spread'.<sup>23</sup> This loss (i.e., credit spread) is generally measured by estimating a 'yield spread' (or 'risk premium') which is 'a premium above the yield on a default-free bond issue necessary to compensate for the risk associated with the bonds'.<sup>24</sup>

17. Caouette, J.B. et al *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 8-9.
18. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 9-20.
19. See s. II.2 in this chapter, below.
20. Fabozzi, F.J., *Fixed Income Analysis*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2007), p. 28.
21. Banks, E., *The Palgrave Macmillan Dictionary of Finance, Investment and Banking* (New York, NY: Palgrave Macmillan, 2010), p. 128.
22. Fabozzi, F.J., *Fixed Income Analysis*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2007), p. 28.
23. Banks, E., *The Palgrave Macmillan Dictionary of Finance, Investment and Banking* (New York, NY: Palgrave Macmillan, 2010), p. 130.
24. Fabozzi, F.J., *Fixed Income Analysis*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2007), p. 28.

Finally, the 'downgrade risk' can be defined as the risk of a deterioration of the credit rating of an entity (i.e., a downgrade of its credit rating).<sup>25</sup> Deterioration can result, for example, in an increase in the entity's cost of borrowing. The probability that this deterioration occurs is generally measured by the use of rating transition matrixes which are tables that depict the percentage of issues that are downgraded or upgraded during a certain period of time. Table 3.1 indicates an example of these instruments.

The credit risk of a firm depends on three factors:<sup>27</sup> the capacity of the firm to generate a cash flow from its operations; the financial obligations of the firm;<sup>28</sup> and the liquidity of the firm's assets. Hence, the credit risk of a firm will decrease (or increase) if:<sup>29</sup>

- The higher (or lower) the cash flows are that are generated by the firm's operations relative to its financial obligations.
- The more stable (or less stable) the cash flows are that are generated by the firm's operations.
- The more liquid (or less liquid) the assets are of the firm.

Moreover, the credit risk could be assessed for either a specific entity (e.g., borrower, lender, guarantor or guaranteed entity) or for a specific instrument (e.g., loan or financial guarantee).

25. Fabozzi, F.J., *Fixed Income Analysis*, 2nd edition (Hoboken, New Jersey: John Wiley & Sons, 2007), p. 30.
27. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), p. 87.
28. That is, payments the firm must make based on the legal obligation it has entered into (e.g., interest and principal payments); discretionary payments such as dividend payments or new capital expenditures are not financial obligations.
29. Damodaran, A., *Applied Corporate Finance*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2011), pp. 87-88.



Table 3.1 Average One-Year Transition Rates For Global Corporates By Rating Modifier (1981-2013) (%)<sup>26</sup>

