Ca' Foscari
University
of Venice

Master's Degree programme

in Business Administration
"Second Cycle (D.M. 270/2004)"

Final Thesis

# Methodological criticalities in the use of APV method in valuing LBOs


**Supervisor**
Ch. Prof. Guido Massimiliano Mantovani

**Assistant supervisor**
Ch. Prof. Antonio Proto

**Graduand**
Daniele Sattin
Matriculation Number 838227


**Academic Year**
2016 / 2017

# TABLE OF CONTENTS

# 1 INTRODUCTION

There are several ways in which a firm can be acquired. In a merger, the board of directors of two different firms agree for the combination. In a tender offer, one firm offers to buy the outstanding shares of another company at a predefined price that will be communicates to shareholders, by doing so, the acquiring firm bypasses the target company management, carrying out a so called hostile takeovers. In a purchase of assets, instead, one firm acquires the assets of another, passing through a formal vote of the selling company' shareholders. Finally, there is a fourth category that does not fit to anyone of those mentioned above. Here, the target firm is acquired by an investor/or a group of investors or more frequently by its own management, usually with a tender offer, with the aim to delist the company and make it a private business. This particular acquisition is called leveraged buyout, if the funds for the tender offers come mostly from debt capital. More technically, an LBO is a financial technique utilized by Private Equity (PE) firms to acquire a public or private company, known as target company, where debt instruments generally account for 50-80% of the purchase price. This enormous amount of debt, that will be pay down using the cash flow generated by the target company, is used to benefit the tax deductibility of interests related to debt. Indeed, as recognized by Modigliani & Miller this deductibility of interests acts as a shield over operating profit that are destined to tax payment. In this way, the Free Cash Flow from Operation (FCFO) are enlarged and consequently also the enterprise value increase. Therefore, the maximization of the tax shield is the core rationale behind almost any LBO transaction. Because, in a highly-leveraged firm a relatively small increase in the firm value can lead to a substantial increase in the value of its equity; allowing the buyers to realize a considerable capital

gain, when reselling the company. But on the other hand, leverage is not an unmixed blessing, indeed, a high leveraged capital structure also means a higher risk, since a relatively small decline in enterprise value could severely impact the value of the equity investment and moreover, high interest charges increase the probability of default of the company. For these reasons, the thesis analyzes the Adjusted Present Value (APV), as was proposed by Myers, and all the criticalities related to this method, in order to define the methodology that best suit the valuation of a leveraged buyout transaction. The APV method, although in its initial formulation by Myers was a static model, is particularly suitable for the valuation of an LBO because it explicitly takes into account the effects of the capital structure of this particular transaction. It allows, in fact, to determine explicitly the effects of the debt on the value of the company, since the levered value of the company is determined starting from its unlevered value and then adding the benefits and costs deriving debt.

The aim of this work, therefore, is to investigate the phenomenon of leveraged buyouts and the possible methodological criticalities that can be encountered by a practitioner in evaluating this type of transaction with the adjusted present value (APV) method, in order to outline a model that attempts to overcome these issues and that is suitable to the nature of this transaction. To do this, it was decided to divide the document into four main parts. In the first part it has been tried, starting from the analysis of the existing literature, to give a definition of the phenomenon, to outline the historical trends and to provide a comprehensive description of the actors and of the financial instruments usually involved when designing an LBO transaction. In the second part, on the other hand, starting from Modigliani & Miller's insights, according to which companies can take advantage of debt,

since they can deduct interest payments from taxes, the adjusted present value is presented as a valuation methodology for an LBO transaction. The third part describes the methodological criticalities deriving from the use of the APV in the valuation of a highly leveraged transaction. In particular, on one hand, the possible assumptions regarding the financial policy, which can be adopted assessing the debt profile, both during and beyond the plan horizon, and the relative discount rates of the tax shield, are analyzed. While, on the other hand, it has been tried to quantify the magnitude of the cost of financial distress by the review of the existing literature. Finally, in the last section, by virtue of the considerations made in the previous chapters, a valuation model, following the guidelines of the Myers' APV, has been proposed.

# 2 LEVERAGED BUYOUT

## 2.1 DEFINITIONS

The same term used to identify this financial technique (leveraged buyout) tells what are the main structural features of this operation. On one hand, leveraged means that the transaction is built with capital provided by third parties, such as debt capital and not equity capital, and on the other hand it would emphasized the high level of the debt to equity ratio that will result after the acquisition. Buyout, instead, means the full or en bloc acquisition of the target company's shares or asset, making it, usually, private.

In this section, it will be seen some definitions founded in existing literature, starting with a definition by Pignataro, to clarify, from the beginning and in a simple way, what a Leveraged Buyout is about.

"A leveraged buyout is an acquisition of a company using a significant amount of debt to meet the cost of the acquisition. This allows for the acquisition of a business with less equity (out-of-pocket) capital. Think of a mortgage on a house. If you take out a mortgage to fund the purchase of a house, you can buy a larger house with less out-of-pocket cash (your down payment). Over time, your income will be used to make the required principal (and interest) mortgage payments; as you pay down those principal payments, and as the debt balance reduces, your equity in the house increases. Effectively, the debt is being converted to equity. And maybe you can sell the house for a profit and receive a return. This concept, on the surface, is similar to a leverage buyout. Although we use a significant amount of borrowed money to buy a business in an LBO, the cash flows produced by the business will hopefully, over time, pay down the debt.

Debt will convert to equity, and we can hope to sell the business for a profit.” (Pignataro, 2014).

Then moving to more technical definitions:

“A leveraged buyout (LBO) is the acquisition of a company, division, business, or collection of assets (“target”) using debt to finance a large portion of the purchase price. The remaining portion of the purchase price is funded with an equity contribution by a financial sponsor (sponsor)”. (Rosenbaum, Pearl, & Perella, 2009).

Another interesting definition is given by Baldi, in which he focuses more on how this debt is repaid to lenders.

“The leveraged buy-out (LBO) is a financial technique consisting in the acquisition of the majority stake of a firm by a buyer (private investor, institutional investor or merchant bank), that is mostly financed by debt to be paid back by using the financial resources produced by the firm itself in terms of operating cash flows or divestments of non-strategic activities, as well as through assets and shares as side guarantee to borrow the capital.” (Baldi, 2015)

In synthesis, an LBO is, the acquisition of a public or private company with a significant amount of borrowed funds by a private equity firm, or group of sponsors, that acquire a company using debt instruments as the majority of the purchase price. In the first period after the purchase of the company, the debt/equity ratio results usually greater than 1.0x, indeed debt instruments generally account for 50-80% of the purchase price, while equity comprise the remaining 20% to 50%. During the period where the private equity firm or firms maintain the ownership of the company, the cash flow of the target company is used to pay down the outstanding debt. Generally, the overall return

realized by the investors in this kind of transaction is determined by the exit multiple at which they are able to resell the company, through an IPO or a simple take-over. Sponsors have historically sought a 20%+ annualized return and an investment exit within five years (Rosenbaum, Pearl, & Perella, 2009). In general terms companies of all sizes and industries can be targets of leveraged buyout transactions, although certain types of businesses, as it will be discussed later, make preferable LBO targets than others.

## 2.2 HISTORY OF LBOS

### 2.2.1 The beginning and the first wave

The first acquisitions through the LBO method, at the time known as "bootstrap" acquisition, can be approximately dated at the beginning of the '60s in the United States. In the years after the end of World War II the Great Depression was still relatively fresh in the minds of US' managers, who considered it wise to keep debt ratios low. As a result, for the first three decades following World War II, very few American companies relied on debt as a significant source of funding

In this context, the first deals concerned small-sized companies with a turnover that rarely exceeded twenty million dollars and with very low risk margins, were financed by financial institutions whom were more interested in collaterals offered by the acquiring company (the so-called secured financing)[1], than to the cash flows of the target

[1] Secured financing is debt backed or secured by collateral to reduce the risk associated with lending, such as a mortgage. If the borrower defaults on repayment, the bank seizes the house, sells it and uses the proceeds to pay back the debt. Assets backing debt or a

company, moreover they usually didn't take any shareholding in the capital of the acquiring company (Morano, 1989).

However, there were many changes at the beginning of the '70s: another type of leveraged buy-out operations began to spread and affirm in the US, in which now the collaterals of the bank loan are no more the existing assets of the target company. From that point onwards the loans were granted essentially on the basis of the prospects of the future cash flows of the target company (the so called unsecured financing) [2] and some lenders began to take direct participations in the equity capital of the acquirer. The success of the first low-risk transactions persuaded financial traders to use this form of investment with ever greater risk margins aiming, obviously, to reach grater earnings (Morano, 1989). In the '70s in the United States, these operations involved only few private investors who bought the shares of a public company to transform it into a private corporation by concentrating the shares in the hands of a limited number of people (going private). The acquirer, through a bid takeover, hostile or friendly, acquired shares of publicly traded company with the aim of subtracting the securities to the market by concentrating them in the hands of one or few. Thus, placing the buyer away from the risks of taking over or allowing him to resell the company, gaining a capital gain (Fava & Fuschino, 2003).

---

debt instrument are considered security, which is why unsecured debt is considered a riskier investment. (www.investopedia.com)

[2] Unsecured financing is a loan that is issued and supported only by the borrower's creditworthiness, rather than by any type of collateral. An unsecured loan is one that is obtained without the use of property as collateral for the loan, and it is also called a signature loan or a personal loan. Borrowers generally must have high credit ratings to be approved for certain unsecured loans. (www.investopedia.com)

Over the years, the leveraged buyout became a tool for achieving high profits, concentrated in a few subjects, that however generate significant collective costs: an increase in the public deficit caused by the tax savings generated by the operation, a no significant increase in production capacity or efficiency, a loss or lack of reintegration of a significant number of jobs, a decline in investment projects and consequent slowdown in long-term growth of businesses. Despite these collective costs the LBO tool was established in the American economic context during the 1970s, mainly thanks to the transition from the so-called "conglomeration" to the "deconglomeration" phase. In other words, many American industrial and financial companies began to split large conglomerates and holdings and sell unprofitable or non-strategic production units over their core business. This led to an increase in the number of companies offered for sale and the consequent need to find new acquisition financial instruments capable of attracting all potential buyers. These, mostly, were hostile takeover financed largely by debt capital in order to achieve merely financial speculation and therefore to achieve in the medium term a gain that was a positive difference between the price paid for the purchase of the blocked company and the sales value of the individual branches or assets of the company itself. After the acquisition, indeed, the target company was dismantled and individual components were resold, paying very high commissions and parcels to legal and tax consultants. High availability of liquidity, the inflation, the level and dynamics of interest rates, the stock market trends and other macroeconomic factors favored the growth of such financial tool. The high inflation rate had a positive impact on the development of the deals in question as the banks, following the Federal Reserve Board's credit restriction measures, were forced to seek more profitable investment alternatives with the aim of maximizing the amount of

commissions. Furthermore, the continuous diffusion of the technique was favored by the acceptance, of this innovative tool, in banking environments: commercial banks and other financial institutions began to participate and to deal with the realization and structuring of these operations. The legitimation of the possibility of buying a company using debt capital and therefore using leverage meant that a change in the psychological attitude of the American financial environment had happened (Morano, 1989).

It was in this environment that the modern LBO was born. Indeed, the concept of a leveraged buyout became a well-known phenomenon in Wall Street in 1978, when a newly formed little-known investment firm Kohlberg Kravis & Roberts (KKR) acquired Houdaille Industries, a distressed industrial pumps maker with $380 million using only $12 million of its own money. The extraordinary small share of equity enabled KKR to reach stratospheric returns if the buyout succeeded while much of the downside risk was carried by lenders. Following the transaction, numerous new private equity firms emerged and opted to pursue magnified returns with similar LBO methods. Private equity firms succeeded in raising vast amounts of capital from institutional investors who were attracted by the superior returns LBOs could offer. The dramatic surge of leverage buyout activity was supported by the raise of junk bond[3] financing. This resulted in the private equity industry's first boom cycle, enduring from 1982 to an eventual bust in 1993 when the junk bond market shut down. The boom culminated in 1988 to the $25 billion buyout of RJR Nabisco. (Carey & Morris, 2012).

[3] A junk bond refers to high-yield or noninvestment-grade bonds. Junk bonds are fixed-income instruments that carry a credit rating of BB or lower by Standard & Poor's, or Ba or below by Moody's Investors Service. Junk bonds are so called because of their higher default risk in relation to investment-grade bonds. (www.investopedia.com)

This emergence of high-yield bond financing[4] opened the door for smaller investors, known as leveraged-buyout (LBO) firms, in the wake of KKR, to take a leading role in the hostile-takeover game (T. Koller, 2015). The early successes of the LBO technique attracted the interest of other investors, commercial bankers, and investment bankers. In particular, from a manager's perspective, this kind of operation had a number of appealing characteristics: first, tax advantages associated with debt financing, second, freedom from the scrutiny of being a public company or a captive division of a larger parent, third, the ability for founders to take advantage of a liquidity event without ceding operational influence or sacrificing continued day-to-day involvement, and finally the opportunity for managers to become owners of a significant percentage of a firm's equity (Olsen, 2002). Thus, every year, more and more LBO firms were founded, investment bankers harry to identify opportunities, and lenders saw increasing opportunities to earn lucrative fees. All this fervor brought between 1981 and 1989, the period known as the first LBO wave, to an exponentially growth from an average of $ 7 billion in 1970 to an average of $ 59 billion in 1985 and to an average of $ 146 billion in 1988. Leveraged buyout deal-making increased significantly in the 80s, from 16 transactions in 199 for an aggregate value of $ 635 million to 47 transactions in 1987 for a total value of $ 22 billion (Baldi, The Economics of Leveraged Buyouts, 2015).

[4] A high-yield bond is a high paying bond with a lower credit rating than investment-grade corporate bonds, Treasury bonds and municipal bonds. Because of the higher risk of default, these bonds pay a higher yield than investment grade bonds. Issuers of high-yield debt tend to be startup companies or capital-intensive firms with high debt ratios. (www.investopedia.com)

In Europe, instead, only during the 1980s, a process of industrial and financial restructuring began, with increasing borrowing, involving several large listed companies on the stock exchange. This encouraged the introduction of leveraged buyout and management buyout techniques, without however reaching US speculative excesses. Privatizations, mergers and acquisitions involved large, publicly-traded companies and many transactions based on widespread leverage (Edward I & Smith, 1993). From the second half of the 1980s, acquisitions of enterprises through high leverage increased due to a favorable economic cycle with high growth rates and low interest rates (Gallea, 1993). This change in the industrial organization, begun around 1985 and grew significantly with an increase in transaction volume until 1989. This was the period where the maximum development of leveraged buyout transactions was recorded and represented a first step towards the most general tendency to rely on debt rather than equity capital (Morano, 1989). In Europe, the first applications of this technique were registered in Great Britain, and later, thanks to the approval of corporate and fiscal laws, also in other European countries such as France, Holland, Sweden, Germany, Italy and Spain. Most of these operations had their hub in Great Britain, where there was free access to the market and where the largest number of listed companies were located. The buy-outs were permitted in English territory following the reforms of the Companies Act of 1981 and 1985 which improved the situation created by the rigid prohibition enshrined in Section 54 of the Companies Act of 1948, which prohibited the use of the assets of the target Company as a means of financing the acquisition. After the boom of the 1980s, this financial technique began its descending parabola when the market began to highlight the impossibility of paying interest rates promised to investors.

In synthesis, it can be said that the first LBOs boom period was, for the most part, a U.S. and U.K. phenomenon. Indeed, from 1985-89, transactions conducted in these countries accounted for 89% of global buyouts and 93% of global transaction value, and almost 50% of the value of all LBOs could be traced back to relatively large public-to-private transactions in mature industries, such as manufacturing and retail. This contributed to the general perception that LBOs equal going-private transactions of large firms in mature industries (Kaplan & Strömberg, 2008).

### 2.2.2 The ‘90s: a second lighter wave

During the first half of the 1990s, the number of operations substantially decreased due to a variety of factors such as the economic crisis, rising interest rates and the shutdown of the junk bond market, which had multiplied debt levels in LBOs, but not respected the repayment plans. These factors marked the end of the first LBO boom. Moreover, European M&A activities have been negatively affected by the American and British recessions of 1990-91 and the changed market conditions. But, after all the combined reduction of these activities in Great Britain and Western Europe was, however, considerably lower than the one of the United States, mainly due to the level of activity in continental Europe in ‘90s. During those years, indeed, the development of European M&A operations and of the first leveraged buyout experiences in European territory occurred. Most of these transactions were smaller and with less debt than the American ones that for the first time occurred in the Sixties. Towards the end of the 1990s, both in the United States and Europe, particularly in Britain, there was a significant increase in leveraged buyout and management buyout activities. For these, we talk about friendly European transactions, where the target company's

management sought funding for its acquisition from its owners without being hindered by the old property. Management buyout (MBO) operations mainly resulted from the sale of family-run companies which were the main source of MBO operations in Germany (55% of all operations), Italy (48%) and France (45%.) (Edward I & Smith, 1993).

In the US, however, while the public-to-private buyouts practically disappeared, a new LBOs wave was about to begin already in 1992. With private equity firms that continued to purchase companies and divisions of them, but now spread to new industries such as ICT, financial services and healthcare, while manufacturing and retail firms no longer resembled the most dominant buyout targets. Even though the aggregate transaction value fell, the amount of deals undertaken doubled in 1990–94 compared to 1985–89. The second buyout boom ultimately culminated in the Dot-com bubble in 1999 and 2000, and along with its burst, the LBO market again crashed (Kaplan & Strömberg, Leveraged Buyouts and Private Equity, 2008).

### 2.2.3 A third wave before the credit crunch

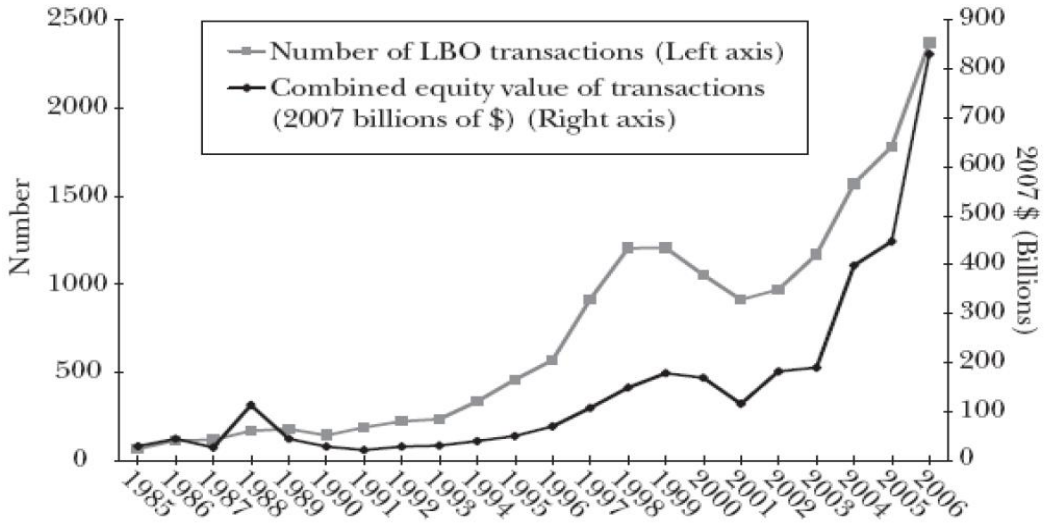


*Figure 1 Global private equity transaction volume between 1985 and 2006. Source: (Kaplan & Strömberg, 2008)*

A third peak was reached in mid 2000s, totaling the amazing amount of $ 535 billion, almost 10 times more than the dormant period between the end of the ‘90s and the beginning of the new millennial. Such a new peak in LBO operations was favored by credit markets, that were overflowing with liquidity, giving space to hedge funds as important financiers for leveraged buyouts; and it was characterized by another financial instrument, after the rise of junk bonds in the ‘80s, the Collacterized Loan Obbligations (CLOs)[5]. Thus, public-to-private transactions started to reappear record amounts of capital were committed to private equity, both in nominal terms and as a fraction of the overall stock market. (Kaplan & Strömberg, Leveraged Buyouts and Private Equity, 2008). This third wave has its pick in February 2007, just before the beginning of the credit crunch, with KKR, Goldman Sachs and other investors acquired Energy Future Holdings for $45 billion, making it the largest LBO in history. However, in late 2007 with the beginning of the credit crunch, due to the collapse of the sub-prime market in June of 2007, LBO activity dramatically decreased because of the mutated market conditions (Figure 2). Indeed, the subprime-market was the fuel of that unprecedented

[5] “Instruments belonging to the Collateralized Debt Obligation (CDO) category are debt instruments issued on a portfolio of heterogeneous assets: bonds, debt instruments, securities in general. CDOs can in turn be classified into different business groups that differ per type of securities in the underlying pool (Collateralized Bond Obligation underlying a bond portfolio or the CMO Collateralized Mortgage Obligation underlying a pool of loans / mortgages). The instruments included in the portfolio differ for the degree of risk and quality of the issuer; of course, the more the underlying portfolio consists of low credit rating instruments, the higher the interest rate associated with CDOs. CDOs are usually issued following a securitization transaction involving the sale of a pool of securities / instruments by an intermediary (said Sponsor) to a special purpose vehicle (SPV).\ The latter, in the face of buying the pool, is funded by issuing CDO. Normally, the SVP issues several CDO tranches characterized by a different degree of risk and a different priority in repayments: the "senior tranche" is the one that is redeemed (capital and interest) for the first time, the "junior tranche" (also called mezzanine) is redeemed with a secondary priority, while the "subordinated tranche" (also called equity tranche) is redeemed last.” (www.investopedia.com)

supply of leverage throughout the whole global financial system (Acharya, Franks, & Servaes, 2007).