From/To	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC	D
AAA	87.10 (7.09)	5.61 (5.96)	2.58 (3.21)	0.69 (1.03)	0.16 (0.44)	0.24 (0.56)	0.13 (0.34)	0.00 (0.00)	0.05 (0.25)	0.00 (0.00)	0.03 (0.17)	0.05 (0.19)	0.00 (0.00)	0.00 (0.00)	0.03 (0.17)	0.00 (0.00)	0.05 (0.34)	0.00 (0.00)
AA+	2.57 (3.72)	76.24 (10.27)	12.07 (7.06)	3.93 (4.20)	0.82 (2.46)	0.44 (0.88)	0.22 (0.51)	0.11 (0.40)	0.05 (0.71)	0.00 (0.24)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
AA	0.45 (0.51)	1.27 (8.49)	80.04 (5.98)	8.69 (5.98)	2.98 (2.61)	1.31 (1.28)	0.41 (0.67)	0.41 (0.82)	0.14 (0.36)	0.09 (0.24)	0.05 (0.16)	0.03 (0.13)	0.02 (0.10)	0.02 (0.12)	0.00 (0.00)	0.02 (0.09)	0.05 (0.15)	0.02 (0.09)
AA-	0.05 (0.14)	0.13 (0.33)	4.00 (4.27)	77.16 (6.93)	10.36 (4.94)	2.57 (2.67)	0.66 (0.86)	0.31 (0.51)	0.18 (0.47)	0.08 (0.27)	0.03 (0.21)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.03 (0.16)	0.10 (0.40)	0.00 (0.00)	0.00 (0.00)
A+	0.00 (0.00)	0.09 (0.22)	0.56 (0.73)	4.66 (2.66)	76.86 (5.22)	9.32 (3.01)	2.44 (1.46)	0.70 (0.67)	0.39 (0.44)	0.09 (0.20)	0.07 (0.18)	0.11 (0.27)	0.01 (0.06)	0.08 (0.20)	0.04 (0.14)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
A	0.04 (0.14)	0.05 (0.14)	0.25 (0.53)	0.50 (0.49)	5.30 (2.01)	77.44 (4.65)	7.07 (3.05)	2.67 (1.73)	1.04 (0.95)	0.32 (0.40)	0.14 (0.22)	0.13 (0.29)	0.09 (0.33)	0.11 (0.36)	0.03 (0.10)	0.00 (0.00)	0.02 (0.06)	0.07 (0.12)
A-	0.05 (0.21)	0.01 (0.05)	-0.08 (0.16)	0.17 (0.29)	0.53 (0.62)	6.74 (3.36)	76.07 (5.63)	7.63 (3.23)	2.45 (1.49)	0.69 (0.65)	0.18 (0.36)	0.15 (0.37)	0.15 (0.25)	0.14 (0.32)	0.03 (0.08)	0.01 (0.09)	0.04 (0.16)	0.08 (0.20)
BBB+	0.00 (0.00)	0.01 (0.05)	0.07 (0.17)	0.08 (0.20)	0.26 (0.48)	0.91 (1.10)	7.21 (3.18)	73.65 (5.74)	8.74 (3.40)	1.89 (1.54)	0.45 (0.56)	0.39 (0.61)	0.16 (0.23)	0.22 (0.46)	0.14 (0.33)	0.03 (0.10)	0.03 (0.19)	0.08 (0.29)
BBB	0.01 (0.08)	0.01 (0.08)	0.05 (0.15)	0.04 (0.14)	0.13 (0.24)	0.40 (0.73)	1.13 (1.05)	7.46 (3.30)	74.89 (4.64)	6.09 (2.19)	1.55 (1.13)	0.73 (0.62)	0.34 (0.52)	0.29 (0.48)	0.15 (0.42)	0.05 (0.11)	0.07 (0.13)	0.20 (0.30)
BBB-	0.01 (0.08)	0.01 (0.06)	0.01 (0.05)	0.06 (0.22)	0.06 (0.18)	0.21 (0.43)	0.32 (0.63)	1.30 (1.27)	9.25 (3.39)	71.50 (5.51)	5.44 (2.18)	2.38 (1.56)	0.90 (0.83)	0.46 (0.89)	0.30 (0.51)	0.19 (0.50)	0.27 (0.61)	0.32 (0.43)
BB+	0.06 (0.25)	0.00 (0.00)	0.00 (0.00)	0.04 (0.14)	0.02 (0.10)	0.12 (0.44)	0.10 (0.32)	0.57 (0.75)	2.09 (2.01)	12.19 (4.55)	63.06 (5.78)	6.48 (2.90)	3.13 (2.13)	1.10 (1.80)	0.73 (1.30)	0.22 (0.37)	0.51 (1.05)	0.43 (0.69)

26. Source: Vazza, D., Kraemer, N., '2013 Annual Global Corporate Default Study And Rating Transitions', Standard & Poor's Financial Services LLC (19 March 2014), p. 52 (Table 23, Average One-Year Transition Rates For Global Corporates By Ratings Modifier (1981-2013) (%)) (Copyright © 2014 Standard & Poor's Financial Services LLC. All rights reserved. Reproduced with permission of the copyright owner).

From/To	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC	D
BB	0.00 (0.00)	0.00 (0.00)	0.05 (0.23)	0.02 (0.07)	0.00 (0.00)	0.08 (0.41)	0.06 (0.24)	0.21 (0.47)	0.61 (0.91)	2.35 (2.34)	9.69 (4.69)	64.13 (5.28)	7.76 (2.94)	2.42 (1.58)	1.22 (1.42)	0.42 (0.62)	0.69 (1.06)	0.68 (0.71)
BB-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.11)	0.01 (0.09)	0.01 (0.08)	0.06 (0.31)	0.14 (0.28)	0.27 (0.47)	0.44 (0.69)	2.00 (1.73)	9.22 (4.05)	63.18 (5.67)	8.43 (4.06)	3.20 (1.69)	0.90 (0.89)	0.80 (0.89)	1.13 (1.51)
B+	0.00 (0.00)	0.01 (0.06)	0.00 (0.00)	0.04 (0.15)	0.00 (0.00)	0.04 (0.10)	0.08 (0.22)	0.05 (0.14)	0.06 (0.18)	0.12 (0.23)	0.30 (0.38)	1.57 (1.14)	7.75 (3.62)	64.00 (5.63)	8.17 (3.30)	2.68 (1.29)	1.83 (1.71)	2.31 (2.11)
B	0.00 (0.00)	0.00 (0.00)	0.01 (0.11)	0.01 (0.07)	0.00 (0.00)	0.05 (0.24)	0.07 (0.46)	0.03 (0.09)	0.09 (0.36)	0.04 (0.13)	0.16 (0.45)	0.37 (0.66)	1.44 (1.44)	8.56 (3.51)	59.66 (7.68)	8.24 (3.94)	4.72 (3.70)	4.73 (4.71)
B-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.03 (0.36)	0.05 (0.36)	0.00 (0.00)	0.11 (0.40)	0.08 (0.21)	0.16 (0.52)	0.13 (0.53)	0.19 (1.04)	0.53 (1.04)	2.72 (2.53)	11.10 (5.83)	52.19 (7.20)	11.37 (4.77)	7.92 (7.00)
CCC/C	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.04 (0.26)	0.00 (0.00)	0.11 (0.42)	0.08 (0.53)	0.08 (0.36)	0.08 (0.43)	0.04 (0.27)	0.19 (0.57)	0.46 (0.84)	1.30 (1.67)	2.98 (3.29)	9.21 (5.86)	43.81 (9.49)	26.87 (12.22)



### II.2.1 Who Measures the Credit Risk

The credit risk is generally measured, in practice, by assigning a rating (i.e., credit rating)<sup>30</sup> to the specific entity or instrument that expresses its probability of default. The credit rating is established based on a qualitative and quantitative analysis of the characteristics of the entity or instrument.

Credit risk measurement can serve the purposes of many 'actors' in the market: lenders (including banks, savings institutions, insurance companies, finance companies, and special purpose entities), portfolio managers (such as investment managers, mutual funds, pension funds, and hedge funds), structural hubs (comprising clearing-houses, derivative product companies, and exchanges), and rating agencies are just some of the categories of the primary users of credit risk information.<sup>31</sup> Therefore, based on the performance of credit risk measurement by these actors, it is possible to distinguish two established systems that measure the credit risk of an entity or of a specific instrument: external systems and internal systems.<sup>32</sup>

External systems provide a credit risk measurement that is publicly available to the market. Typical examples of external systems for measuring credit risk are those employed by rating agencies. The three major rating agencies in the world are Moody's Investors Service ('Moody's'), Standard and Poor's ('S&P'), and Fitch Ratings ('Fitch').<sup>33</sup> The rating agencies summarize the credit risk measurement in a credit rating in the form of an opinion. Generally, in order to establish their credit ratings, these agencies use the rating methodology that most suitably reflects the borrower's creditworthiness compared to similar companies in the same industry and offers the best possible relative ranking.<sup>34</sup> The rating opinions are synthesized into a system of grades represented by letters which position the specific entity or instrument in a credit

30. The 'credit rating' can be defined as 'a measure of an obligor's financial strength based on an assessment of financial standing, performance, and prospects. The rating analysis process focuses on the obligor's earnings, leverage, liquidity, capitalization, asset quality, funding access, management experience, strategy, competition, and operating environment. A credit rating may be established internally by a firm's own credit department, or through external rating agencies such as Moody's, Standard and Poor's and Fitch IBCA' (Banks, E., *The Palgrave Macmillan Dictionary of Finance, Investment and Banking* (New York, NY: Palgrave Macmillan, 2010), p. 129).