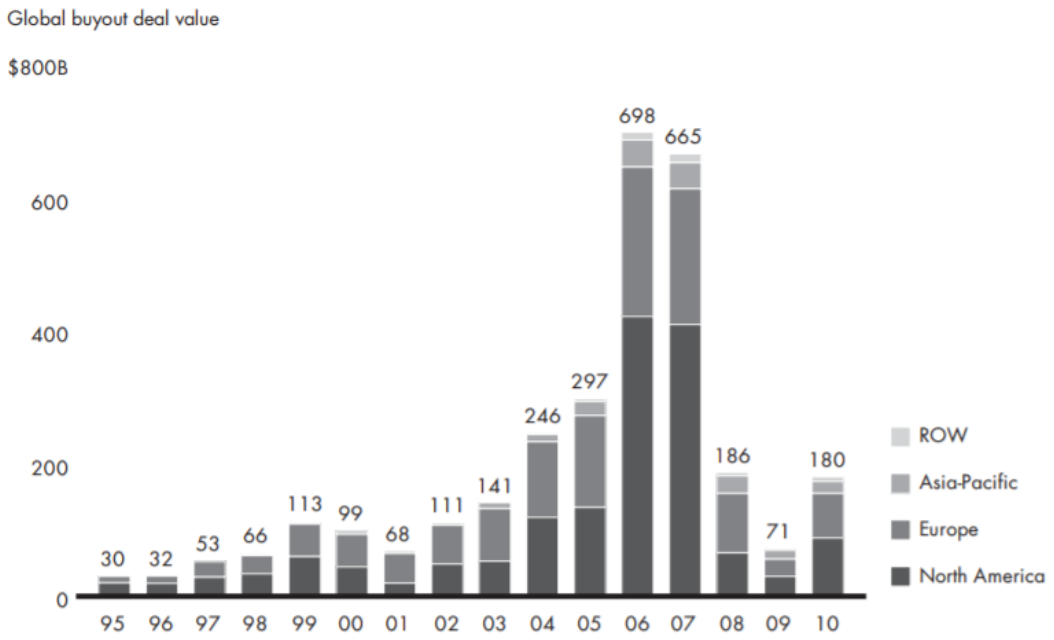


*Figure 2 Global buyout deal activity between 1995-2010. Source: (Bain & Company, 2011)*

### 2.2.4 The recovery

After the crisis of 2008, private equity has become a global phenomenon, heaving reached either the entire Europe either Asia and Australia. In 2013, even if still lower than the peak of the first half of 2007, the total transaction value of private equity-backed LBOs amounted to $700 billion (Pitchbook, 2014). In 2013, indeed, the economic environment started to change again, the market was now characterized by near zero interest rates, yield-hungry investors and banks eager to lend. Therefore, 2013 was a record year for fundraising since the global financial crisis, $356 billion of new fund capital earmarked for buyouts (Bain & Company, 2014). This trend has strengthened also in recent years, driven by economic recovery both in the U.S. and Euro area, reaching its peak in 2014 and then stabilizing during the last two years 2015-16. As regards the last year

available, despite a slew of disruptive events that created volatile markets early in 2016 (Brexit and US elections), the buyout sector, and more broadly private equity (PE) industry, posted solid results for the year, consolidating the trend of recent years. As it can be seen in Figure 3, even if slightly lower than 2015, Global buyout deal value was in line with other recent years.

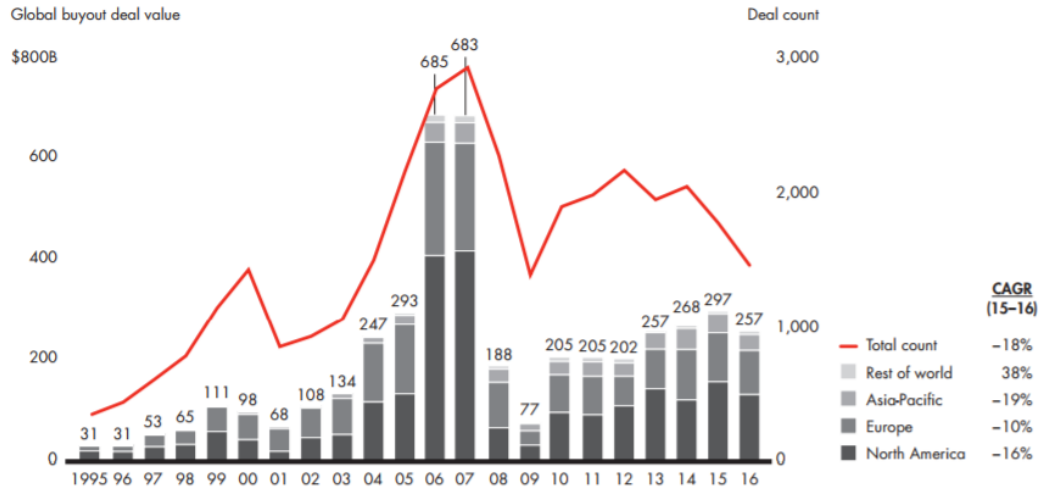


*Figure 3 Global buyout value in 2016. Source: (Bain & Company, 2017)*

In line with the buyout deal value trend, also the capital raised by Global PE increased over the past several years. PE firms globally raised $589 billion in capital, just 2% less than in 2015 (see Figure 4). With more than $500 billion raised each year since 2013, it has been an excellent period. In particular, buyout funds had an even better year showing the best results since the financial crisis (+20% compared to 2015).

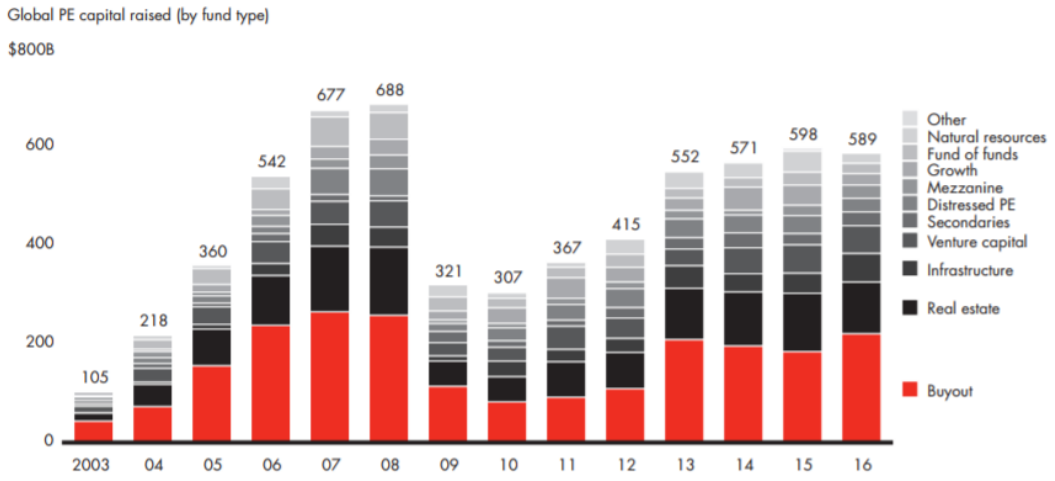


*Figure 4 Global PE capital raised. Source: (Bain & Company, 2017)*

The results of the latest years are, of course, driven by the accommodating monetary policies of central banks, which have made the debt market more accessible.

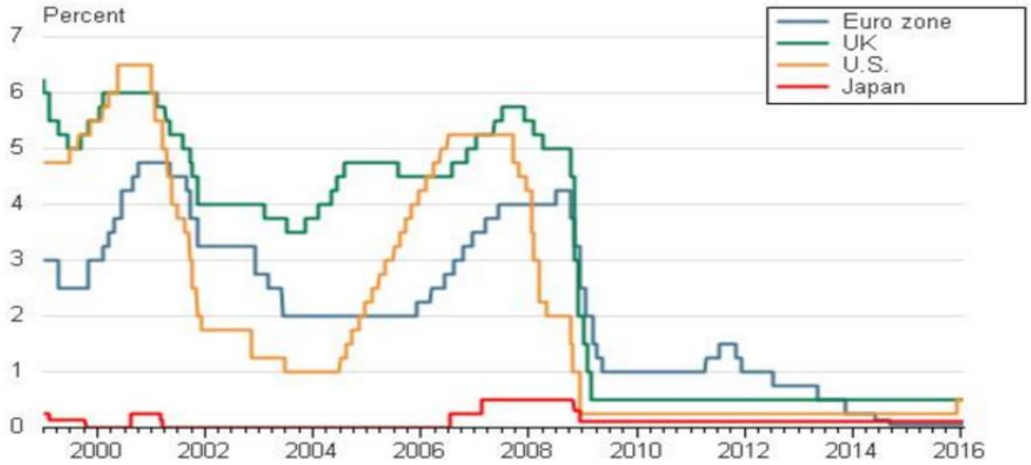


*Figure 5: Central banks interest rates. Source: Thomson Reuters Datastream*

In this macroeconomic context, LBO's activities have found their ideal setting. Consequently, as can be seen from Figure 6, also the EBITDA/debt ratio has returned almost to pre-crisis levels. Showing a positive correlation with the QE launched by central banks.

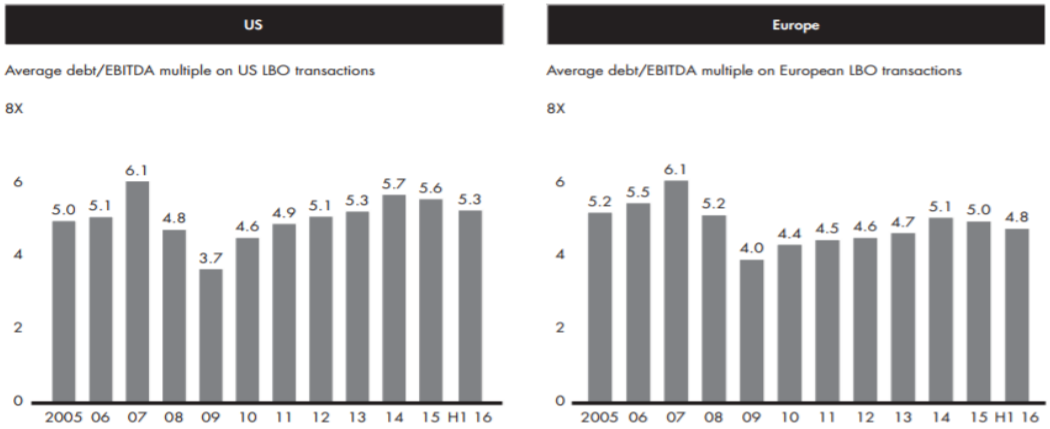


*Figura 6: Debt markets continued to be accommodating for new deals. Source: S&P Capital IQ LCD*

Moreover, with ample dry powder[6] in the wings and debt readily available, LBOs' transactions have shown acquisition multiples record or near-record highs across the US and Europe, at more than 10 times EBITDA in both regions at the start of 2016.

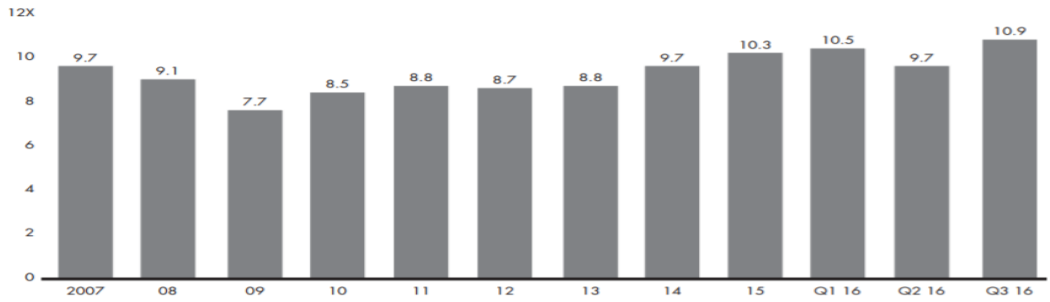


*Figure 7: Average EBITDA purchase price multiple for LBO transactions.*
*Source: S&P Capital IQ LCD*

[6] "Dry powder is a slang term referring to marketable securities that are highly liquid and considered cash-like. Dry powder can also refer to cash reserves kept on hand by a company, venture capital firm or person to cover future obligations, purchase assets or make acquisitions. Securities considered to be dry powder could be Treasuries, or other fixed income investments, and can be liquidated on short notice, in order to provide emergency funding or allow an investor to purchase assets." (Investopedia, s.d.)

According to these data, Alasdair Warren and Massimo Della Ragione (Goldman Sachs International) believe that this period has been one of the most favorable for the PE market:

*"Today, the world is flush with capital: debt and equity markets are extremely liquid, credit spreads are at all-time lows, and equity market valuations are higher than pre-crisis levels. Over the last three years, private equity firms have raised new funds in excess of $280 billion globally, an amount of capital never raised before in any three-year period in the three-decade history of private equity"* (Gatti & Chiarella, 2015).

## 2.3 MODERN LBO'S TRANSACTIONS: TRENDS IN NORD AMERICA AND EUROPE

### 2.3.1 Trends in European buyout market

Even if Europe has historically been a major market in private equity, PE activity in Europe have been weakened after the 2008 financial crisis and the subsequent economic turmoil that effected the region. In these years, PE funds and deals have left Europe whose economy suffered from the severe effects of the financial crisis. In particular, fundraising for buyout vehicles chop down due to a widespread lack of confidence for making large leveraged. Consequently, deal numbers and values have fallen considerably.

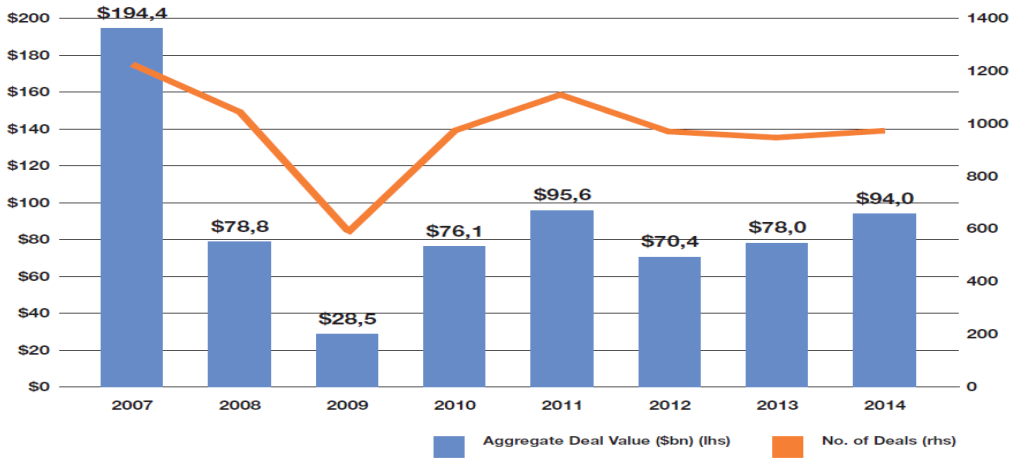


*Figure 8: buyout deal volumes (2007-2014). Source: (Probitas Partners , 2014)*

As seen in the previous section, although, worldwide the private equity sector, and in particular that of buyout activities, has recovered and has been very dynamic in recent years. This global trend is also confirmed in the European private equity market. Even if the volume of deals is still far from a full comeback compared to the levels reached in 2007, PE volume deals has grown by a CAGR of 4.2% since 2011 (PWC, 2017). According to the annual surveys carried out by EVCA[7], there were 1,200 private equity operators active on the European market in 2016. In terms of fundraising activities, in Europe, approximately 73.8 billion euros were raised in 2016, an increase of 38% compared to the previous year; at continental level, 2016 was therefore a positive year from the point of view of raising capital by private equity funds, whose level remains significantly lower than in the pre-crisis years. Capital invested in European companies in 2016 amounted to EUR 52.5 billion, remaining substantially at the same levels as in 20015. In contrast, 6000 companies were targeted for these investments, 80% of which are SMEs. As far as divestments are

[7] The European Private Equity and Venture Capital Association

concerned, however, in 2011 they totaled 38.5 billion euros in Europe in terms of value. while 15% lower than 2015, they are in line with the annual average since 2012. It should be noted that the divestment activity had reached its peak in 2006 with a countervalue of 33 billion euros; the strong recovery that characterized this activity in the last years has therefore made it possible to reach again a very high level, slightly higher than that period.

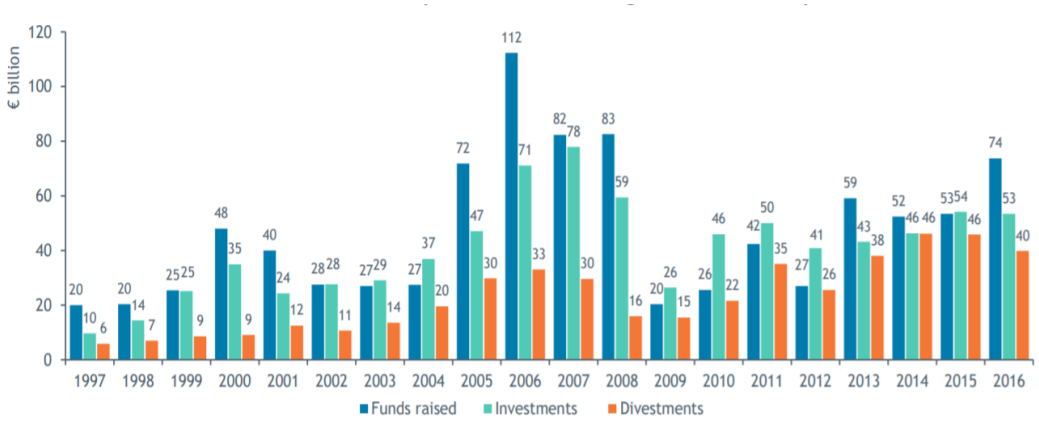


*Figure 9 European PE overview. Source: (EVCA, 2017)*

In a favorable macroeconomic landscape, where GDP is slowly return to pre-crisis level and where debt has never been cheaper and the spread between investment grade and high yield cost of funding has never been narrower (Figure 11); also buyouts, in the wake of whole PE sector, are increasing in number and volume (Figure 10).