31. Caouette, J.B. et al. *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 41-101.

32. Bessis, J., *Risk Management in Banking*, 2nd edition (West Sussex, UK: John Wiley & Sons, 2002), p. 443-450.

33. However, there are many other less renowned rating agencies around the world (e.g., A.M. Best, Canadian Bond Rating Service (S&P), Dominion Bond Rating Service (DBRS), Agence d'Évaluation Financière (S&P), Credit Rating Services of India Ltd., Egan Jones Rating, European Rating Agency, Japan Bond Research Institute, Japan Credit Rating Agency, Mikuni & Co., Nippon Investors Service, Korean Investors Service) (Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 84).

34. PwC, *Clarifying the Rules: Sustainable Transfer Pricing in the Financial Sector* (PwC, 2012), p. 133.

quality ranging from the highest (Aaa/AAA) to the lowest (C/D/DDD). Moreover, each grade contains so-called 'modifiers', represented by numbers or by a '+' or '-', that more specifically differentiate the grades. Table 3.2 illustrates an example of the different categories of credit ratings adopted by Moody's, S&P, and Fitch.

Table 3.2 Categories of Long-Term Credit Rating Used by Moody's, S&P, and Fitch

Moody's	S&P	Fitch
Aaa	AAA	AAA
Aa1	AA+	AA+
Aa2	AA	AA
Aa3	AA-	AA-
A1	A+	A+
A2	A	A
A3	A-	A-
Baa1	BBB+	BBB+
Baa2	BBB	BBB
Baa3	BBB-	BBB-
Ba1	BB+	BB+
Ba2	BB	BB
Ba3	BB-	BB-
B1	B+	B+
B2	B	B
B3	B-	B-
Caa1	CCC+	CCC
Caa2	CCC	
Caa3	CCC-	
Ca	CC	
	C	
C	D	DDD

The higher the rating, the lower the credit risk of a specific entity or instrument. Table 3.3 demonstrates the general interpretation assigned by each credit rating.<sup>35</sup>

35. This is a summary of the interpretation provided by the main rating agencies. However, each agency provides a specific interpretation of its individual credit rating.



Table 3.3 Summary Interpretation of Long-Term Senior Debt Rating Symbols<sup>36</sup>

Investment Grade Ratings	
Rating	Interpretation
AAA/Aaa	Highest quality; extremely strong, highly unlikely to be affected by foreseeable events.
AA/Aa	Very high quality; capacity for repayment is not significantly vulnerable to foreseeable events.
A/A	Strong payment capacity; more likely to be affected by changes in economic circumstances.
BBB/Baa	Adequate payment capacity; a negative change in environment may affect capacity for repayment.
Below Investment Grade Ratings	
Rating	Interpretation
BB/Ba	Considered speculative with possibility of developing credit risks.
B/B	Considered very speculative with significant credit risk.
CCC/Caa	Considered highly speculative with substantial credit risk.
CC/Ca	Maybe in default or wildly speculative.
C/C/D	In bankruptcy or default.

In order to define the credit rating of a specific entity or instrument, rating agencies perform a qualitative and quantitative analysis of their characteristics by taking into account all relevant factors including, for example, business risk, industry characteristics, competitive positioning, management, financial risk, financial characteristics, financial policies, profitability, capitalization, cash flow protection, and financial flexibility. These analyses are not uniform for all of the agencies; however, it appears that they are implemented in a broadly similar process.<sup>37</sup>

Internal systems, instead, provide a credit risk measurement that will not be publicly available to the market. Typical examples of internal systems for measuring credit risk are those employed by banks. As with the external systems, the ultimate output of the analysis is the assignment of a credit rating to a specific entity or instrument. However, internal systems usually measure the credit rating of smaller entities and instruments (such as small- and medium-sized businesses) and are typically less transparent than the external systems.<sup>38</sup>

36. Source: Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 86 (Copyright © 2008 Caouette, J.B. et al. All rights reserved. Reproduced with permission of John Wiley & Sons, Inc.).

37. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 88.

38. Bessis, J., *Risk Management in Banking*, 2nd edition (West Sussex, UK: John Wiley & Sons, 2002), pp. 445-447.

## II.2.2 How to Measure Credit Risk

The credit risk has historically been one of the most relevant factors that lenders, portfolio managers, structural hubs, and rating agencies, among others, have to measure. However, this measurement involves processes and methodologies that have radically developed over the course of the preceding years. The following sections<sup>39</sup> will illustrate processes and methodologies adopted by the 'classic credit analysis', first, and by the users of credit risk models, more recently. It is worth mentioning that these processes and methodologies are employed by both external systems and internal systems.

### II.2.2.1 The Classic Credit Analysis

Traditionally, banks' credit officers have developed processes and methodologies in order to ultimately assess the credit risk of entities and financial instruments. However, these processes and methodologies (commonly known as 'classic credit analysis')<sup>40</sup> have always been considered to provide an ultimate result of a 'personal judgment about a borrower's ability to repay'.<sup>41</sup> This classic credit analysis has been described as the result of a lengthy, articulated, and subjective process as illustrated in Figure 3.4.

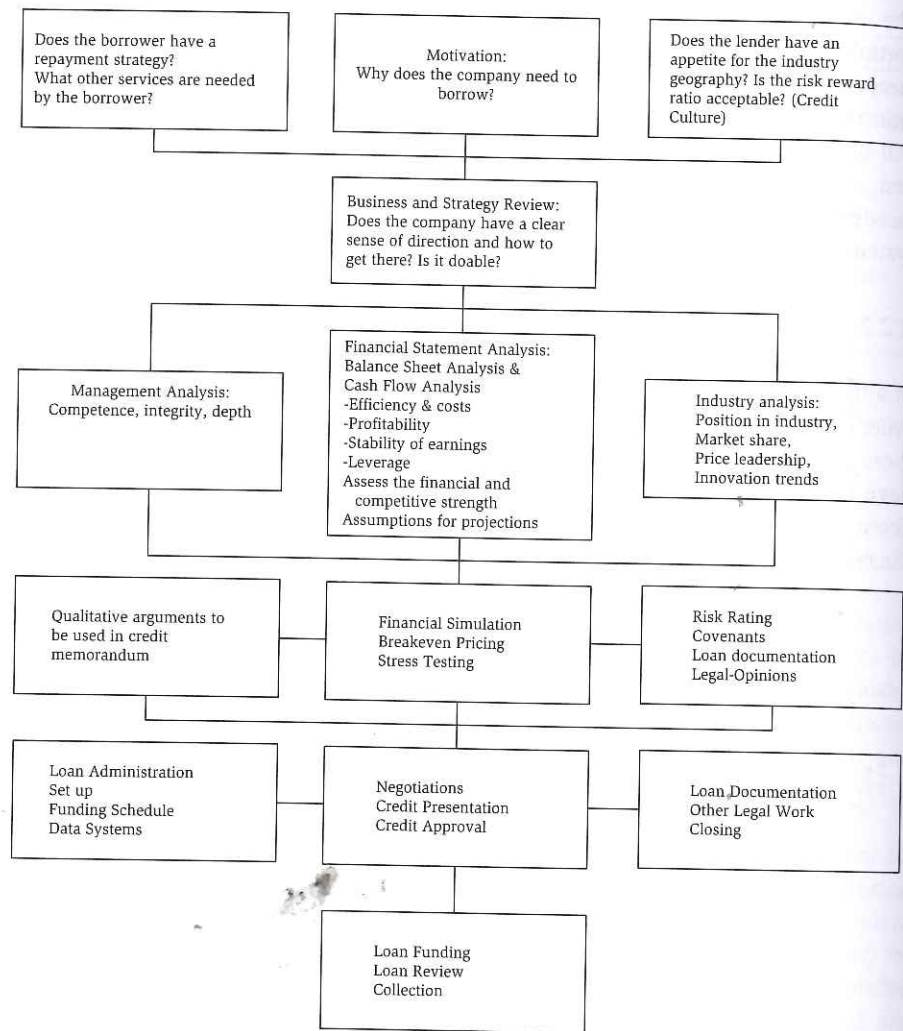
39. See s. II.2.2.1 and II.2.2.2 in this chapter, below.

40. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 103-104. For an overview of classic credit analysis see Boyadjian, H. J. & Warren, J. F., *Risks: Reading Corporate Signals* (New York, NY: John Wiley & Sons, 1987); Hale, R.H., *Credit Analysis: A Complete Guide* (Hoboken, NJ: John Wiley & Sons, 1983); Mayer, M., *The Bankers* (New York, NY: Weybright and Talley, 1974).

41. Hale, R.H., *Credit Analysis: A Complete Guide* (Hoboken, NJ: John Wiley & Sons, 1983). Hale underlined, 'Credit decisions are personal. They cannot be made solely on the basis of guidelines or analytic techniques. Each lending officer must exercise common sense and good judgement.'



Figure 3.4 Example of Classic Credit Analysis<sup>42</sup>



One of the most used instruments in this process is the 'ratio analysis'. This analysis, developed from the beginning of the past century,<sup>43</sup> provides for an immediate review of numerous critical aspects of a firm such as operating performance,

42. Source: Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 108 (Copyright © 2008 Caouette, J.B. et al. All rights reserved. Reproduced with permission of John Wiley & Sons, Inc.).  
 43. Two of the first pioneers of the ratio analysis were Wall and Duning (Wall, A. & Duning, R., *Ratio Analysis of Financial Statements* (New York, NY: Harper, 1928)).

operating profitability, cash flows, leverage, and liquidity. The most commonly used ratios for these purposes are illustrated in Table 3.4.

Table 3.4 Most Commonly Used Financial Ratios in the Classic Credit Analysis<sup>44</sup>

Category	Ratio
Operating performance	EBITDA/Sales
	Net income/Sales
	Effective tax rate
	Net income/Net worth
	Net income/Total assets
Debt service coverage	Sales/Fixed assets
	EBITDA/Interest
	Free cash flow-Capital expenditure/Interest Free cash flow-Capital expenditure-Dividend/Interest
Financial leverage	Long-term debt/Capitalization
	Long-term debt/Tangible net worth
	Total liabilities/Tangible net worth (Total liabilities-Long-term capital)/(Long-term capital)
	Long-term capital = Total net worth + Preferred + Subordinated debt
	Current liabilities/Tangible net worth
Liquidity	Current ratio
	Quick ratio
	Inventory to net sales
	Inventory to net working capital
	Current debt to inventory
	Raw material, work in process, and finished goods as percentages of total inventory
Receivables	Aging of receivables: 30, 60, 90, 90+ days
	Average collection period

Furthermore, the ratio analysis was often supplemented by a comparative analysis of the sector in which the company was operating (i.e., a 'strategic analysis'), in the classic credit analysis.<sup>45</sup>

44. Source: Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 109 (Copyright © 2008 Caouette, J.B. et al. All rights reserved. Reproduced with permission of John Wiley & Sons, Inc.).

45. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 110-112. See also Rizzi, J., 'Strategic Analysis: The Neglected Element in the Term Credit Decision', *Journal of Commercial Lending* 66 (1984), p. 2. For a detailed overview of the strategic analysis, see Porter, M.E., 'How Competitive Forces Shape Strategy', *Harvard Business Review* 57 (March/April 1979); Porter, M.E., *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: The Free Press, 1980); Porter, M.E., *Competitive Advantage: Creating and Sustaining Superior Performance* (New York, NY: Free Press, 1985); Porter, M.E., 'The Five Competitive Forces That



However, the use of the classic credit analysis to measure the credit risk has recently been partially abandoned. The intense competition in lending institutions that are able to commoditize lending products and offer debt capital at decreased prices and the questionable effectiveness of the process utilized in this analysis which, as previously mentioned, is often characterized by the subjectivity of credit officers and inevitably leads to misjudgment, have changed the perception on the performance of the credit analysis.