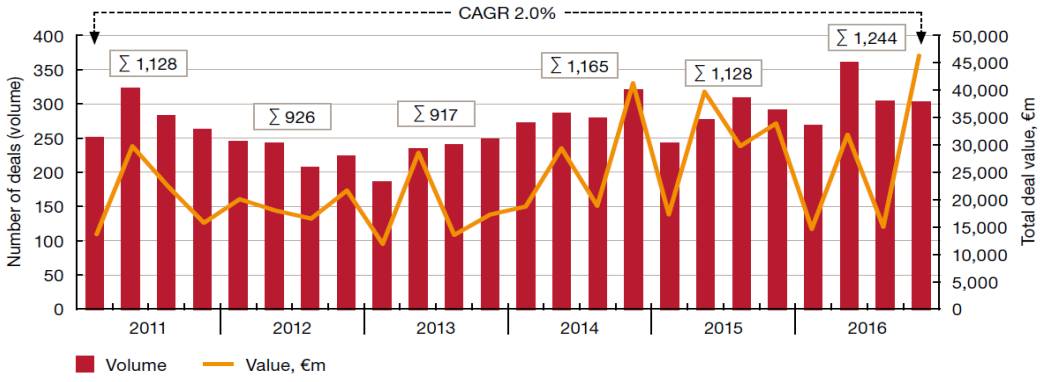


*Figure 10 European buyout trends (2011-2017). Source: (PWC, 2017)*

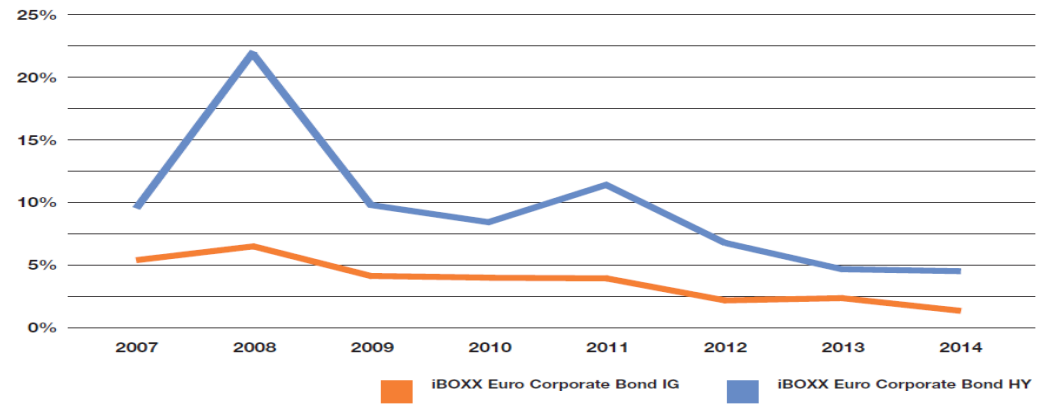


*Figura 11 European credit markets: yields on corporate bonds (2007-2014)*
*Source: (Gatti & Chiarella, 2015)*

Geographically, the composition of Europe's buyout activity remains relatively static over time, mainly due to the nature and the maturity of each market of each member state. As can be seen in Figure 12, the UK and Ireland, despite the uncertainty for the financial sector brought by Brexit, are steel dominating in terms of both value and volume. In 2015-16 the UK and Ireland accounted for 21% of buyout volume and 31% of buyout value. These two countries are followed respectively by France (19% and 10%), Germany (14% and 13%) and Nordics (13% and 11%).

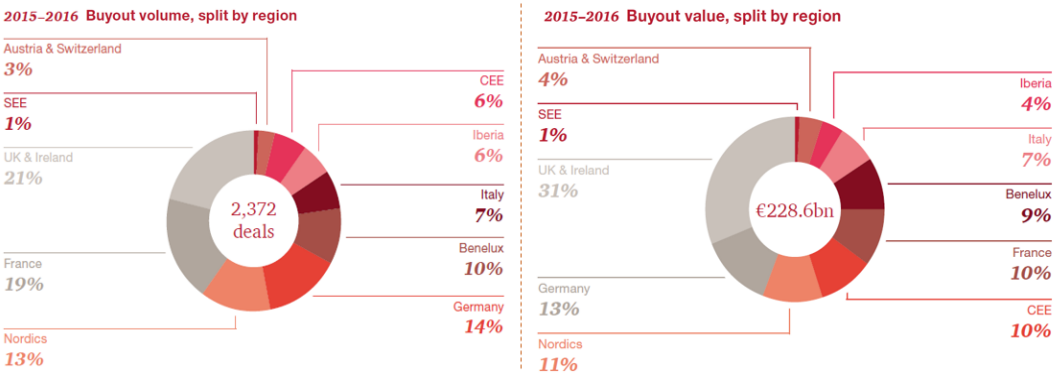


*Figure 12 Buyout volume & value by region. Source: (PWC, 2017)*

As far as the industries most affected by buyouts phenomena, it should be noted that industrial and chemicals sector continues to

account for the most buyout by both volume and value (22%-15%), followed by Consumer (15%-12%) and business services (16%-8%).

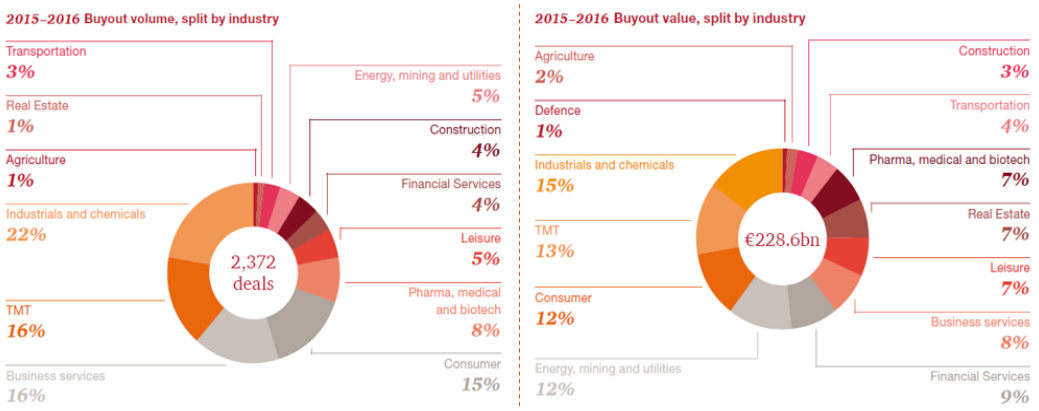


*Figure 13 Buyout volume & value by industry. Source: (PWC, 2017)*

### 2.3.2 Trends in Nord American buyout market

After having seen the figures of the European market, it will be now analyzed those of the largest PE market in the world: the U.S. market. As for the European one, after the financial crisis, also the U.S. market has shown a recovery mainly driven by the monetary policy of the Federal Reserve (FED) and the positive macroeconomic environment of the latest years. This recovery of the PE market, has been driven, in particular, by the buyout sector that has benefited most of these circumstances.

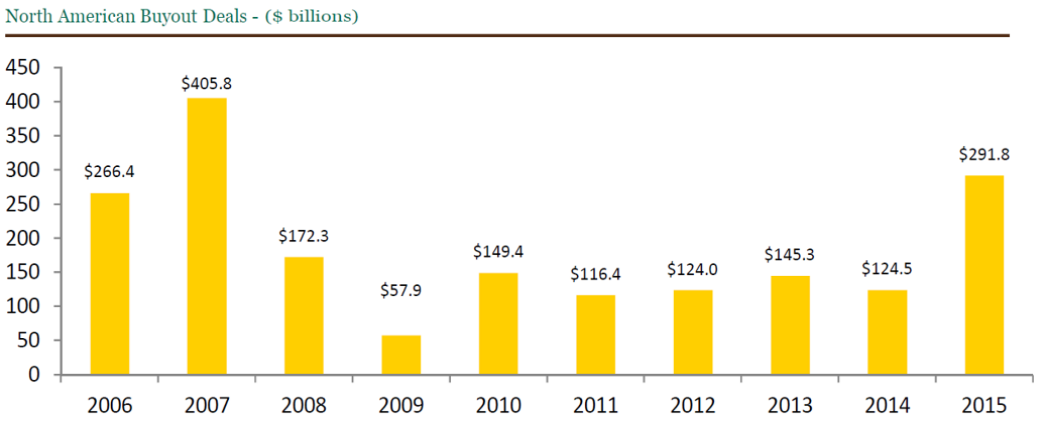


*Figure 14 North American Buyout Deals. Source: (TorreyCove Capital Partners, 2016)*

The buyout environment in 2015 was as competitive as nearly never before, primarily driven by US funds finally began to deploy their cash hoards, which totaled over $1.5 trillion at the beginning of the year (TorreyCove Capital Partners, 2016). In this context, it is no surprise that the deal value is increasing, both 2014 and 2015 saw purchase price multiples for all LBO transactions break 10.0x, a level not seen even in the bubble years of 2006 and 2007. Also leverage levels have reached remarkable levels, at 5.7x for large deals and 5.3x for the middle market. The highest levels seen in the past 15 years, excepted for 2007 (6.2x and 5.6x, respectively).

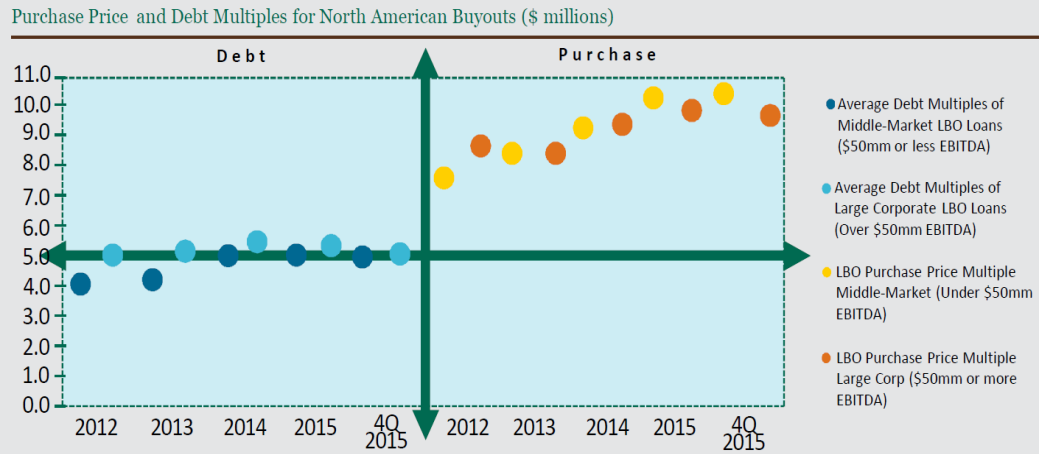


*Figure 15 Source: (TorreyCove Capital Partners, 2016)*

## 2.4 CLASSIFICATION OF LEVERAGED BUYOUT

Knowing that a Leveraged Buyout is a financial tool that allows investors to acquire shareholding or the full package, using a high leverage, and then after 3/5 years realizing a capital gain trough the resell of the company either to private investors or to the market (IPO). The LBOs can be classified in different categories depending on the parties involved in the transaction.

Basically, it is possible to distinguish the various types of leveraged buyout in various categories: (1) Leveraged Buyout in a straight sense (LBO) (2) Management Buyout (MBO); (3) Management Buy-in (MBI); (4) Management Buy-in & out (BIMBO);(5) Family Buyout (FBO);(6) Workers Buyout (WBO); (7) Corporate Buyout (CBO) and finally (8) Fiscal Buyout (FBO).

However, it must be noted that all the empirical cases have a common element constituting the translation of the cost of the acquisition on the assets of the target company

### 2.4.1 Leveraged Buyout in a straight sense (LBO)

Transactions involving institutional investors, venture capitalists (VC)[8] and private equity (PE), or other lenders entering in the target company's equity. Leveraged buyout transactions may be: "friendly" or "hostile", the qualification of the transaction as friendly or hostile depends on the attitude of the managers of the target company, who may support the operation or discourage it. (Fava & Fuschino, 2003)

### 2.4.2 Management Buyout (MBO)

A Management buyout is nothing more than an LBO originated and led by a target's existing management team. The existing managers acquire the existing firm with the help of an equity partner (sponsor), who provides capital support and access to debt financing through established investment banking relationships. The aim behind this kind of operation is that the management team believes it can create

[8] Government, semi-government, or private firm that provides startup or growth equity capital and/or loan capital to promising ventures for returns that are higher than market interest rates. **Invalid source specified.**

more value running the company on its own. The MBO structure also serves to eliminate the conflict between management and the board of directors/shareholders as owner-managers are able to run the company as they see fit. (Rosenbaum, Pearl, & Perella, 2009). Moreover, the motivation and preparation of managers increase the probability of success of the acquisition and convince the lenders to make the necessary funds.

### 2.4.3 Management Buy-in (MBI)

The acquirer, always with the help of a sponsor, in this hypothesis of LBO is a group of managers outside the target firm, but with the skills that are consistent with the company's business needs.

### 2.4.4 Management Buy-in & out (BIMBO)

If there are simultaneous presence of managers from outside and inside the target company.

### 2.4.5 Family Buyout (FBO)

Family buyout are the "familiar" variant of management buyouts. This tool is use for acquiring companies, especially medium-sized companies, using banking leverage. In the specific case of a family buyout, a family member who intends to buy shares of other family members, but does not have the necessary financial capacity, uses a bank loan, guaranteed by the consistency of the family's property, the target company. The family member who intends to take control of the family company creates a new company, so-called "newco", which obtains the banking loan that will be used to purchase the shareholdings of the other family members in the "target." Family buy-out is a very widespread operation in Italy, due to the strong presence of small and medium-sized family businesses, a not-

so-weighted stock market, few listed companies, an underdeveloped financial system largely based only on the banking system, and a poor participation in corporate capital from investors external to the family.

### 2.4.6 Workers Buyout (WBO)

A Workers buyout (WBO) occurs when the purchase of the target company is promoted directly by its employees, who take over and assume an entrepreneurial role. Such transactions are commonplace in the US, where in order to promote the active participation of workers in the ownership and management of the firms, the legislator has granted a number of tax incentives to promote the implementation thereof (Baldi, The Economics of Leveraged Buyouts, 2015).

### 2.4.7 Corporate Buyout (CBO)

Corporate buy out (CBO) is a financial technique that can be used within corporate groups to rearrange the existing asset or to rationalize the group structure by reducing the number of subsidiaries companies. Generally, it happens by eliminating those subsidiaries who have achieved their goals or who have found difficulties in achieving them. The transaction is carried out by merging two or more subsidiaries, thus rearranging group's assets.

### 2.4.8 Fiscal Buyout (FBO)

The fiscal buy out is a transaction that take place with an exclusive aim: to get a tax saving, creating a tax shield for the buyer by reducing the incidence of direct taxes on its taxable income. This operation is characterized in that the same people who are existing shareholders of the target firm count, in whole or in part, among the shareholders of the acquiring firm, while retaining a significant majority stake in the former with the same reciprocal proportion. Doing that from a

substantial point of view, the operation does not give rise to any real transfer of ownership, but find justification only in fiscal rather than economic motivations (Baldi, The Economics of Leveraged Buyouts, 2015).

## 2.5 RATIONALE

While every leveraged buyout transaction is unique with respect to the actors involved, as it has seen in the previous chapter, and to its specific capital structure, all LBOs have always one common element that is the use of a high amount of debt, and, consequently, a relatively low amount of equity capital to complete the acquisition of a target company. This financial ploy is used to exploit a capital market inefficiency: the presence of taxation. According to Modigliani and Miller[9]'s intuition if there was not taxation in the economy the choice of a given financial structure for a firm would have an indifference effect on its value. But, given that in real world taxes exist and contribute to the market imperfection, they play a specific and fundamental role in the capital structure' strategy of a firm. Taxes, indeed, in most of developed countries' fiscal legislations make interests related to debt act as a shield (Tax Shield)[10] over operating profit (EBIT) that are destined to tax payment. Doing so, the deductibility, for fiscal purpose, of financial interests enlarge the Free

[9] See more at: F. Modigliani and Merton H. Miller; "The Cost of Capital, Corporation Finance and the Theory of Investment"; The American Economic Review Vol. 48, No. 3 (Jun., 1958), pp. 261-297. (Modigliani & Miller, The Cost of Capital, Corporation Finance and the Theory of Investment, 1958)

[10] A tax shield is the present value of future tax savings attributed to the tax deductibility of a particular expense in a company's P&L. Usually the term in used in connection to interest on corporate debt ("tax shield of debt"). Interest expense is, as opposed to dividends and capital gains, tax deductible, therefore the tax shield (being a benefit of debt financing over equity financing) is an important factor influencing the company's capital structure choice.

Cash Flows from Operations (FCFO), saving some of them from being destined to debt holder while destining them to increase the firm value. Therefore, increased tax shield is almost always the core reason for adopting an LBO scheme. Such an inefficiency, in the capital market, produces a misalignment in the risk perception between debt and equity market. Thus, bondholders are willing to assign less riskiness to a firm when is levered than equity investors do to the same firm if completely unlevered. Moreover, the cost of debt is generally lower than the equity one, with the result that increasing a company's gearing should reduce its cost of capital. In other words, given the effect of taxes, debt is cheaper than equity. Therefore, in a highly-leveraged company, that in this case is the target company after the takeover, a relatively small increase in the company's enterprise value can lead to a substantial increase in the value of its equity; permitting to buyers to realize a capital gain trough the resell of the company. But on the other hand, of course, the leveraging effect also means that high gearing increases equity investor's risk, since a relatively small decline in enterprise value could severely impact the value of the equity investment and moreover, high interest charges increase the risk of default[11] of the company.

Moreover, according to (Jensen & Meckling, Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, 1976), high level of debt appears to be a discipline on management, since a

[11] "When an investor lends to an individual or a firm, there is the possibility that the borrower may default on interest and principal payments on the borrowing. This possibility of default is called the default risk. (…) The default risk of a firm is a function of its capacity to generate cash flows from operations and its financial obligations—including interest and principal payments.13 It is also a function of the how liquid a firm's assets are as firms with more liquid assets should have an easier time liquidating them, in a crisis, to meet debt obligations." (Damodaran, 2015)

company's cash flow is usually quite tight due to the necessary pay-down of interests and debt. Therefore, management should focus on cutting down costs and controlling capital expenditure. For this reason, lot of LBOs are structured in a way that managers have substantial incentives to increase the value of the business. In these operations, management will subscribe for a small proportion of the equity. A 'ratchet', therefore, will often be put into place which will give management an increased share of the company's equity in circumstances where the returns accruing to shareholders are greater than a pre-determined level. Whilst the ratchet allows management to benefit disproportionately compared with other equity investors, other investors usually recognize the additional value for them. (Deutsche Bank, 2008)

Furthermore, LBOs might have a strategic-industrial or financial-speculative rationale.

As about the strategic-industrial rationale, the acquiring company looks at the industrial features of the deal and relies on her capacity of improving the static and the dynamic efficiency of the core-business management, namely the technical way of performing production operations and the capability of adapting to changing external conditions such as market conditions, in order to enhance the target firm's profitability (Baldi, Valuing a Leveraged Buyout: Expansion of the Adjusted Present Value by Means of Real Options Analysis, 2005). Additionally, to the growth of operating profits, it is needed a reduction in fixed capital, running a non-core assets divestment [12]

[12] Process also known as Asset Stripping, such as the activity in which a company buys an unsuccessful company cheaply and sells its assets separately at a profit

and/or a lease-back[13] process, with the aim to increase the ROI of the target firm. Such a process is implemented to favor value creation for shareholders, such as the acquirers. Indeed, in order to pay-back interests related to the great amount of debt contracted, extra Free Cash Flows from Operations must be generated, and this is possible only if the difference between the ROI and the cost of debt results positive.

A leveraged buyout can be structured also with merely a financial-speculative purpose, taking advantage from another capital market inefficiency. Such an imperfection consists in a market myopia that leads to valuing the single parts of a conglomerate at prices whose sum is greater than the value of the whole firm. An acquisition premium can be easily gained, if the control of a diversified group is acquired by resorting to a leveraged buy-out's technique and the debt is repaid through a process of divesting single business units. (Baldi, 2005)

## 2.6 KEY PARTICIPANTS

This section provides an overview on key participants in a typical LBO transaction.

[13] A leaseback is an arrangement where the seller of an asset leases back the same asset from the purchaser. In a leaseback arrangement, the specifics of the arrangement are made immediately after the sale of the asset, with the amount of the payments and the time period specified. Essentially, the seller of the asset becomes the lessee and the purchaser becomes the lessor in this arrangement. (www.investopedia.com)

### 2.6.1 Financial Sponsors

When we spoke about “financial sponsor” we refer to traditional private equity (PE) firms, merchant banking divisions of investment banks, hedge funds, venture capital funds (VC), and special purpose acquisition companies (SPACs). These raise most of their investment capital from third-party investors, including public and corporate pension funds, insurance companies, endowments and foundations, sovereign wealth funds, and wealthy individuals. The rest may be constituted, in particular investment opportunities, by sponsor partners and investment professionals’ own money. Sponsors vary greatly in terms of fund size, focus, and investment strategy, but independently from them they simply look at a broad spectrum of opportunities across multiple industries with the aim of gain as much as possible. In evaluating the feasibility of an investment opportunity, the sponsor usually performs a detailed due diligence[14] on the target firm. The due diligence serves to develop a financial model and support purchase price assumptions. In this process sponsors usually hire accountants, consultants, and industry and other functional experts to assist them in the process

### 2.6.2 Investment Banks

Another key role is played by investment banks, whether as a strategic advisor or as provider of financing. About their role as a strategic advisor, investment banks play a double role, indeed, they are engaged as buy-side M&A advisor, for their expertise, relationships,

[14] “Due diligence is the process of learning as much as possible about all aspects of the target (e.g., business, sector, financial, accounting, tax, legal, regulatory, and environmental) to discover, confirm, or discredit information critical to the sponsor’s investment thesis” (Rosenbaum, Pearl, & Perella, 2009)

and in-house resources and/or in return for sourcing deals; and as sell-side advisor when the sponsor decide to sell company in order to make a profit from the entire operation. In this case investment banks are typically engaged to market the target company to prospective buyers through an organized sale process. Generally, investment banks act thorough due diligence on LBO targets and go through an extensive internal credit process in order to validate the target's business plan, and hence its ability to service a highly-leveraged capital structure (Rosenbaum, Pearl, & Perella, 2009). The sponsor and the investment bank now work together to determine the appropriate financing structure that best fit that particular transaction.[15] Once the preferred financial structure is set, this is presented, by deal team, to the bank's internal credit committee(s) for final approval. After this step, investment banks are able to provide a financing commitment[16] to support the sponsor's bid. This letter of commitment includes the proposed terms and conditions[17] under which funds, for the debt portion of the transaction, are offered. Each investment bank involved in the transaction, for as regards the bank debt, expects to hold a certain dollar amount of the revolving credit

[15] Alternatively, the banks may be asked to commit to a financing structure already developed by the sponsor.

[16] "The financing commitment includes: a commitment letter for the bank debt and a bridge facility (to be provided by the lender in lieu of a bond financing if the capital markets are not available at the time the acquisition is consummated); an engagement letter, in which the sponsor engages the investment banks to underwrite the bonds on behalf of the issuer; and a fee letter, which sets forth the various fees to be paid to the investment banks in connection with the financing. Traditionally, in an LBO, the sponsor has been required to provide certainty of financing and, therefore, had to pay for a bridge financing commitment even if it was unlikely that the bridge would be funded" (Rosenbaum, Pearl, & Perella, 2009).

[17] including worst case maximum interest rates ("caps")) in exchange for various fees and subject to specific conditions, including the sponsor's contribution of an acceptable level of cash equity

facility[18] in its loan portfolio, while seeking to syndicate the remainder along with any term loan (Rosenbaum, Pearl, & Perella, 2009). Instead, as high yield bonds and mezzanine debt' underwriters, they try to sell their entire offering to investors, seeking to hold any securities on their balance sheets. Nevertheless, investment banks, in an underwritten[19] financing, usually provide a bridge loan to give assurance that the sponsor will have sufficient funding to finance and close the deal.

### 2.6.3 Banks and Institutional Lenders

As the name suggest, banks and institutional lenders are capital providers for what concern the bank debt in an LBO's financial structure (see next sections). Bank lenders, that typically consist on commercial banks, savings and loan institutions, finance companies, and the investment banks serving as arrangers, usually are providers of capital for revolvers and amortizing term loans. While Institutional lenders, composed by hedge funds, pension funds, prime funds, insurance companies, and structured vehicles such as collateralized debt obligation funds, usually provide capital for longer tailored, limited amortization term. As Investment banks do, also lenders perform a due diligence, before entering in an LBO financing, in order to mitigate

[18] Revolving credit is a line of credit where the customer pays a commitment fee and is then allowed to use the funds when they are needed. It is usually used for operating purposes and can fluctuate each month depending on the customer's current cash flow needs. Revolving lines of credit can be taken out by corporations or individuals. (www.investopedia.com)

[19] Underwriting is the process by which investment bankers raise investment capital from investors on behalf of corporations and governments that are issuing either equity or debt securities. (www.investopedia.com)

the risk to not receive back all principal repayment, at maturity, and all interest during the LBO's period.

## 2.7 STRUCTURING AN LBO: TECHNIQUES AND OPERATIONAL SCHEMES

One of the most delicate operation in a leveraged buyout transaction is the acquisition of the target firm through the intervention of a newly established company, in jargon Newco. The Newco's capital structure is molded, with the help of the financial advisor, according to the debt/equity ratio objective to be assigned to the target company. In particular, its share capital, a modest contribution in respect to the debt one, is divided among the shareholders according to predefined percentages; while the loan capital, the predominant part, is rise through external cash and/or unsecured lines of credit on the basis of the price required to take over the target. With this liquidity, the Newco acquires the majority shares or same of capital assets of target firm. If the previous scenario happens, we speak about cash merger technique, if the latest occurs, we speak about an asset for cash technique.

### 2.7.1 Cash Merger

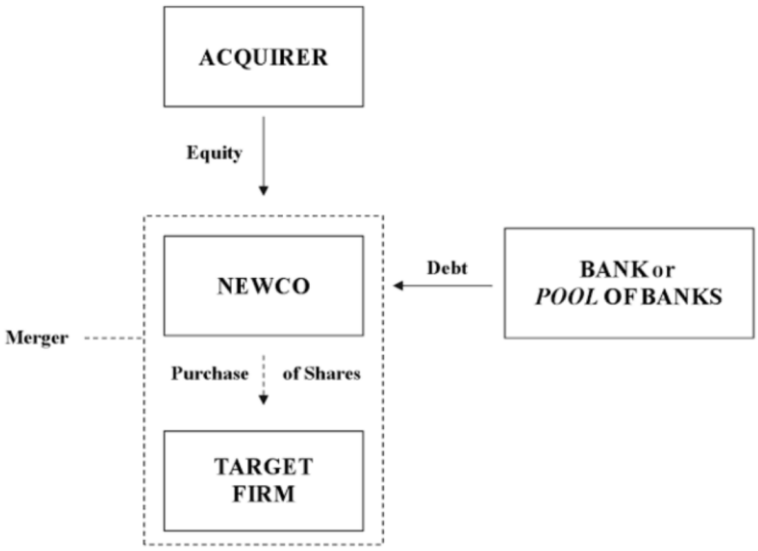


**Figure 16:** *Cash Merger Technique, source: Baldi F. (2015)," The Economics of a Leveraged Buyout", pg 10.*

In this technique, also known as the Kohlberg Kravis & Roberts (KKR)[20] technique, the buyer establishes a Newco as the vehicle for the acquisition, giving it the most suitable financial structure to pay the agreed price. The offer, to purchase the all or the controlling majority shareholding, is presented to the owner of the target by of a takeover bid when the firm to be acquired is listed on a stock exchange, on the contrary, by private negotiation when the target is not listed. In this phase, the bank or the pool of banks usually grant a bridge loan[21] to complete the transaction. This loan is usually in excess of the predetermined price, giving to the Newco a certain degree of flexibility. After that all fulfilment have been done, the Newco and the target firm

[20] From the name of the US Investment bank which first identified the operational procedures used in US$ 390 million Hondaille transaction in 1978.

[21] An unsecured line of credit issued for a very short period of time and subject to the conclusion of the transaction.

undergo a merger, that can have dual nature: merger by absorption (improper)[22] or mergers of equals (proper merger)[23]. The merger, moreover, can be a forward merger[24] or a reverse merger[25], in the previous case the target firm is merged into the Newco, on the contrary, in the second case the Newco is merged into the target. In all cases the merger generates a predominant effect, which supports the entire economic and financial structure and convenience of the entire operation and that is the core of the LBO itself: the Free Cash Flow from Operations (FCFO) can now be used to repay the funds that the Newco borrowed. Furthermore, target's assets become the main security for the loan issued by the bank or the pool of banks. Once the two firms have merged, the target firms will be managed in the best way possible by the new buyer in order to guarantee the gradual repayment of the loan through maximizing the FCFO. But, usually, this is not enough and the management start the identification of non-core assets, the ones that are not instrumental to the running of the business, and so their sale (asset stripping), allows an increase in cash flow.

[22] In an improper merger, a company, known as absorbing company, absorbs another company, known as absorbed company, that will be cancelled by the effect of the merger.

[23] In a proper merger two or more companies (merged companies) case to exist as autonomous legal entities in order that a new company may be created. This new company issues its own shares to be allocated to the existing shareholders of the merged companies, whose shares consequently case to exist.

[24] If the event of a forward merger happens, the target company's assets and liabilities are transferred to the Newco, cancelling its shares.

[25] If the event of a reverse merger happens, the target firms absorbs the Newco, which means that the Newco's assets (only cash flows arising from the composition of the financial structure) and liabilities (equity and debt) are channeled into the target firm (Baldi, The Economics of Leveraged Buyouts, 2015).

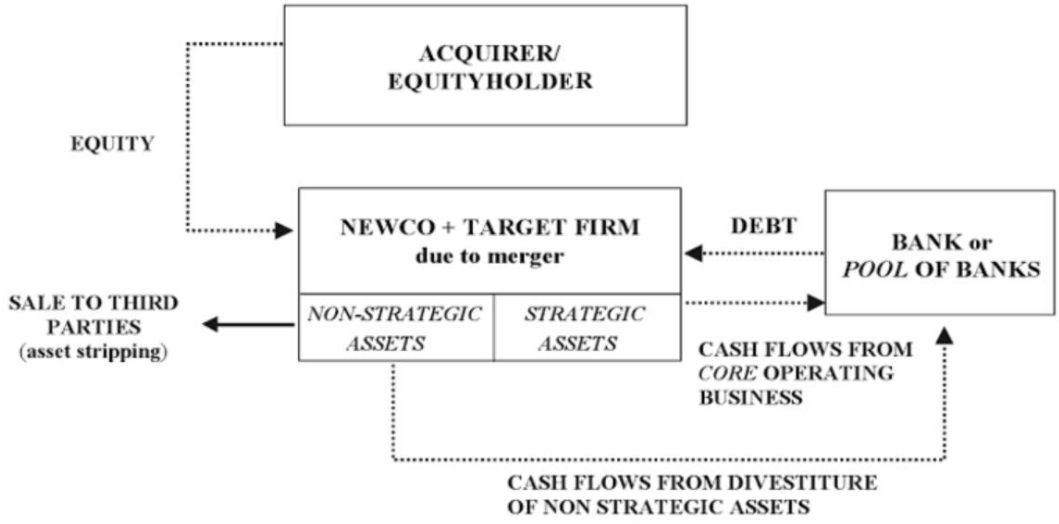


*Figure 17 Post-Merger Phase: repayment of debt through FCFO and asset stripping. Source: Baldi F. (2015)," The Economics of a Leveraged Buyout", pg 11.*

### 2.7.2 Asset for Cash Merger

Asset for Cash is the second operational technique for structuring leveraged buyouts, known also as Oppenheimer technique[26]. This second transaction consists, as the previous, in establishing a Newco, with the purpose, however, of acquiring not the majority shareholding of the target but only individual assets or some specific business units. The selection of these is based on the analysis of ones that seems to have grater development potential when incorporated in the Newco. This technique provides two main advantages:

1. The debt capital of the target firm is not transferred to the Newco, non-changing its the capital structure.
2. The assets acquired constitute the basis on which the Newco obtains the secured loans.

[26] The name derives from the name of the merchant bank that invented this type of LBO structure

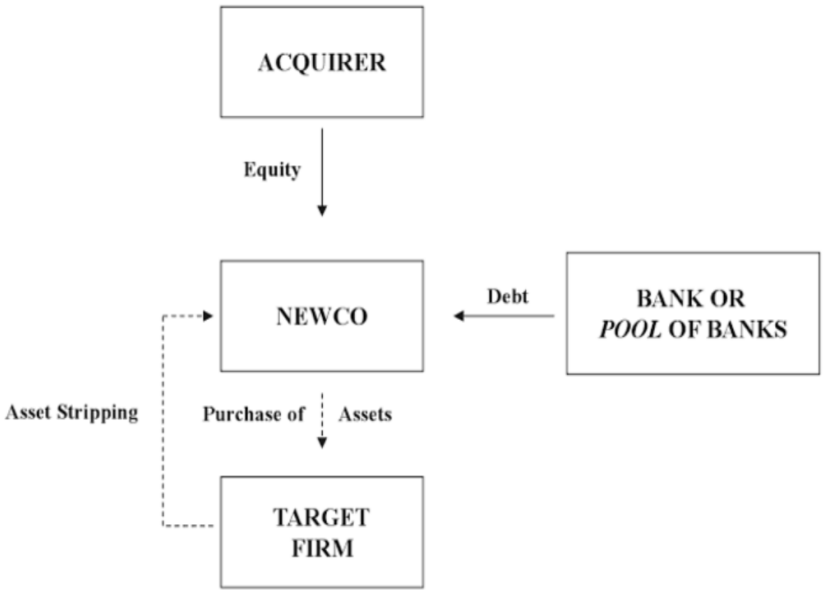


*Figura 18 Asset for Cash Technique. Sorce: Baldi F. (2015)," The Economics of a Leveraged Buyout", pg 12.*

## 2.8 IDENTIFICATION OF THE TARGET FIRM

The feasibility and success of a leveraged buyout transaction are due, not only to the choice of the best capital structure (the best debt / equity ratio) for the new company, but also to the presence of the ideal features on the acquired company. So, the result of the transaction is mainly tied to the quality of the planning phase, which includes the target company's choice as well as the right mix of resources needed to support the operation. For this reason, during due diligence, the buyer company or the sponsors study and evaluate the key strengths and risks associated to the LBO's candidate. The candidate might be identified or among non-core or underperforming divisions of larger companies, neglected or troubled companies with turnaround potential, or companies in fragmented markets as platforms for a roll-up strategy; or among solidly performing company with a compelling business model, defensible competitive position, and strong growth

opportunities (Rosenbaum, Pearl, & Perella, 2009). If the target is a public traded company, instead, the sponsors might search for company that is perceived as undervalued by the market or recognize in that opportunities for growth and efficiency not that are not being exploited by current management. Regardless of the situation, the target represents an attractive opportunity, only, if it can be purchased at a price and, therefore, utilizing a financing structure, that provides sufficient returns with a viable exit strategy. Hence, not all companies are suitable targets for an LBO, indeed, there are few but essential fundamental characteristics a financial buyer will look for:

- Strong and Stable Cash Flow Generation
- Leading and Defensible Market Positions
- Growth Opportunities
- Efficiency Enhancement Opportunities
- Low Capex Requirements
- Strong Asset Base
- Proven Management Team

### 2.8.1 Strong and Stable Cash Flow Generation

Since the LBO will be highly leveraged, the ability to generate strong, predictable cash flow is critical as significant interest and capital repayments will need to be made out of its cash flows. Indeed, debt investors, such as a bank or a pool of banks, require a business model that demonstrates the ability to support periodic interest payments and debt repayment over the entire life of the operation. The features that usually guarantee the predictability of robust cash flow are: the candidate operates in a mature or niche business with stable customer demand and end markets, a strong brand name, an established customer base, and/or long-term sales contracts. Cash flow projections, that are made during the due diligence phase, are usually stress-tested (sensitized) based on historical volatility and

potential future business and economic conditions to ensure the ability to support the LBO financing structure under challenging circumstances (Rosenbaum, Pearl, & Perella, 2009).

### 2.8.2 Leading and Defensible Market Positions

In order to achieve the appropriate level of liquidity and profits consistent with debt-related requirements, it is desirable for the target company to operate in market segment where it has a good and defensible competitive position, such as where the pace of demand expansion and the dynamics of innovative processes are mild and where there are no seasonal phenomena, other than have high customer relationships, brand name recognition, superior products and services, a favorable cost structure, and scale advantages, among other attributes. Indeed, all these characteristics, if not owned, might absorb financial resources by generating new working capital or fixed capital requirement, removing them from paying back principle and interests. The optimal target is, therefore, generally a company that operates in a mature market and with not overly sophisticated product lines. For this reason, is not recommended to acquire companies operating in markets with a strong growth rate and offering high technology products that absorb huge investment and that can mutate in a short time. An extremely high growth rate in sales, which characterized growing sectors, would in fact result in an excessive use of resources to finance the growth of the enterprise rather than the repayment of the contract debt and the payment of related charges. A clarifying example is Prime Computer's disastrous takeover in 1989, testifying that the LBO approach is not applicable to technology companies.

### 2.8.3 Growth Opportunities

The speech made in the previous section is invalid if the company presents organic growth potential or through potential future bolt-on acquisitions. These, indeed, helps drive extra returns, generate greater FCFO available for debt repayment while also increasing EBITDA and enterprise value, thus enhancing the speed and optionality for exit opportunities. Companies with consistent growth opportunities have a greater likelihood of selling the target for a higher EBITDA multiple during the sponsor's investment horizon, increasing returns.

### 2.8.4 Efficiency Enhancement Opportunities

One of the main characteristics that the buyer seek in the target is the possibility for margin improvement and cost reduction potential. Therefore, the sponsor will search for company that historically has not been well run, trying to improve margins to the levels of its major competitors. In doing so the financial buyer will implement traditional cost-saving measures, such as lowering corporate overhead, streamlining operations, reducing headcount, rationalizing the supply chain, and implementing new management information systems. The sponsor may also seek to negotiate better terms with existing suppliers and customers, trying to increase liquidity. At the same time, these initiatives must be undertaken carefully, indeed, extensive and non-weighted cuts in marketing, capex, or research & development, for example, may lead to hurt customer retention, new product development, or other growth initiatives, putting the company at risk of deteriorating sales and profitability.

### 2.8.5 Low Capex Requirements

Great LBO candidates tend to have limited capital expenditure needs, because this enhance a company's cash flow generation capabilities. For this reason, during the due diligence, the buyer and its advisors focus on differentiating those expenditures deemed necessary to continue operating the business[27] from those that are discretionary[28] (Rosenbaum, Pearl, & Perella, 2009), because the latest can be reduced or eliminated if economic conditions or operating performance decline.

### 2.8.6 Strong Asset Base

A strong asset base is needed to help the Newco in rise loan capital because it acts as collateral and, moreover, increase the likelihood of principal recovery in the event of bankruptcy (and liquidation). For this reason, as strong the asset base is, the higher will be the banks' willingness to provide debt to the target.

### 2.8.7 Proven Management Team

Another factor sought in target companies, which is crucial to the success of the operation, is the presence of a high-quality management. Indeed, in the very next moment of the acquisition, it is essential a management group capable of administering at best a heavily indebted company. They are call to increase efficiency and reduce costs with the aim to repay short-term debt and meet the objectives set out in the business plan. The management's role will

[27] Knowns as Maintenance capex, such as capital required to sustain existing assets (typically PP&E) at their current output levels.

[28] Known as Growth capex, that is primarily used to purchase new assets or expand the existing asset base.

be, therefore, to identify initiatives to improve, as seen above, the performance and profitability margins, to sale non-strategic properties, facilities, holdings or branches of business that allow an adequate cash flow increase. In addition, management will have to deal with suppliers who, due to the strong debt, might pretend different conditions from the previous ones; and reclaiming customers who, after the operation, may no longer trust the quality of the products. Moreover, the presence, in the sponsor's team, of prestigious financial partners could reassure creditors and customers about the company's intentions and could help to increase credibility to the entire operation. Management will have, also, the task of choosing the best financial structure capable of providing, to itself, to the other investors and to the banks, with an adequate return on invested or lent capital. For banks, the return depends solely on the repayment of the debt and related interests. For the management and other investors, instead, depends from the sale of the entire shareholding (or part of it) held in the acquiring company. For this reason, the purpose of the management must be to manage the company in such a way as to favor a steady growth, which makes it possible to achieve, at resale, an adequate "exit price".

## 2.9 Capital Structure of an LBO Transaction

As is well known, an LBO transaction is characterized by financing the acquisition of the target by using, for a large part, debt capital. The purchase price, however, is not financed by a single bank loan but is financed through different debt instruments. These instruments, historically accounting for 70-75% of the capital structure (Citigroup corporate & investment banking, 2006) even if today a debt level close to 50% is more common, are paid down with future operating cash flows of the acquired company. This heavy debt burden, as seen in

previous sections, works, also, as an incentive to force managers to run the company efficiently in order to avoid bankruptcy. In addition to debt capital, a 25%-30% of equity capital, provided by the buyer and some sponsors, complete the initial capital structure of the Newco. This equity stake, owned by the acquiring company or by Private Equity firms, provides theme incentives to motivate and monitor managers. Arguments of how these incentives works together and creates value in LBOs are presented by Jensen in his studies (Jensen M. , 1986) and (Jensen M. , 1991), and empirical evidence in supports of Jensen's arguments have followed in the years: (Lehn & Poulsen, 1989), (Kaplan S. , 1989), (Baker & Wruck, 1989), (Denis, 1994), (Smith, 1990) and (Wruck, 1994).

Coming back to the capital structure of a leveraged buyout transaction, Figure 4 represents the standard LBO transaction where the purchase price is primarily financed through different debt instruments that are paid down with future operating cash flows (FCFO) of the target company.