### II.2.2.2 The Use of Credit Risk Models

During the past thirty years,<sup>46</sup> the understanding and measuring of credit risk has radically changed primarily due to the following factors:<sup>47</sup>

- Deregulation stimulating financial innovation and facilitating the provision of services by new entrants.
- The expansion of credit markets to encompass new domestic and international borrowing sectors.
- A continuing movement away from balance sheet lending leading, instead, to cash flow lending.
- An increase in off-balance-sheet risks.
- The shrinking of the margins on the loans that have forced banks to explore less expensive methods for measuring and managing credit risk.
- Securitization, which has prompted the development of credit risk tools that are more efficient and standardized.
- Advances in finance theory which have facilitated examining credit risk in completely different ways.
- Development of credit derivative markets whereby trade occurs by direct negotiation between buyers and sellers.
- Regulatory reform of international standards including Basel II for banks and Solvency II for insurance companies.

All of these factors have ultimately generated innovative methodologies for measuring credit risk. Due to the contribution of new theories (such as the Arbitrage Pricing Theory, the Option Pricing Theory, the Capital Asset Pricing Model) and of new statistic and operation research (including survival analysis, neural networks ('NN')),

Shape Strategy', *Harvard Business Review* 86 (January 2008), pp. 78-93; Porter, M.E., Argyres, N. & McGahan, A.M., 'An Interview with Michael Porter', *The Academy of Management Executive* 16 (May, 2002), pp. 43-52.

46. Based on Altman and Hotchkiss, credit risk models have been developed over the past 150 years. However, the past thirty years have seen a radical development in the use and implementation of these models (Altman, E.I. & Hotchkiss, E., *Corporate Financial Distress and Bankruptcy*, 3rd edition (New York, NY: John Wiley & Sons, 2006), pp. 233-235).

47. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 127. See also McKinsey, 'The New World of Financial Services', *The McKinsey Quarterly* (2/1993), pp. 59-106.

mathematical programming, deterministic and probabilistic simulation, stochastic calculus, game theory), new tools referred to as 'credit risk models' has been developed to estimate the value of credit risk.<sup>48</sup>

Credit risk models attempt to answer questions such as 'Given our past experience and our assumptions about the future, what is the value of a given loan or fixed income security?' by means of econometrics, simulation, optimization, or a combination of the three.<sup>49</sup> In general, credit risk models can be classified based on the following three factors:<sup>50</sup>

- Techniques employed, such as econometric techniques, NN, optimization models, rule-based, or expert systems, and hybrid systems using direct computation, estimation and simulation.
- Domain of application in the credit process, including credit approval, credit rating determination, credit pricing, financial early warning, common credit language, collection strategies.
- Products to which they are applied, which comprise large corporate commercial and industrial loans, commercial real estate loans, small business loans, residential first mortgages, home equity and consumer loans, loans to financial institutions, and loans to sovereign government.

Table 3.5 shows a summary of the most famous credit risk models thus far developed around the world.

48. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), p. 128. For some contributions on this topic, see Hillier, F.S. & Lieberman, G.J., *Introduction to Operations Research* (San Francisco: Holden-Day, Inc., 1973); Mallios, W., *Statistical Modeling: Applications in Contemporary Issues* (Ames, Iowa: Iowa State University Press, 1989); Trigeorgis, L., *Real Options: Managerial Flexibility and Strategy in Resource Allocation* (Cambridge, Mass.: MIT Press, 1996).

49. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 128-129.

50. Caouette, J.B. et al., *Managing Credit Risk: The Great Challenge for the Global Financial Markets*, 2nd edition (Hoboken, NJ: John Wiley & Sons, 2008), pp. 129-131.