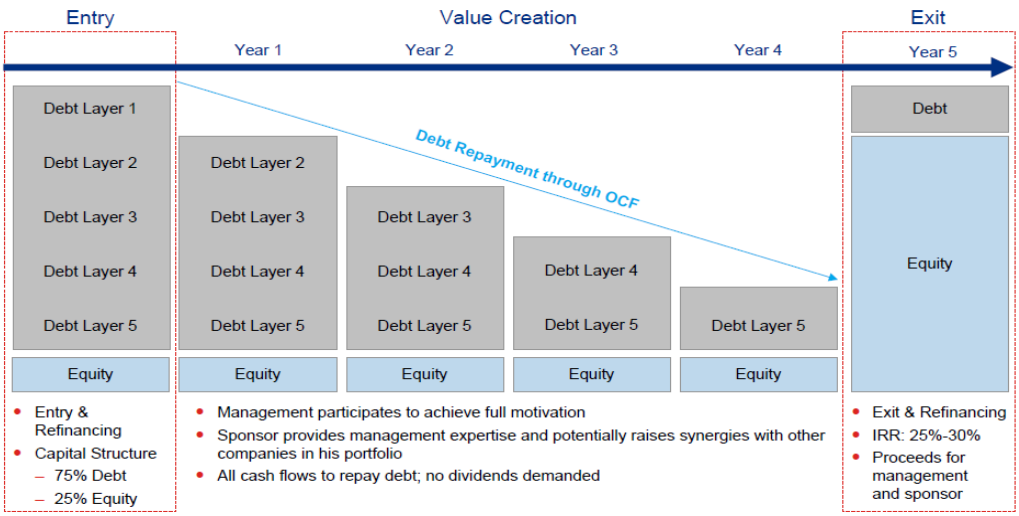


*Figure 19 Source: Citigroup corporate & investment banking*

The different debt layers represented in figure 4 are the various debt sources. These layers are divided ranging from high cost debt such as Junk Bonds in debt layer 1 down to low cost financing such as a revolving credit facility and bank's loans in layer 5. Layer 5 is usually unrepaid at the exit of the deal. Indeed, a certain amount of debt is often left due to tax shield benefits. While during the entire operation debt goes down, being repaid, the enterprise value remains constant, or even grow, resulting in a considerable equity growth. Equity, indeed, grow hand in hand with value creation activities conducted by management and sponsors, and it's translated to capital gains for investors at the time of exit. Profits for debt holders rise during the LBO transaction, while for equity holders comes only at the exit, therefore, in order to keep cash flows maximized during the holding period, no dividends are paid out to shareholders.

During traditional M&A transactions, in "building" the capital structure that best fit the operation, the first thing that must be done is to determine the level of equity capital needed. This level should cover the total amount of fixed assets and partially contribute to the fixed component of the working capital[29] (Baldi, 2015). Whereas, in an LBO deal this principle does not. Indeed, the amount of equity to be used is the direct consequence of the level of supportable debt, which depends on the company's ability to create cash flow from operating activities. Consequently, our capital structure analysis will begin with the investigation of the different source of debt that the Newco must

[29] "The magnitude of investment in working capital may increase or decrease over a period of time according to the level of production. But, there is a need for minimum level of working capital to carry its business irrespective of change in level of sales or production. Such minimum level of working capital is called 'permanent working capital' or 'fixed working capital'. It is the irreducible minimum amount necessary for maintaining the circulation of current assets" (www.accountingnotes.com)

evaluate while funding the best capital structure, because a capital structure optimal for every Leveraged buyout transaction doesn't exist. However, a similar financing structure is applied to all buyouts. The structure comprises of the following sources of finance:

- **Senior or bank debt:** first lien secured debt such as a revolving credit facility and term loan facilities.
- **High-Yield Bonds,** referred to as corporate bonds.
- **Mezzanine debt**, ranked between traditional debt and equity.
- **Equity contribution**, the lowest ranked source of finance and therefore the most expensive.

Debt is not permanent, it needs to be redeemed in a timely and prearranged manner. Reimbursement usually takes place with the liquidity that the target makes available, often after applying an innovative. This debt is classified according to its risk and the relationship between corporate performance and growth. As a general rule, the higher a given debt instrument ranks in the capital structure hierarchy, the lower its risk and, consequently, the lower its cost of capital to the borrower/issuer. However, cost of capital tends to be inversely related to the flexibility permitted by the applicable debt instrument (Rosenbaum, Pearl, & Perella, 2009).

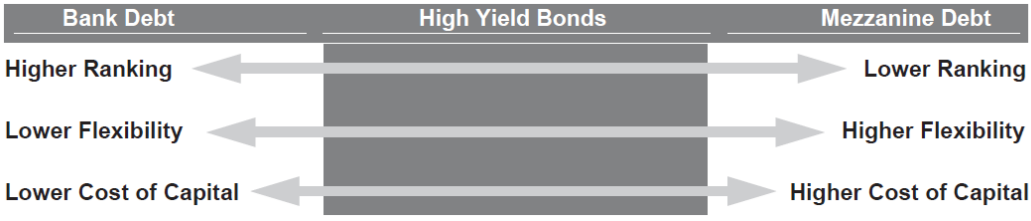


*Figure 20 Characteristics of debt source*
*Source: (Rosenbaum, Pearl, & Perella, 2009)*

### 2.9.1 Senior or Bank Debt

Bank debt, known also as “senior secured credit facilities”, is an integral part of the LBO financing structure, serving as a substantial source of capital. Usually it is comprised of a revolving credit facility[30] and one or more term loan tranches[31]. In general terms, senior debt has higher ranking, lower flexibility and lower cost of capital than the other sources, and for this reason it is the main financing source in an LBO and typically has a term of 5-10 years and its interest rate is SWAP plus a spread of 2-3% with the credit spread tied to the appraised fair market value of land and buildings, enterprise value as well as the liquidation value of machinery and equipment (Citigroup corporate & investment banking, 2006). Senior debt is somewhat flexible with varying collateral and covenant packages as well as amortization schedules. It often comprises of 25-50% of the total deal. The debt is used to finance property and equipment as well as other long-lived assets, acquisitions, buyouts and stock repurchases. Main lenders are commercial and investment banks, mutual funds, structured investment funds and finance companies. Bank loans is

[30] A revolving credit facility (“revolver”) is a source of funds that the bought-out firm can draw upon as its working capital needs dictate. A revolving credit facility is designed to offer the bought-out firm some flexibility with respect to its capital needs – it serves as a line of credit that allows the firm to make certain capital investments, deal with unforeseen costs, or cover increases in working capital without having to seek additional debt or equity financing (Olsen, 2002).

[31] Senior debt that may not be reborrowed once repaid. It is often secured by the assets of the bought-out firm, is the most senior claim against the cash flows of the business. As such, bank debt is repaid first, with its interest and principal payments taking precedence over other, junior sources of debt financing (Olsen, 2002)

typically structured in up to three tranches: 'A'[32], 'B'[33] and 'C'[34]. The debt is usually secured on specific assets of the company, meaning that the lender can automatically acquire these assets if the company goes bankruptcy; therefore, it has the lowest cost of debt. These obligations are usually quite stringent though senior debt is often not subject to reporting requirements as they are usually unrated. The bank loans are usually held by a syndicate of banks and specialized funds. For these reasons, financial buyer usually want the transaction to be financed by as much senior debt as possible. However, the providers of senior debt are usually reluctant to accept very high levels of senior debt and so may impose unacceptable conditions to the equity investor. As a result, senior debt will often only form about 50% of the total financing (Deutsche Bank, 2008).

---

[32] Term loan A, called "TLA", are commonly referred to as amortizing term loan because it typically requires substantial principal repayment throughout the life of the loan. Term loans with significant annual required amortizations are perceived by lenders as less risky than those with a looser repayment schedule. Consequently, term loan A's are often the lowest priced term loans in the capital structure. Term loan A's are syndicated to commercial banks and finance companies together with the revolver and are often referred to as "pro rata" tranches because lenders typically commit to equal percentages of the revolver and term loan A during syndication. Term loan A's in the LBO financing structure often have a term that ends simultaneously with the revolver. (www.valuation-methods.net)

[33] B term loans, or "TLBs", are commonly referred to as "institutional term loans" due to the fact that they are sold to institutional investors. Term loan B's are used to a greater extent than term loan A's in LBO financings. Typical, term loan B's are larger in size and has a longer term than term loan A's. A reason for the longer term is that, bank lenders prefer to have their debt mature before term loan B's. Term loan B's are generally amortized at a nominal rate such as 1% per annum. The rest is repaid as a bullet at maturity. Common tenor for term loan B's is up to seven years. As institutional investors prefer non-amortizing loans with longer maturities and higher coupons, TLBs are more suitable for them to invest in than term loan A's. (www.valuation-methods.net)

[34] The institutional term loan tranches of syndicated loans. Payments on these tranches are usually back-loaded, with interest payments constituting the majority of cash flows in early years. Tranches are designated C, D etc. on the basis of maturity. Each successive tranche has maturity later than the previous tranche. For each additional year until maturity, spreads are generally 25 to 75 bps wider. (www.mjxam.com)

*Table 1 Source: (Citigroup corporate & investment banking, 2006)*

| REVOLVING CREDIT FACILITY | SENIOR TERM DEBT |
|---|---|
| ▪ **Term:** 5+ years<br>▪ **Size:** 5%-15% of total<br>▪ **Interest:** Prime plus 2.0%-2.5%. Cash interest only. Credit spread tied to level and quantity of current assets as well as to financial performance and risk measures<br>▪ **Seniority:** Senior secured claim against assets. Usually secured by inventory and accounts receivable (the most liquid operating assets)<br>▪ **Main Lenders:** Commercial banks, commercial paper investors<br>▪ **Uses:** Used to finance investments in working capital, capital expenditures, general liquidity support<br>▪ **Flexibility:** Rather flexible, tailor-made loan contracts with varying collateral and covenant packages<br>▪ **Other:** Restrictive covenants; pre-payable at par | ▪ **Term:** 5-10 years<br>▪ **Size:** 25%-50% of total<br>▪ **Interest:** Prime plus 2%-3%. Credit spread tied to the appraised fair market value of the land and building, enterprise value as well as the liquidation value of machinery and equipment<br>▪ **Seniority:** Senior Term debt is usually the second-lowest-cost financing because it is secured by assets and is structurally senior to other debt layers and equity<br>▪ **Main Lenders:** Commercial and Investment banks, mutual funds, structured investment funds, finance companies<br>▪ **Uses:** Issued to finance property and equipment as well as other long-lived<br>▪ assets (land, machinery, etc.), acquisitions, buyouts, redemptions, stock repurchases<br>▪ **Flexibility:** Tailor-made loan contracts with varying collateral and covenant packages, as well as amortization schedules<br>▪ **Other:** Several tranches, consisting of amortizing debt and bullet payment at Equity maturity |

### 2.9.2 Subordinated debt and the High-Yield Bonds

There is another debt category at the core of LBOs transactions, and it is the substantial debt financing against the target company's assets from banks and from buyers of subordinated public debt, which in the 1980s became known as junk bonds (Shleifer & Vishny, 1997).

These subordinated debts instruments are ranked behind senior debt in order of priority on any liquidation. Their terms are usually less

rigorous than senior debt. Indeed, reimbursement is usually required in one ‘bullet’ payment at the end of the term. Since subordinated debt gives the lender less security than senior debt, lending costs are typically higher. The most important form of subordinated debt is the high yield bond (junk bonds), often listed on US markets (Deutsche Bank, 2008). An High yield bond is a non-investment grade debt security due to its rating of “Ba1” or below from Moody’s Investor Service (Moody's, 2009) and “BB+” or below when using a rating scale from Standard and Poor’s (Standard & Poor's, 2009). Due to this, high yield bonds issued through an LBO are often referred to as “Junk” bonds because of the relative high risk associated with this type of investment. High-yield bonds in LBO financing can be structured in a variety of forms but most frequently have a maturity of seven to ten years, bear cash-interest payments and are fully repaid at term (Pindur, 2007). As regards the interests, the issuing of these securities obligates the issuer to make interest payments to bondholders at regularly defined intervals (typically on a semiannual basis), the high yield bond pays interests at a fixed rate, which is priced at issuance on the basis of a spread; usually 4% to 7%, to a benchmark Treasury. The. Size of spread is tied to cash flows and depends on the investment grade of the bond (Citigroup corporate & investment banking, 2006). As opposed to term loans, high yield bonds are nonamortizing with the principal due at a stated maturity date (bullet), usually seven to ten years after issuance. (Rosenbaum, Pearl, & Perella, 2009). Usually, lenders are pension funds, insurance and finance companies, debt and mutual funds, hedge funds or other institutional and private investors.

*Table 2: Source (Citigroup corporate & investment banking, 2006)*

| HIGH-YIELD BONDS |
| --- |
| ▪ **Term:** 6-10 years. Matures after Senior debt<br>▪ **Size:** 20%-40% of total<br>▪ **Interest:** Prime plus 4%-7%. More expensive than Senior debt due to greater degree of risk<br>▪ **Seniority:** Subordinate to Senior debt in rights and remedies<br>▪ **Main Lenders:** Pension funds, insurance and finance companies, debt and mutual funds, hedge funds, other institutional and private investors. High-Yield debt usually publicly traded<br>▪ **Flexibility:** Flexible instrument, can be structured as a debt security with a fixed coupon and equity-linked features (e.g. warrants) |

### 2.9.3 Mezzanine debt

As its name suggests, mezzanine debt regards a layer of capital that is an intermediate financing between debt and equity and an alternative to high yield bonds. Mezzanine debt is a highly-negotiated instrument between the issuer and investors that is tailored to meet the financing needs of the specific transaction and required investor returns. As such, mezzanine debt allows great flexibility in structuring terms conducive to issuer and investor alike (Rosenbaum, Pearl, & Perella, 2009). For sponsors, mezzanine debt may offer incremental capital at a lower cost than that of equity. In this way, it enables sponsors to increase leverage levels and purchase price when alternative capital sources are inaccessible. Indeed it, usually, serves as supplement to high yield financing when markets conditions are unfavorable or even inaccessible (e.g., for smaller companies whose size needs are below high yield bond market minimum thresholds) (Rosenbaum, Pearl, & Perella, 2009). While, for the issuers mezzanine debt offers a higher rate of return than traditional high yield bonds and can be structured to offer equity upside potential in the form

of detachable warrants[35] that are exchangeable into common stock of the issuer.

*Table 3 Source: (Deutsche Bank, 2008)*

| **MEZZANINE DEBT** |
| --- |
| ▪ **Term:** up to10 years. Matures after Senior debt<br>▪ **Size:** 10%-30% of total<br>▪ **Interest:** LIBOR 4%-7%.<br>▪ **Seniority:** Subordinate to Senior debt<br>▪ **Repayment:** Single payment at maturity<br>▪ **Flexibility:** Flexible instrument, intermediate financing between debt and equity |

### 2.9.4 Equity Contribution

Once the sustainable amount of debt is established, with all its variants seen above, and the cost of such sources negotiated, the capital structure of an LBO transaction must be completed by the determination of the capital contribution to be allocated. This equity contribution, consisting in the share capital of the Newco, could be provided by private financial investors, corporate entities, management team of the target company, or a management team with specific expertise or knowledge of that specific industry or business (Baldi, 2015). For large LBOs, several sponsors may team up to create a consortium of buyers, thereby reducing the amount of each individual sponsor's equity contribution (known as a"club deal") (Rosenbaum, Pearl, & Perella, 2009). Historically, the equity stake in

[35] A warrant is a derivative that confers the right, but not the obligation, to buy or sell a security – normally an equity – at a certain price before expiration. The price at which the underlying security can be bought or sold is referred to as the exercise price or strike price. (www.investopedia.com)

an LBO transaction usually comprises of 20-40% of the total capital. However, now a days it is possible to see also transactions with an equity portion which reaches 50-60% of the total capital. The equity contribution provides a cushion for lenders and bondholders in the event that the company's enterprise value deteriorates as equity value is eliminated before debt holders lose recovery value (Rosenbaum, Pearl, & Perella, 2009). Equity, indeed, is riskier than debt capital mainly because dividend and liquidation rights are subordinated to the interest of the debt lenders. Having all this in mind, the determination of the equity stake sponsors would be willing to commit, must be done considering all the needs investors could have.

- The management team on one hand has the need to hold a significant portion of the shareholding of the Newco, but on the other hand its investment power is limited due to a poor capital availability, often only based on earning derived from life-long career saving. For these reasons, management is usually able to underwrite only 2-10% of shareholder's equity (Baldi, 2015). However, managers have the possibility to increase their positions thanks to results obtained through exercise of stock options, or other equity incentives given ("equity on performance")
- Institutional investors, such as Venture Capital or Private Equity funds, have, instead, the need of higher returns on capital invested compared to the ones they made in their ordinary activities of asset management, due to the higher risk nature of this kind of transaction
- Even the needs of the Newco must be considered. Indeed, it needs sufficient capital resources in order to complete the operation.

*Table 4 Source: (Citigroup corporate & investment banking, 2006)*

| EQUITY CONTRIBUTION |
| --- |
| ▪ **Size:** 20%-40% of total<br>▪ **Exit Strategy:** 3-7 yearsSeniority<br>▪ Dividend and liquidation rights are subordinated to the interests of the debt lenders<br>▪ Management often invests in the equity together with an LBO sponsor<br>▪ Sponsors will typically seek a 25%-30% compounded annual total return over five years |

## 2.10 EXIT STRATEGY

Most sponsors try to exit or monetize their investments in a five to seven-year time horizon, in order to provide timely returns to their LPs. The primary exit strategies are usually the “Sale of Business” or an IPO. The former is the sale to a strategic buyer, to management or even to another PE/VC found; the latest means put the company again on the market. In an IPO, however, the sponsor sells only a portion of its shares in the target to the public, retaining the largest equity stake in the target, because full exit will come through future follow-on equity offerings or an eventual sale of the company. Therefore, as opposed to a private sale, an IPO generally does not afford the sponsor full upfront monetization (Rosenbaum, Pearl, & Perella, 2009).

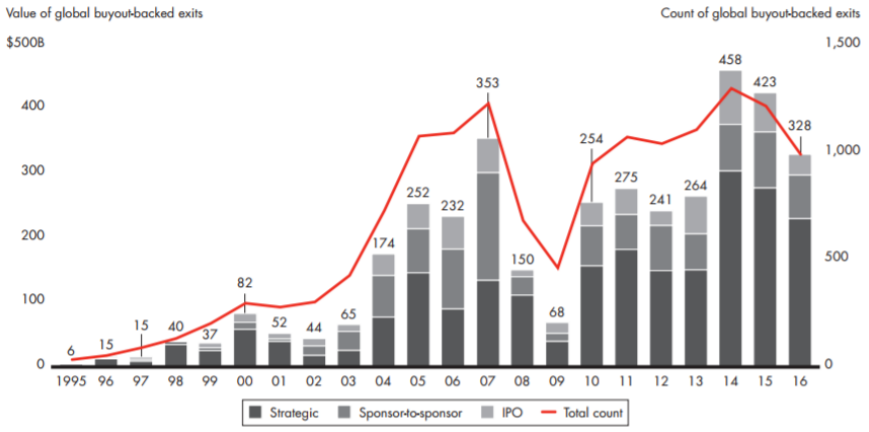


*Figure 21 Exit strategies. Source: (Bain & Company, 2017)*

The final decision regarding when to monetize an investment, however, depends on the performance of the target as well as prevailing market conditions. In some cases, such as when the target has performed particularly well or market conditions are favorable, the exit or monetization may occur before the usually 5-7 years (Figure 7), sometimes even in a year or two. In order to exit, indeed, the sponsor should have increased the EBITDA of the target company, as seen before through organic growth, asset stripping, and/or increased profitability, and have reduced its debt burden. By doing so, thus, they might have increased the target's equity value. The sponsor also seeks to achieve multiple expansion upon exit.

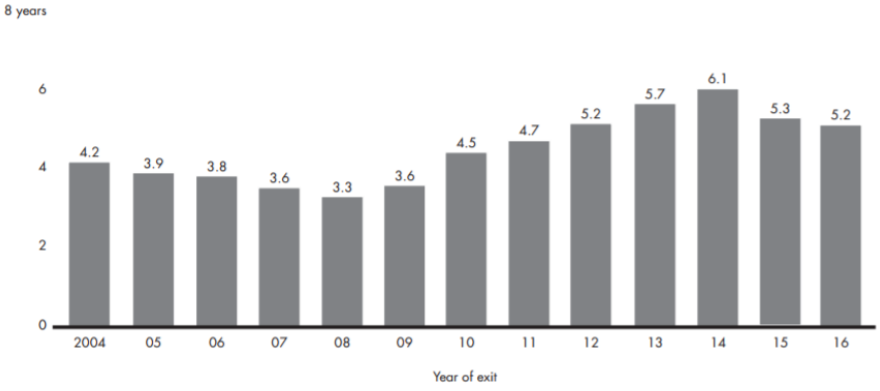


*Figure 22 The median holding period for buyouts. Source: (Bain & Company, 2017)*

# 3 LEVERAGED BUYOUT VALUATION WITH THE ADJUSTED PRESENT VALUE (APV) METHOD

This chapter describes the approach silently used to evaluate the target company in an LBO operation. The approach known as Adjusted Present Value (APV) is based on the adjustment of the unlevered enterprise value based on tax benefits (TS) and on possible costs of financial distress (CD). With reference to it, the chapter presents the methodology and the arguments that demonstrate the superiority, in a LBO, of proceeding to autonomous estimates of the value of operating cash flows (FCFO), tax shields (TS) and of the possible costs of financial distress (CD).

## 3.1 MODIGLIANI AND MILLER'S PROPOSITIONS AND THE VALUE CONSERVATION RULE

Modigliani & Miller's work represents a milestone in modern finance theory. Indeed, their contribution was the first attempt to explain the relationship between a company's financial structure and its value. The theorem was created with the aim of develop the key principles that need to be adopted in order to make rational decisions in assessing investment possibilities and making decisions about financial policy, in a world where future yields of securities and cash flow present a certain degree of uncertainty. The ultimate objective was to maximize the company's profits or market value.

### 3.1.1 The Modigliani & Miller's propositions: a world without taxes

The first theorem of Modigliani and Miller[36] concerns the irrelevance of the financial structure given the fundamental assumption of no taxation. The two authors, in the first part of their work, demonstrate that the value of a company is independent of the debt-equity ratio that the company intends to have, such as whether it intends to finance itself using equity or debt capital. The total value of an enterprise is related exclusively to the profitability and risk characteristics of its real assets, which is why the value cannot change due to changes in the financial structure. Proposition I of Modigliani & Miller (M&M) therefore argues that the value of a levered company is equal to the value of an unlevered company and is defined as follows:

$$V = D + E \tag{3.1}$$

Where D is the amount of debt and E is the market value of the equity. The model remembered with the expression "the pie model"; the idea was born by the two authors trying to explain in simpler terms and to a wider public the principles underlying their work. The value is, indeed, compared to a cake, where regardless of the number of slices in which the cake should be cut or the size of the slices, the total amount of cake you own remains constant; of course, the slices symbolize the amount of debt and equity. The first proposal is based on an extremely simple assumption: in the absence of fiscal interference. The overall value of an enterprise depends exclusively

[36] See more at (Modigliani & Miller, The Cost of Capital, Corporation Finance and the Theory of Investment, 1958)

on the operating flows that it is able to generate[37]. Therefore, if the law of value preservation applies, changes in the debt ratio cannot change the value of the assets. The fact that the value of the assets must remain constant gives rise to the calculation rules that will be examined in this section. First, the value of a company can be calculated by discounting cash flows to an appropriate discount rate (R).

$$R_k = \sum_{i=0}^{n} \frac{X_i}{V} \tag{3.2}$$

Where ($X_i$) are the future cash flows and (V) is the present value of the enterprise. Modigliani and Miller define ($R_k$) as the weighted average cost of capital (WACC). If the WACC[38] is independent of the capital structure, according to the law of value conservation, it will only measure the risky market yield on the basis of the operational risk profile that characterizes the company's activity. Therefore, it can be assumed the following equality:

$$WACC = R_{eu}{}^{39} \tag{3.3}$$

This equation states that, in the absence of fiscal interference, the weighted average cost of capital does not change according to the debt ratio, and WACC will only be able to match the return required

[37]The first to speak of the so-called "law of value conservation" was J. B. Williams in a famous 1930s finance book: *The Theory of Investment Value*, Harvard University Press, 1938. (Williams, 1938)

[38] $WACC = R_e \frac{E}{D+E} + R_d \frac{D}{D+E}$

[39] Cost of Unlevered capital, such as in absence of financial indebtment

by shareholders if the company is financed exclusively from its own funds.

$$WACC = R_{eu} = R_{el} \frac{E}{D+E} + R_d \frac{D}{D+E} \quad (3.4)$$

The symbol ($R_{el}$) indicates, indeed, that the rate (Re) measures the return required by shareholders for levered flows. In this way, the E/(D+E) and D/(D+E) ratios identify the weights of equity and debt respect to the overall investment. The formula can also be written in the following way, placing $R_{el}$ as unknown:

$$R_{el} = R_{eu} + (R_{eu} - R_d) * \frac{D}{E} \quad (3.5)$$

Therefore, the value assumed by $R_{el}$, in the absence of taxation, is a direct consequence of the law of value preservation. It is, also, interesting to compare this formula with the relationship between the value of ROI and the value assumed by ROE[40]. They are identical even if the parameters have a different meaning. In one case, they are accounting profitability ratios, in the other case they are returns desired by investors.

[40] $ROE = ROI + (ROI - i) * D/E$

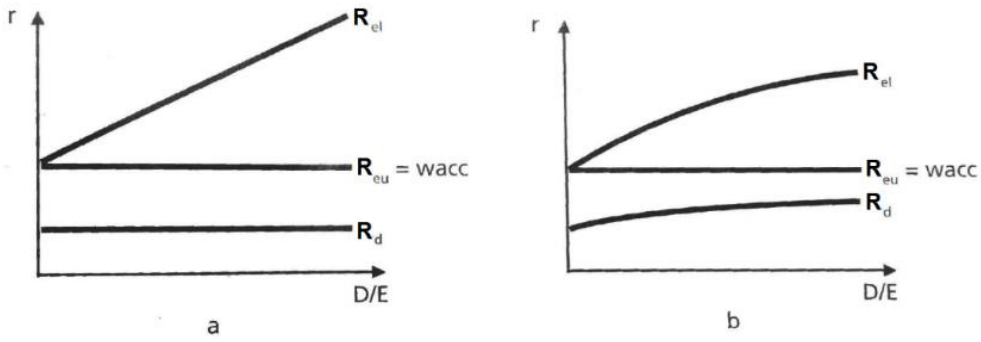


*Figure 23: Relation between $R_{el}$ and the D/E ratio. Source: (Massari & Zanetti, 1998)*

The function that binds $R_{el}$ and the debt ratio is represented graphically by Figure 6. Figure 6a shows that there is a linear relationship between $R_{el}$ and D/E. The slope of the straight line, which identifies $R_{el}$'s trend, depends on the difference between $R_{eu}$ and $R_d$. The fact that in Figure (6a) $R_D$ is constant can be justified if, even in the worst scenario, operating cash flows (FCFO) allow debt repayment for each level of indebtedness. If this assumption is removed, the cost of debt will have to increase more realistically depending on the degree of leverage. The law of value preservation and the formulae deriving from it remain equally valid. In this case, a share of the business risk is borne by the financial creditors. Consequently, given a certain operational risk, the fact that it is shared between shareholders and financial creditors will ensure that the increase in $R_d$ is offset by an increase in $R_{el}$. However, it will be smaller than shown in Figure 6a. In fact, it assumes that the business risk weight exclusively on shareholders.

Obviously, the hypothesis of irrelevance of the financial structure is correct only under a set of other stringent assumptions. The model presupposes, in addition to the hypothesis of non-taxation, that investors move in a world of perfect markets. Such as a scenario characterised by the absence of information asymmetries, bankruptcy

costs and transaction costs. Moreover, there are no constraints on borrowing or lending at an interest rate inclusive of the risk premium of the company, which coincides with the discount rate for discounting future cash flows. Therefore, basically everyone can carry out the same transactions carried out by the company and at the same price (no arbitrage opportunity). Finally, profit streams are perpetual annuities.

#### *3.1.1.1 Is the law of value preservation always valid?*

According to (Massari & Zanetti, 1998) the law of conservation of value represents the enunciation of a principle that is difficult to attack. The value created by an investment depends exclusively on its industrial feasibility and not on how it is financed (in the absence of tax benefits). However, many are convinced that this is not acceptable when the debt ratio is very high. A particularly high debt ratio can have undesirable consequences: from weakening the competitive position to bankruptcy. In the presence of such possible negative effects, above a certain critical threshold of debt, $R_{el}$ should increase more than linearly with respect to D/E, with consequences of value destruction. According to the authors, this critique is certainly acceptable. But from the perspective of estimating the opportunity-cost of capital, scholars of corporate finance are inclined not to affect the validity of the law of value conservation. Alternatively, $R_{el}$'s estimation would be subjective and arbitrary, implying that the relationship between $R_{el}$ and the leverage ratio remains linear for each level of debt and the costs related to insolvency scenarios, as in the case of the LBOs, are assessed separately, as it will be seen in the following paragraphs.

### 3.1.2 Modigliani and Miller theorem in presence of taxes: the tax benefits linked to leveraged

Aware that, both, the financial structure affects the value of a company and that the presence of taxation could not be excluded in the model, Modigliani and Miller themselves dropped the hypothesis of no taxation and developed prepositions I and II in the presence of taxes[41]. The two authors have shown, in fact, that the value of a firm is positively correlated to its debt amount. This assumption derives from the tax advantage available to an indebted company. The benefit is the tax deductibility of interest on the debt, which results in a reduction in taxes to be paid equal exactly to the value of the tax shield.

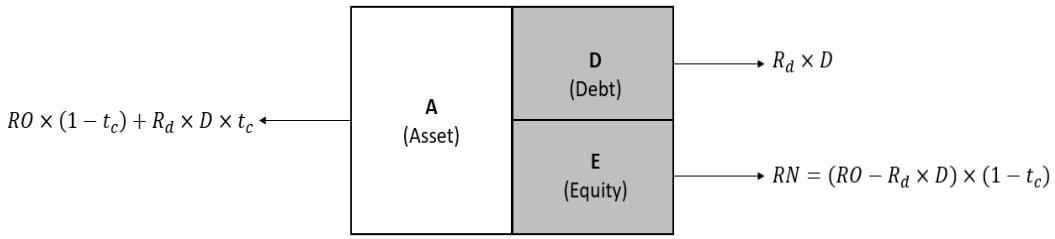


*Figure 24Source: (Massari & Zanetti, 1998) pg. 70*

Where:

- $RO$= operating profit
- $RN$= net income
- $t_c$= corporate tax rate

[41] See more at: (Modigliani & Miller, "Corporate income taxes and the cost of capital: a correction", 1963)

The cash flows relating to debtholders and equityholders can be determined as follows:

- $D: R_d \times D$
- $E: RN = (RO - R_d \times D) \times (1 - t_c)$

By definition, the sum of the cash flows due to the contributors must correspond to the total cash flow generated by the assets (A). The following equality must therefore apply:

$$\boldsymbol{Cash\ flow\ generated\ by\ assets} = R_d \times D + (RO - R_d \times D) \times (1 - t_c)$$

Simplifying the previous equation

$$\boldsymbol{Cash\ flow\ generated\ by\ assets} = RO \times (1 - t_c) + R_d \times D \times t_c$$

Therefore, in the presence of corporate taxation and tax deductibility of interest expense, the overall flow due to the capital contributions increases by the amount $R_d \times D \times t_c$. Consequently, the firm's overall value will have to increase in line with the present value of the stream of tax shield. This increase in value will benefit shareholders.

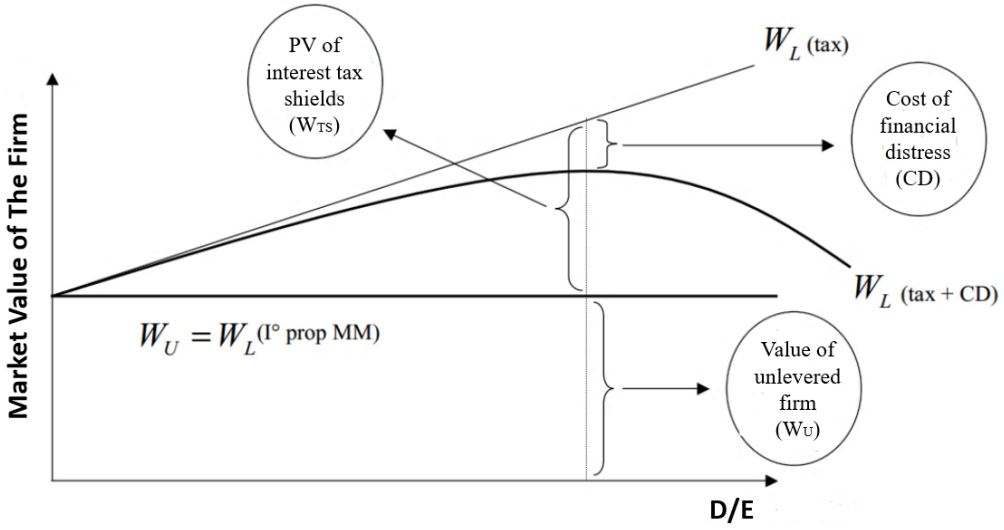


*Figure 25 Value increase attributable to tax shield. Source: own elaboration*

Figure 8 shows that, as the debt ratio increases, the value of the company levered ($W_L$) increases in proportion to the quantity of $W_{TS}$. This corresponds to the discounted value of the tax savings related to the deductibility of interest expenses:

$$W_{TS} = \sum \frac{R_D \times D \times t_c}{(1 + R_{TS})} \tag{3.6}$$

Modigliani and Miller's work immediately highlighted the importance of the tax shield in the evaluation process of a company. The previous formula have highlighted how interest on debt is deducted from profit, in order to obtain a reduction in corporate taxes for an amount equal to $R_D \times D \times t_c$. Since the model assumes that flows are perpetuity, the same treatment is applied to the tax shield, which is discounted at the expressive rate of the cost of debt, $R_D$. In the valuation process, the risk profile and the context that qualifies a business are fundamental to define the discount rate. The assumption that is therefore implicitly made is that the risk of the stream of tax shield is the same as that of the company's debt. The hypotheses on the riskiness of flows are still the subject of many debates today and over the years, there have been many other theories on the evaluation of the tax shield which it will analyzed in the next chapter.

## 3.2 MEYERS'APPROACH: THE ADJUSTED PRESENT VALUE (APV)

The adjusted present value is a valuation method that has become popular thanks mainly to Mayers' work (Mayers, Interactions of Corporate Financing and Investement Decisions. Implication for Capital Budgeting, 1974). Initially with reference to the valuation of investment projects. More recently, on the other hand, it has also been

proposed in some important texts[42] dedicated to the evaluation of companies and in particular to acquisitions with a high level of leverage, such as the LBO transactions.

After that Modigliani and Miller set the foundations for the study of the interactions between capital structure and firm value, many other academics devoted themselves to the theme by starting from M&M ideas and insights. As said before one of the best-known works after Modigliani and Miller was created by Stewart C. Myers, who, in addition to his numerous theoretical insights, also provided a series of approaches and practical tools to address the problems of the "real world". The model presented by Myers, universally known by the acronym APV, even if it was static in its previous form, it has some features that allow it to obtain an advantage position so that it has become one of the most accredited methods for assessing investment opportunities. Indeed, the Adjusted Present Value method, in addition to its flexibility of application, presents two important virtues (Baldi, 2005):

1. it provides disaggregated information about the factors that share in creating the firm’s value;

2. it permits a detailed analysis of the value deriving from the choice of a particular financial structure by isolating the contribution of fiscal benefits to the corporate value creation.

[42] One of the first applications of the APV technique for assessing a business acquisition is the valuation of RJR Nabisco's leveraged buyout illustrated in the well-known Ross manual. See: (Ross & Westerfield, 1997). For other texts see: (Copeland, Koller, & Murrin, 2000)

In the process of capital budgeting and evaluation of companies, one of the topics that still today continue to be a source of debate among analysts, is the search for the right method to capture the tax benefit of debt. The latter is one of the most important sources of value creation and plays a key role in the APV approach, as shown in the 1974 article "Interactions of Corporate Financing and Investment Decision - Implications for Capital Budgeting ". Myers presents what he considers the general approach for the analysis of the interactions between value and capital structure. Defining a kind of general rule to be used in evaluating every investment opportunity. The model, as already mentioned above, is static, such as in its initial version it does not consider how future financial decisions could be modified as a result of changes in the market, but suggests an optimal financial plan given the realisation of current expectations. What the author aims to do is to outline a general approach of which the WACC method, developed by Modigliani and Miller, is a particular case.

In order to present its theory, Myers uses a constrained optimization problem through which he try to choose which project should be undertaken. The objective is to maximise the variation in current market value ($\varphi$) which in turn is a function of four factors: the percentage of the accepted project ($X_j$), the stock of outstanding debt ($Y_t$), total dividends paid ($D_t$) and net income from equity investments issued ($E_t$). Moreover, ($Z_j$) is the estimates of the project's year-by year contribution to debt capacity, and ($C_j$)is after-tax cash flow. Once it is built the function to maximize and the necessary constraints are placed, the following formula results:

$$APV_j \equiv A_j + \sum_{t=0}^{T} \left[\lambda_t^F Z_{jt} + \lambda_t^C C_{jt}\right] > 0 \quad (3.7)$$

Where: $A_j = \delta\varphi/\delta x_j \; F_t = \delta\varphi/\delta y_j \; Z_{jt} = \delta Z_t/\delta x_j \; C_{jt} = \delta C_t/\delta x_j.$

The optimal solution would be $APV_j = \lambda_j$[43], in this case the project would be accepted. If the APV were negative, instead, it would be refused. If considering the hypothesis of irrelevance of MM, the values in the square parenthesis would all be equal to zero. The result, therefore, would be the following:

$$APV_j = A_j \quad (3.8)$$

In this model, MM's hypothesis results very useful in order to discover the economic interpretation of Aj. Which represents the contribution to the value of the firm, of the marginal investment in project j without taxation and subject to the hypothesis of perfect markets. Indeed, at the base of the APV there is the idea to initially evaluate the project in the basic case and then make the appropriate adjustments. Operatively, the process can be divided into three steps:

1. the first involves calculating the value of the company as if it were financed entirely by equity, in order to obtain the unlevered value;

[43] See more at: Stewart C. Myers, (1974); "Interactions of Corporate Financing and Investment Decisions-Implications for Capital Budgeting". The Journal of Finance, Vol. 29, No. 1. (1974), pp. 1-25.

2. the second step instead consists in calculating the present value of the tax savings deriving from the tax benefit of debt;

3. the third, finally, also considers the possible negative effects that can derive from leverage, by translating them into a certain percentage of bankruptcy probability and/or any costs resulting from financial distress.

Once the previous steps have been completed, the theory of the APV can be applied to Discounted Cash Flow valuation, making however, considerations on the discount rates of available flows[44].Therefore, the value of an initiative (in our case the Newco) consists of the "unlevered" value and that of all the "side effects" of the debt, namely: the present value of the tax savings and the costs related to possible bankruptcy, the "agency costs". Therefore, adopting Meyers' methodological approach, the value of a "levered" firm can be represented as follows:

$$W_L = W_U + W_{TS} + CD \qquad (3.9)$$

Where:

$W_L = Value\ of\ the\ levered\ firm$

$W_U = Value\ of\ the\ unlevered\ firm$

$W_{TS} =$ present value of the tax savings due to deductibility of interest expense

[44] See more at: Massari, M.; Zanetti, L. (1998). *"Valutazione Finanziaria". McGraw-Hill*

$$CD = \ Probable\ costs\ of\ financial\ distress\ (bankruptcy)$$

The Adjusted Present Value (APV) is, therefore, only an extension of the M&M DCF approach, that is particularly suited to the valuation of transactions characterised by a large amount of borrowing and a variable financial structure from year to year; as in the case of leveraged buyout transactions.

In short, the APV provides a separate and analytical valuation of tax shields, linked to the deductibility of interest expense. In the classic DCF approach the tax benefits of debt are implicitly included in the WACC formula. However, in the event of significant changes in the financial structure from one year to the next, a correct and rigorous application of the DCF would require an estimate of a different WACC for each year. In order to overcome this criticality, it is therefore possible to use the separate valuation of both the tax benefits and costs of the debt.

## 3.3 VALUE OF THE UNLEVERED FIRM

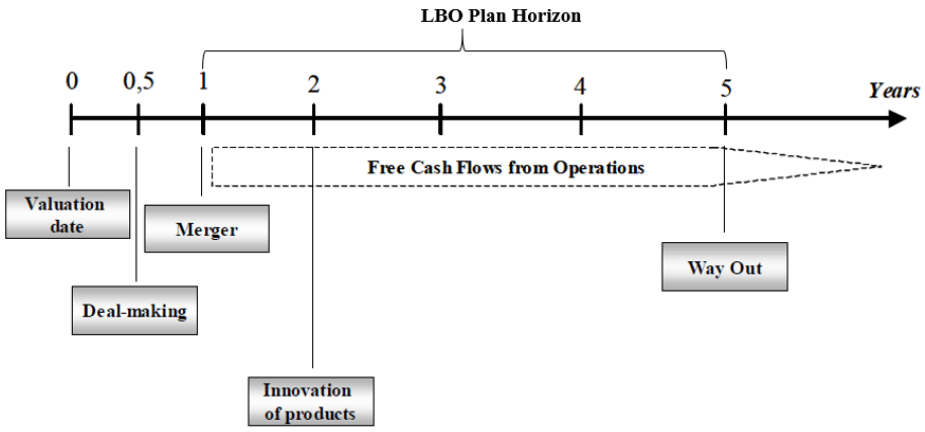


*Figure 26 Source: (Baldi, The Economics of Leveraged Buyouts, 2015)*

The first step, in valuing a company, using the APV is the estimation of the value of the unlevered firm during the plan horizon. This can be

accomplished by valuing the firm as if it had no debt, i.e., by discounting the expected free cash flow from operations (FCFO) at the unlevered cost of equity. To do that, in our analysis, it is assumed that FCFOs during the plan period are known.

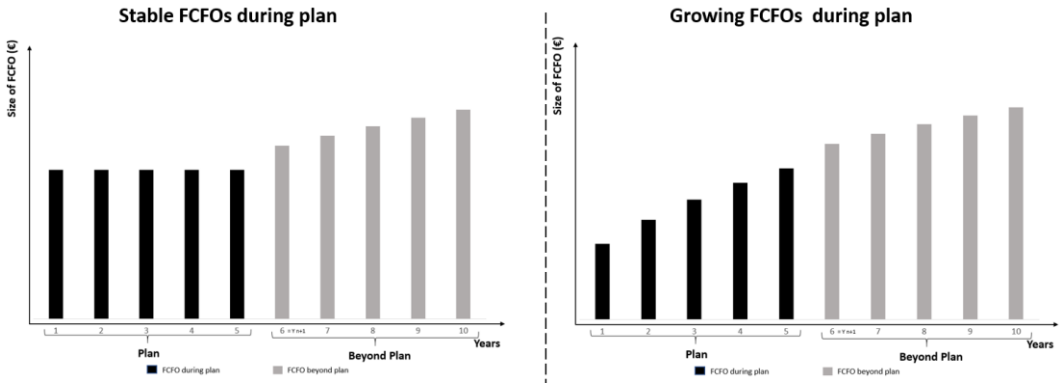


*Figure 27 Size of FCFOs during plan. Source: own elaboration*

As seen in the second chapter, indeed, the management of Newco estimated them during the due diligence phase. These FCFOs, during the plan horizon, could be either growing or constant. Indeed, as seen earlier, managers of the Newco aim to maximize operating cash flows so that they will repay with them the debt contracted to buy the target company. While in the second hypothesis these cash flows show a constant trend. This because one of the characteristics sought, by the management, in the target is the presence of strong and stable cash flows. The value of the unlevered firm, during the plan, will be given, therefore, by the following formula:

$$W_{U\ plan} = \sum_{t=1}^{n} \frac{FCFO_t}{(1 + R_{eu})^t} \tag{3.10}$$

Where $FCFO_t$[45] are the expected after-tax operating cash flows and $R_{eu}$ is the unlevered cost of equity. The inputs needed for this valuation are the expected operating cash flows and the unlevered cost of equity. The first are estimated by the management team during the due diligence phase, while the second must be estimated.

To estimate the unlevered cost of equity ($R_{eu}$), instead:

$$R_{eu} = R_f + \beta_u \times (R_M - R_f) \quad (3.11)$$

Where:

$R_f = Risk\ Free$ [46]

$R_M = Return\ of\ the\ Market$[47]

$(R_M - R_f) = Market\ risk\ Premium$[48]

$\beta_u = Unlevered\ Beta$

About the unlevered beta of a firm, it is determined by the types of the businesses in which it operates and its operating leverage[49]. This unlevered beta is, often, referred to as the asset beta, because its value is determined by the assets (or businesses) owned by the firm. Thus, the equity beta of a company is determined both by the riskiness

---

[45] Free Cash Flow From Operating Activities = EBIT + Depreciation &Amortization +/- Change in Working Capital

[46] See more at: Damodaran, A.; (2010). *"Applied corporate finance*". John Wiley & Sons, pg 88.

[47] See more at: Damodaran, A.; (2010). *"Applied corporate finance*". John Wiley & Sons, pg 93.

[48] See more at: Damodaran, A.; (2010). *"Applied corporate finance*". John Wiley & Sons, pg 94.

[49] Operating leverage = % Change in EBIT⁄% Change in sales

of the business it operates in as well as the amount of financial leverage risk it has taken on (Damodaran, 2015). To estimate it, therefore, it can be utilized the well-known formula of the levered beta[50] and compute the unlevered beta[51] of it:

$$\beta_U = \frac{\beta_L}{1 + (1 - t_c)\frac{D}{E}} \tag{3.12}$$

Where:

$\beta_L = Levered\ Beta$

$t_c = Marginal\ Tax\ rate\ of\ the\ Firm$

This unlevered beta can then be used to arrive at the unlevered cost of equity and finally calculate the value of the unlevered firm during the plan horizon, that is usually of 5-7 years as seen in the previous chapter.

The second step, instead, is to estimate the value of the unlevered firm beyond the plan horizon ($TV_{unlevered}$). The valuation process with terminal value is the standard generally followed by financial analysts, particularly in M&A transactions. As pointed out in the previous section, in a LBO operation, the analytical cash flow projection usually covers the duration of the plan (5-7 years). Therefore, in general, the analysts must assume the business plan as a starting point and then expand it using hypotheses. In fact, the value of the target company

[50] The beta of a firm is determined by three variables: (1) the type of business or businesses the firm is in, (2) the degree of operating leverage in the firm, and (3) the firm's financial leverage (Damodaran, 2015).

[51] See more at: Massari, M.; Zanetti, L. (1998). *"Valutazione Finanziaria". McGraw-Hill, pg 141*

cannot be based solely on the cash flows generated by it during the plan. The most commonly used hypothesis is that of a constant perpetual growth. Which, in unlevered enterprises, is also known as the "Gordon's model", named by Myron Gordon, whom made it popular in the United States in the 1950s[52].

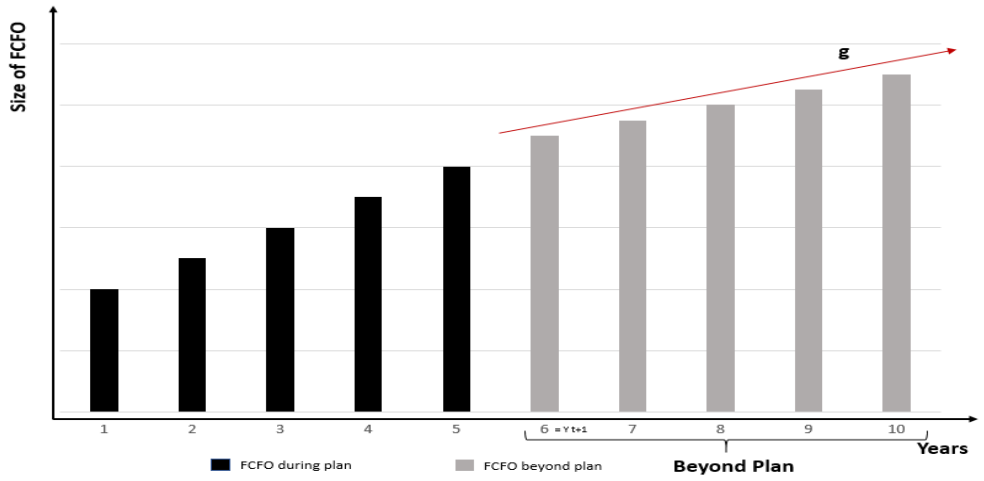


*Figure 28: Growth of FCFO beyond plan horizon. Source: own elaboration*

The formula to derive the value of the unlevered Newco, for the period after the plan, can be represented as follows:

$$W_{U\ beyond\ plan} = \frac{FCFO_{n+1}}{R_{eu} + g} \qquad (3.13)$$

Where:

$FCFO_{n+1} = Operating\ cash\ flow\ of\ the\ first\ year\ beyond\ the\ plan$

$R_{eu} = \ Unlevered\ cost\ of\ capital$

$g = Perpetual\ growth\ rate, nomilal\ or\ real$

[52] See M. Gordon, E. Shapiro, (1956). "Capital Equipment Analysis: The required Rate of Profit", in Management Science,3, October 1956, pp. 102-110

The choice of how to develop the cash flows beyond the plan horizon is based, usually, on three major assumptions:

- growth in consumption aligned with that of GDP
- growth in FCFO supported by Asset stripping and low CAPEX[53]
- nominal growth, due to inflation phenomena[54]

The results of the formula above is known as the terminal value ($TV$) of the unlevered firm:

$$TV_{unlevered} = W_{U\,n+1} = \frac{FCFO_{n+1}}{R_{eu} + g} \tag{3.14}$$

But to sum up it to the value of the unlevered firm during the plan horizon, the $TV_{unlevered}$ must be discounted in order to obtain its present value ($DTV_{unlevered}$):

$$DTV_{unlevered} = \frac{TV_{unlevered}}{(1 + R_{eu})^t} \tag{3.15}$$

Knowing that, now it can be derived the value of the unlevered Newco, just adding to the result above the one found in equation (3.11):

$$W_U = W_{U\,plan} + DTV_{unlevered} \tag{3.16}$$

[53] See Chapter 2

[54] See more at: Massari, M.; Zanetti, L. (1998). *"Valutazione Finanziaria*". McGraw-Hill; pg.83

$$W_U = \sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t} + \frac{TV_{unlevered}}{(1+R_{eu})^t} \quad (3.17)$$

## 3.4 VALUE OF THE TAX SHIELD

As seen in chapter 2, tax shield (TS) can be a powerful incentive for LBO, because companies always have a lot of taxable income. High financial leveraged would bring the tax benefit, which regards to U.S. and most of developed countries' tax regulation: government provides subsidy for debt financing within company[55]. Tax shield is linked to financial leveraged, so leveraged company would receive additional subsidy which doesn't exist for unleveraged company

Moving now to the second component of the (3.9), it will be computed the present value of the future stream of tax saving. In this section, it will be analyzed the valuation of the tax shield (TS) in a standard case, leaving the debate about the methodological issues to next chapter. In which it will be addressed the criticalities about the discount rate and the analysis of the debt repayment schedule. Therefore, it will be adopted the notation ($R_{TS}$) for the discount rate of the tax shield; and the debt to equity ratio will be considered as if it decreases linearly (Ross & Westerfield, 2005) for all the time horizon due to constant repayment schedule (Figure 29).

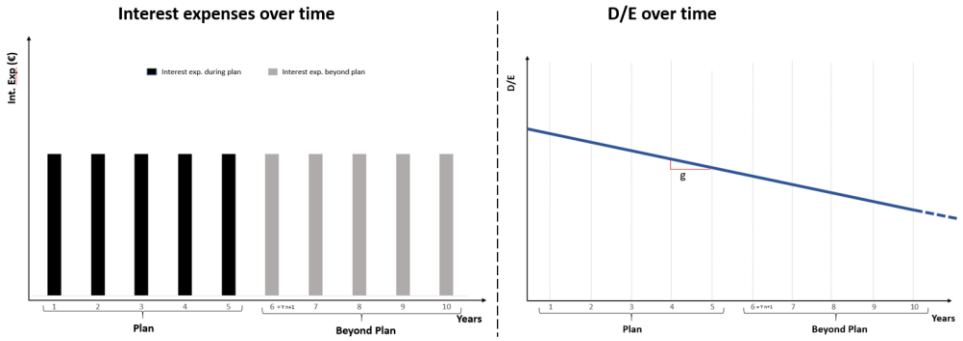


*Figure 29 Source: Own elaboration*

The third step in the APV approach is the calculation of the expected tax benefit from planned interest expenses, in this case from a given level of debt. This tax benefit, as seen in the (3.6) is a function of the tax rate of the firm and is discounted at ($R_{TS}$), usually associated to the cost of debt, to reflect the riskiness of this cash flow. Under this hypothesis of predetermined leverage changes, according to (Kaplan & Rubback, 1995), (Inselbalg & Kaufold, 1989) and (Ross & Westerfield, 2005)there are no criticality in applying Mayers' APV method with the cost of debt ($K_d$) as discount rate. If, instead, debt covenants require that the entire free cash flow must be dedicated to debt service, the interest tax shield at any point in time are a direct function of the FCFO. Under this circumstances, the debt balance, and therefore the TS, is as risky as the operating cash flows. Consequently, the unlevered cost of capital ($k_u$) should be used to discount the interest tax shields. A step forward, however, must be done when the debt reduction is uncertain or the leveraged ratio is not fixed. According to (Arzac, Valuation of Highly Leveraged Firms, 1996), the valuation of an asset or of a firm, when debt reduction is uncertain, is the same as the valuation of an option[56]. Debt reduction

[56] This argument goes beyond the purpose of this thesis. See more at: Arzac, E. R. (1996). Valuation of Highly Leveraged Firms. Financial Analysts Journal, 42-50.

in LBOs will therefore result, in any given period, as a function of the random cash flow realization of that period ($E(FCFO_t)$). Therefore, the tax shield discounted or at the cost of debt, as proposed by Mayers and MM before him, or at the unlevered cost of equity as proposed by (Miles & Ezzel, 1980) and, under different set of hypothesis, by (Kaplan & Rubback, 1995), lead to valuations error. [57]

Anyway, if the tax savings are known, as in the case of an LBO plan horizon, the tax shield will result as follows:

$$W_{TS\,plan} = \sum_{t=1}^{n} \frac{R_D \times D_t \times t_c}{(1 + R_{TS})^t} \tag{3.18}$$

Where (n) is the last year of the LBO plan, usually year 5 or 7, and ($D_t$) is the amount of debt left at each year of the plan.

As for the value of the unlevered firm, the following step is to estimate the present value of interests' tax shield beyond the plan horizon (terminal value of tax shield). As seen in Figure 29, in this section the D/E ratio and the interest expenses are supposed to decrease linearly over time by a fixed percentage per year (g). In practice, this cannot happen, because it will be lead to a leveraged ratio equal to 0 after few years. As it will be seen in the section dedicated to debt profile analysis, according to (Massari & Zanetti, 1998), it is more realist assuming that, after the plan horizon, the debt to equity ratio will

[57] The full arguments about the appropriate discount rate for tax shield is explained in deep in Chapter 4

progressively decrease to a predefined lower limit, and then remain constant over time.

Under the hypothesis of Figure 29, however, the terminal value of the tax shield ($TV_{TS}$) will be a perpetuity:

$$TV_{TS} = \frac{R_D \times D_{n+1} \times t_c}{R_{TS} + g} \tag{3.19}$$

As in the case of the terminal value of the unlevered company, the result founded in equation (3.19) must be discounted in order to be sum up to the present value of the tax shield during the plan ($W_{TS\,plan}$). Doing this it will be obtained the discounted terminal value of tax shields ($DTV_{TS}$):

$$DTV_{TS} = \frac{TV_{TS}}{(1 + R_{TS})^t} \tag{3.20}$$

Knowing that, now it can be derived the value of complete stream of tax shields of the Newco, just adding to the result above to the one found

in equation (3.19):

$$W_{TS} = \sum_{t=1}^{n} \frac{R_D \times D_t \times t_c}{(1 + R_{TS})^t} + \frac{TV_{TS}}{(1 + R_{TS})^t} \tag{3.21}$$

## 3.5 THE ESTIMATE VALUE OF THE EXPECTED BANKRUPTCY COSTS RELATED TO DEBT

The last step in estimating the value of a firm, using the adjusted present value approach, is to evaluate the effect of the given level of debt on the default risk of the firm and on expected costs of financial distress. This step poses the most significant estimation problem, since neither the probability of bankruptcy nor the bankruptcy cost can be estimated directly. For this reason, lot of financial analysts and university text books ignore it. In this way, just adding the tax benefits to unlevered firm value to get to the levered firm value makes debt seem like an unmixed blessing. Firm value will be overstated, especially at very high debt ratios, where the cost of bankruptcy is clearly not zero and, in some instances, the cost of bankruptcy is higher than the tax benefit of debt (Damodaran, 2015). In next chapter this topic will be discussed in depth, through the revision of the most important articles and empirical research that tried to estimate the bankruptcy costs directly[58]. For the time being, the approach proposed by Damodaran will be followed. Which consists essentially in the indirect estimation of the probability of default with the additional debt and the direct and indirect cost of bankruptcy. If ($\pi_a$) is the probability of default after debt is added to the Newco capital structure and (BC) is the present value of the bankruptcy cost, the present value of expected costs of financial distress (CD) can be estimated in this way:

[58] See: Andrade, G., Kaplan, S. N., (1998). "How Costly is Financial (Not Economic) Distress? Evidence from Highly Leveraged Transactions that Became Distressed." J Finance. 53 1443-1493. (Andrade & Kaplan, 1998)

Shapiro, A., 1989, Modern Corporate Finance, Macmillan, New York; Titman, S., 1984, The Effect of Capital Structure on a Firm's Liquidation Decision, Journal of Financial Economics, v13, 1371–51.

$$CD = \pi_a \times BC \quad (3.22)$$

For what concerns the probability of default ($\pi_a$), it is the possibility that a firm's cash flows will not be sufficient to cover debt obligations (interest or principal). Such eventuality does not automatically mean bankruptcy, it does trigger default, with all its negative consequences. According to this definition, therefore, the probability of bankruptcy is a function of both the size of the FCFOs and the volatility of them. With, on one hand, larger cash flows that reduce the probability of default, while on the other, more volatile cash flows that increase this probability. Consequently, the likelihood of bankruptcy increases marginally for all firms as they borrow more money, irrespective of how large their cash flows might be, and the increase should be greater for firms in riskier businesses (Damodaran, 2015). According to the author, there are two basic ways in which the probability of default can be estimated indirectly. The first, is to estimate a bond rating at each level of debt and use the empirical estimates of default probabilities for each rating, and look at historical trends to estimate the default likelihood for a given rating. Figure 12 extracted from an annually updated study by (Altman E. , 2008), summarizes the probability of default over 10 years by bond rating class.

| *Rating* | Likelihood of Default (%) |
|---|---|
| AAA | 0.07 |
| AA | 0.51 |
| A+ | 0.60 |
| A | 0.66 |
| A− | 2.50 |
| BBB | 7.54 |
| BB | 16.63 |
| B+ | 25.00 |
| B | 36.80 |
| B− | 45.00 |
| CCC | 59.01 |
| CC | 70.00 |
| C | 85.00 |
| D | 100.00 |

*Figure 30 Default Rates by Bond Rating Classes. Source: (Damodaran, 2015)*

The second way is to use a statistical approach, such as a probit to estimate the probability of default, based upon the firm's observable characteristics, at each level of debt (Damodaran, 2015).

The bankruptcy's costs (BC), instead, from a certain point of view, are even more difficult to quantify. When bankruptcy happens, it is a calamity for all stakeholders involved in the firm, on one hand debtholders often get back only a portion of what they are owed, and equityholders, on the other hand, frequently get nothing. The overall cost of bankruptcy includes both the direct and indirect costs.

a) The direct costs of bankruptcy, also known as deadweight, are that costs incurring at the time of bankruptcy. These include legal and administrative expenses as well as the present value effects of delays in paying out the cash flows. They can't be directly estimated, therefore, even if with substantial errors, they must be estimated indirectly from studies that have looked at the empirical scale of this costs. According to these, the direct costs of

bankruptcy are small, relative to firm value. For example, Warner's study (Warner, 1977) found out that direct cost of bankruptcy seems to be about 5%.

b) Indirect costs, instead, are not so small. Indeed, if the only costs related to bankruptcy were the direct costs, the firms that are maintaining a low leverage would be puzzling. Indirect costs increase default risk mainly because they are the consequence of the perception that a firm may be in financial trouble. In such a circumstance, customers may stop buying products and service, of the firm perceived to be distressed, because of the fear that the company will be out of business in the very next future. Another source of indirect costs could be the more stringent terms suppliers start demanding to protect them against the likelihood of default. Consequently, the firm may see an increase in working capital and a decrease in cash flows. The last, and perhaps the most important source of indirect costs is, however, the difficulty in accessing the credit and/or debt market. A high leveraged firm may experience difficulties in trying to raise fresh capital for its projects. Indeed, both debt and equity investors would require a huge rate of return, or even be reluctant to bear that risk, moving to other projects. According to (Shapiro, 1989) and (Titman, 1984) the indirect costs could be as large as 25–30% of firm value but they provided no direct evidence of the costs.[59] More precisely, these indirect costs are likely to be more severe for the following types of firms[60]:

---

[59] See more at: Shapiro, A., 1989, Modern Corporate Finance, Macmillan, New York; Titman, S., 1984, The Effect of Capital Structure on a Firm's Liquidation Decision, Journal of Financial Economics, v13, 1371–51.

[60] See Damodaran, A.; (2010). *"Applied corporate finance*". John Wiley & Sons, pg 315.

- Firms producing durable products with long lives requiring replacement parts and service.
- Firms providing goods or services for which quality is an important attribute but is difficult to determine in advance. A good example could be the one of airline perceived in financial trouble. Indeed, that may scare away customers who could worry about the aircrafts' maintenance.
- Firms that provide goods whose value added depends on complementary products and services provided by independent companies.
- Firms selling products requiring continuous service and support from the manufacturer.

# 4 MAIN METHODOLOGICAL CRITICALITY IN USING THE APV METHOD FOR HIGH LEVERAGED TRANSACTIONS VALUATION

The characteristics of the adjusted present value methodology, which, as already mentioned, for the first time was proposed by Myers in 1973, permit to go beyond the limits of the conventional DCF approach. Indeed, the Modigliani and Miller' WACC approach doesn't fit in situations in which the capital structure is highly variable, as in the LBOs case. However, although the adjusted present value method is relevant from a theoretical point of view, the high complexity encountered in determining the inputs required for its use let it happen that this methodology is not often used in practice. In this chapter, it will be discussed in deep the difficulties that a practitioner may face in determining the necessary inputs while valuing an LBO, or in general a high leveraged transaction, using the APV method. This debate will be developed following the point of views and the answers given by different academics to the following methodological issues:

- Which set of assumptions, regarding the financial policy, should be adopted in assessing the debt profile?
- At which rate should be discounted the tax shield?
- How large are the expected costs of financial distress?

## 4.1 ASSUMPTIONS ABOUT THE DEBT PROFILE ANALYSIS IN A LEVERAGED BUYOUT

The first issue a practitioner will face while valuing an LBO transaction, or, even, every highly leveraged transaction (HLT)[61], is to set the appropriate assumptions about the financial policy. Particularly, about the assumptions underlying the high leverage phase and the debt repayment schedule. As it will be seen in section 4.2, the choice of one assumption rather than another will have a decisive influence on the decision about at which rate should be discount the interests tax shield.

As seen in the previous chapters, the financial sponsor(s) of an LBO plans to reduce the leverage ratio, of the Newco, over time by deploying its free cash flow from operations (FCFOs) to debt reduction. According to numerous academics (Arzac, 1996) (Inselbalg & Kaufold, 1989) (Kaplan & Rubback, 1995) (Mayers, Interactions of Corporate Financing and Investement Decisions. Implication for Capital Budgeting, 1974) (Miles & Ezzel, 1980) and (Luehrman, 1997), the APV is the most appropriate valuation technique, at least theoretically, in valuing firms that present significant changes in capital structure over time.[62] Given that, the hypothesis of how this capital structure changes over time must be discussed in order to identify a realistic model that describes the trend of debts over time; and consequently, adopt the procedure for valuing tax shields in line with the profile previously assumed. In valuing an LBO operation, at least,

[61] Corporate restructuring, recapitalizations and project financing (Vivas & Leardini, 2015)

[62] (Kaplan & Rubback, 1995) provides evidence that the APV and its compressed form CCF provide reliable estimates of market value. Their median estimates of discounted cash flows for 51 HLTs are within 10 percent of the market values of the completed transactions and perform at least as well as valuation techniques using multiples.

four assumptions must be evaluated, two regarding the debt profile during the plan horizon and two beyond it.

1) Assumptions about debt profile during plan horizon:
    i) debt service is fixed in advance and, therefore, its dollar amount is known at each period
    ii) the debt covenants require that the entire future FCFO must be dedicated to the interest and principal payments

2) Assumptions about debt profile beyond plan horizon:
    i) the amount of debt is adjusted to maintain a fixed optimal market value leverage ratio
    ii) the amount of debt in each future period is set initially and not revised in light of subsequent developments

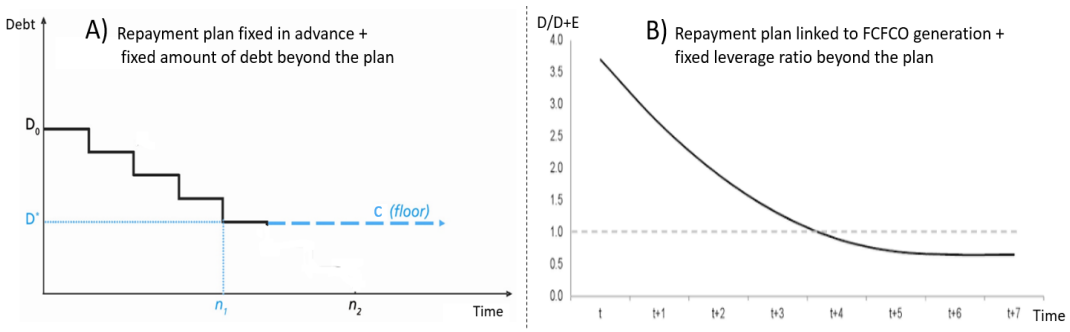


*Figure 30: Debt profile assumptions. Source: Own elaboration*

### 4.1.1 Debt profile analysis during plan horizon

The debt profile analysis during plan horizon should follow the debt covenants the sponsor has subscribed. If this is unknown two main assumptions should be made. The first is that the reduction of the outstanding debt follows a fixed scheme set in advance, up to a predetermined lower limit in the last year of the plan, that correspond to the desired capital structure (D*) (Figure 30.A). Doing so, the dollar amount of debt is known at each period of the plan. Alternately, the

second assumption is that the debt covenants require that the entire operating cash flows, during the plan horizon, are dedicated to interests and principal payments (Figure 30.B), meaning that the debt reduction in any given period is a function of the random cash flow realization of that period (Arzac, 1996).

Assuming the first (a) or the second (b) hypotheses described above, the valuation of the tax benefits linked to debt over the plan horizon changes in the following terms:

a)
$$W_{TS\,plan} = \sum_{t=1}^{n} \frac{R_D \times D_t \times t_c}{(1 + R_{TS})^t} \tag{4.1}$$

or
$$W_{TS\,plan} = \sum_{t=1}^{n} \frac{R_D \times D_0 \times (1 - c \times t) \times t_c}{(1 + R_{TS})^t} \tag{4.2}$$

Where:

$n$= years of the repayment schedule

$t$= time

$c$ = coefficient expressing the share of debt repayment in the presence of the lower limit (D*)

$$c = \frac{D_0 - D^*}{n \times D_0}$$

$t_c$= corporate marginal tax rate

b)
$$W_{TS\,plan} = \sum_{t=1}^{n} \frac{E(FCFO_t)}{(1 + R_{TS})^t} \quad (4.3)$$

The difference between (4.1) and (4.2) resides only in the methodology approach used. In the former, given the level of debt at the beginning of the plan ($D_0$) and the desired capital structure at the end (D*), the amount of the repayments could be different, from one year to the other, but is known in advance because they follow a predetermined reimbursements' schedule. In (4.2), following (Massari & Zanetti, 1998) insights, the debt is repaid in constant tranches (c), that are a function of ($D_0$), (D*) and the number of years of the plan.

As regards the (4.3), a further criticality may arise when assuming the second hypothesis. Indeed, if the future operating cash flows are uncertain, also future tax savings are uncertain, because they are a function of cash flow generation. For instance, in some circumstances the Newco may not have enough taxable income to pay tax, generating no tax saving. In such a case, the future tax payments, and so the future debt repayments, are like a call option on taxable income of the Newco (Cooper & Nyborg, 2004). This raises complex valuation issues, that go beyond the scope of this dissertation[63]. In general terms, this issue can be neglected, due to, as seen in Section 2.8, the features that are sought in the possible target company, such as strong and stable cash flow generation, leading and defensible market positions, growth opportunities, efficiency enhancement opportunities

[63] See more at: (Baldi, Valuing a Leveraged Buyout: Expansion of the Adjusted Present Value by Means of Real Options Analysis, 2005) and (Arzac, Valuation of Highly Leveraged Firms, 1996)

low capex requirements, strong asset base and proven management team.

### 4.1.2 Debt profile analysis beyond plan horizon

According to (Arzac, 1996), the gradual process of debt reduction, is consistent with Myers' pecking order theory (Mayers, 1984) and with the cash flow signalling hypothesis of leveraged buyouts in which LBO firms (Newcos) revert to more conventional capital structure in the years following the buyout, usually after 5-7 years (Arzac, 1992).

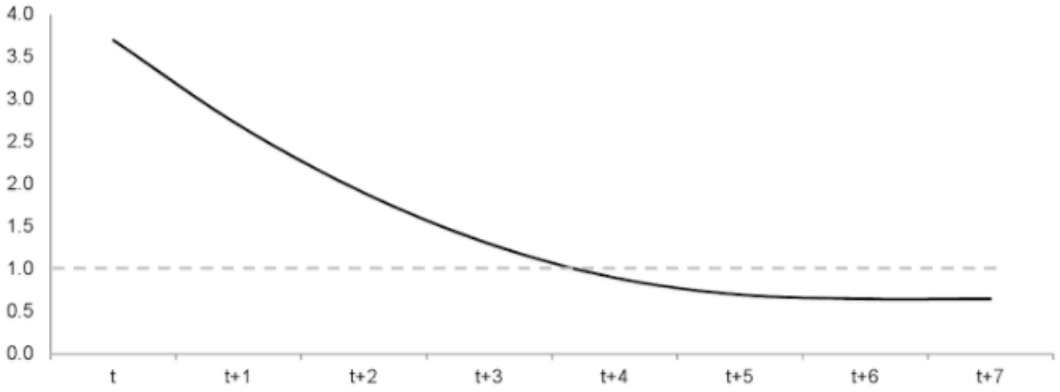


*Figure 31: Capital structure of the Newco after an LBO deal. Source: (Baldi, The Economics of Leveraged Buyouts, 2015)*

Therefore, the capital structure of the Newco can be stated as follows. All the operating cash flows ($E[FCFO_t]$), or a fixed amount predetermined in a plan, are dedicated to paying interests and debt reduction during the plan horizon. While beyond the plan, the firm is recapitalized according to one of this two simple assumption:

a) According to (Modigliani & Miller, 1963) and (Mayers, 1974) assumptions, in which the future dollar amount of debt will remain constant
b) According to (Miles & Ezzel, 1980) assumption, in which the future leverage ratio will remain constant

Adopting one of these, it will be obtained a relatively simple expression for discount rate which include the tax benefit of borrowing, making it easy to put the tax effect of borrowing into a valuation (Cooper & Nyborg, 2004). Leaving the debate about discount rates at next section[64], it will be now derived the expression for the tax shield beyond the plan horizon ($DTV_{TS}$). In this phase, there is no difference in the expression of the terminal value because, following MM or ME assumptions, it would change only in the discount rate. For this reason, the discount rate for the tax shield is now noticed as $R_{TS}$.

$$DTV_{TS} = \frac{R_D \times D^* \times t_c}{R_{TS} \times (1 + R_{TS})^n} \tag{4.4}$$

or

$$DTV_{TS} = \frac{R_D \times D_0 \times (1 - c \times n) \times t_c}{R_{TS} \times (1 + R_{TS})^n} \tag{4.5}$$

## 4.2 THE RIGHT DISCOUNT FACTOR FOR THE INTERESTS TAX SHIELD

As fully explained in the previous chapters, the theoretical foundations for the application of Mayers' APV method can be found in the teachings of Modigliani and Miller (MM). They showed how, under perfect capital market conditions, without transaction costs and taxes, the choice of a specific financial structure did not influence the economic value of firm's assets. In presence of taxation, on the other hand, debt financing allows the company to obtain tax benefit, given the deductibility of interest, and therefore an increase in the firm's value and, at the same time, the onset of bankruptcy costs. With regard to the tax benefit of debt, the tax shield, it is the tax savings

[64] See Section 4.2

that result from deducting interest from EBT. By deducting a single dollar of interest, a firm reduces its tax liability by its marginal corporate tax rate ($t_c$) (Graham, 2000). The greatest criticality that may arise during the implementation of the APV method in valuing an LBO transaction concerns the estimate of debt levels in the long term, and consequently that of the present value of the future stream of tax shields. This limit can be exceeded by assuming that in the long term the company uses a target capital structure. As seen in Section 4.1.2, literature is divided between those who support the MM and Mayers assumption that the future dollar amount of debt will remain constant, and who support the ME assumption of constant market value leverage. For this reason, although nowadays the presence of the benefit of interest tax shields is widely recognized by the scientific community, there is still a great controversy about its valuation.

Miles and Ezzel themselves addressed the debate about the use of the two different assumptions in the valuation and estimation of the benefit of the tax shield in their famous article, "Capital Project Analysis and the Debt Transaction Plan" (Miles & Ezzell, 1983). In this work, the two authors re-examine the conflict between the WACC (constant leverage ratio over time) and the APV (value of debt constant over time) approach. Generally, the two approaches lead to different evaluation results, as appeared from both the work of (Mayers, 1974) and (Miles & Ezzel, 1980). The relevant element, which emerged from the previous analysis, was that the two methods had the same basic assumptions regarding the value of unlevered flows. Since the present value of levered cash flows is the sum of the present value of unlevered cash flows and the present value of the tax shield. Consequently, it follows that the substantial difference between the two models consists in the different assumptions regarding the

valuation of the present value of the tax shield. The key factor determining the changes in the tax shield is the assumptions concerning the capital structure of the company to be assessed. Miles and Ezzel had already demonstrated that in the WACC approach it is necessary to appropriately rebalance the amount of debt in order to maintain a constant leverage ratio in terms of market value. For the Mayers' model, however, it is necessary to know future debt levels in order to express the most correct valuations possible. Since the use of one pretend to know exactly the amount of future debt while the other pretend to keep the debt ratio constant, the choice of one model excludes the other. Consequently, the choice of the method to be used will be influenced by the firm's financial policy or the assumptions about that.

The Adjusted Present Value model, as originally presented by (Mayers, 1974), calculates the value of the levered enterprise as the sum of future operating cash flows discounted at the cost of unlevered capital ($R_U$), and of future cash flows linked to the tax shield, discounting them at the rate representative of the cost of debt ($R_D$). While, (Miles & Ezzell, 1983), in their work, developed new insights about the APV model as originally presented by Mayers, hypothesizing to modify the formula replacing the discount rate of the tax shield. The two scholars proposed to exchange the cost of debt ($R_D$), as discount rate, with ($R_U$), the cost of unlevered capital. The choice depends on the riskiness associated with the tax savings generated by the deductibility of interest on debt. Indeed, if it is assumed that all future movements of the debt are know with certainty, and consequently also the exact amount of the value of the tax shield, it is reasonable to discount it at the ($R_D$) rate since the riskiness of the debt and the tax shield is the same. Therefore, the

idea behind the original formulation of the APV is that of MM, i. e. that the level of debt is predetermined and never changed over the period of the valuation (Cooper & Nyborg, 2004). In the case of an LBO transaction, over the period beyond the plan horizon. Miles and Ezzel, on the other hand, consider the leverage ratio to be constant, therefore, the exact level of debt is known only in the first period, while in subsequent periods it can be increased or decreased, in order to maintain the debt to value ratio constant, according to the market value of company. Based on these considerations, it follows that the future level of debt depends on the value of the levered company, and consequently the riskiness of debt is assimilated to the riskiness of operating activities, reflected in the unlevered cost of capital. Since the tax shield by its nature is as risky as debt, it should also be discounted at the $R_{eu}$ rate (Miles & Ezzell, 1983).

In summary, in the article the two authors outline the origin of the conflict between the two approaches. Both methods make the same assumptions for the valuation of the unlevered component of the cash flows of a project but define different hypotheses for the valuation of the tax shield. According to Myers' approach, the latter should be discounted to the cost of debt. While, the approach outlined by Miles and Ezzell discount the tax shield in the initial period to the cost of debt, while in the remaining periods they use the rate adjusted for the risk of the cost of unlevered capital. The difference, indeed, is due to a completely different set of assumptions about the financing strategy. MM assume that the amount of debt will not change, whereas ME assume that it will rise and fall in line with the expected cash flow (Cooper & Nyborg, 2004), making the debt levels after the initial period uncertain. Moreover, since usually $R_{eu}$ exceeds $R_D$, the approach

proposed by ME reduce the present value of interest tax shield relative to those implied by the MM approach (Harris & Pringle, 1985).

Until then, however, the debate was about the general case of a business valuation or that of an investment project. According to (Arzac, 1996), the possibility of applying the Myers' APV rule to value LBOs, was first noted by (Inselbalg & Kaufold, 1989). Which, however, analyzed only the case in which the debt levels were predetermined. The first to address the criticalities of using the APV in valuing an HLT transaction were (Kaplan & Ruback, The valuation of cash flow forecasts: An empirical analysis, 1995) and (Ruback, 2002). The authors, in addition to analyzing the criticalities mentioned above and proposing their own variant to Myers' model, have found out, for a sample of 51 HLTs completed between 1983 and 1989, that their valuations, discounting the value of the cash flow forecasts, perform at least as well as valuation methods using comparable companies (Kaplan & Ruback, The valuation of cash flow forecasts: An empirical analysis, 1995). Coming back to the criticalities, Kaplan & Ruback affirmed that it is unreasonable to discount the tax shield at the debt discount rate, because in an HLT it is possible that the interest charges would not always save taxes. Therefore, for the authors is more reasonable to assume that the tax shield has the same systematic risk as the firm's underlying cash flows or assets. The authors have called this method the Capital Cash Flow (CCF) method because the cash flows of the (4.7) include all the cash available to capital providers (Ruback, 2002). More specifically, the CCF is equal to the cash flow that can be distributed to equityholders[65], plus the

[65] dividends paid + buyback - capital increases (Vivas & Leardini, 2015)

cash flow that can be distributed to debtholders[66]. From the company's point of view, the CCF is equal to the operating cash flow (FCFO) plus the interest tax shield (TS). Because the interest tax shields are included in the cash flows, the appropriate discount rate is before-tax and corresponds to the riskiness of the assets (Ruback, 2002).

$$W_L = \sum_{t=1}^{n} \frac{CCF_t}{(1+R_{eu})^t} = \sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t} + \sum_{t=1}^{n} \frac{TS_t}{(1+R_{eu})^t} \quad (4.6)$$

$$W_L = \sum_{t=1}^{n} \frac{FCFO_t + TS_t}{(1+R_{eu})^t} \quad (4.7)$$

The CCF is known also as the Compressed Adjusted Present Value Technique (Compressed APV)[67], because as recognized by (Kaplan & Ruback, The valuation of cash flow forecasts: An empirical analysis, 1995) themselves the CCF is equivalent to using the APV method discounting interest tax shields at the discount rate for an all-equity firm. Even if the results obtained by the two scholars seems, at first glance, equal to the ones obtained by ME, according to (Cooper & Nyborg, 2004) the reason for discounting the tax saving at $R_{eu}$ is different. On one hand, ME use as the motivation the assumption that debt is always proportional to the market value of the firm, and therefore to the underlying cash flows. In Kaplan and Ruback, on the other hand, the tax shield is discounted at the unlevered cost of equity because the interest tax shields are included in the so-called capital

[66] interest paid + debts repaid - new debts (Vivas & Leardini, 2015)

[67] Stewart Myers himself has suggested the name “Compressed APV” as a label for this method.

cash flow, such as the cash available to capital providers. In this way, they suggest that the use of the CCF method has a computational advantage over the standard APV approach, because it can be used for valuing any HLT regardless of whether the ME or MM debt policy assumption is followed.

## 4.3 HOW LARGE ARE THE EXPECTED COSTS OF FINANCIAL DISTRESS?

As seen in chapter 3, the adjusted present value method is very useful in valuing LBOs transaction because explicitly takes into account all the effects of the capital structure (Arzac, 1996). Indeed, the APV method makes it possible to determine the value of the levered company by adding to its unlevered value, not only the interest tax benefits, but also the costs deriving from the presence of a high level of debt. According to (Damodaran, 2015), the assessment of the expected costs of financial failure requires the estimation of the probability of default associated with a given debt level and the direct and indirect costs of failure, as in (3.22). Where, direct costs include all costs that arise immediately upon bankruptcy, including legal, administrative, expert appraisal and reorganisation costs of the bankrupt company, while indirect costs result in the perception of external parties regarding the conditions of financial distress. But, given that neither the probability of bankruptcy nor the bankruptcy cost can be easily estimated directly (Brealey & Myers, 2003), this step lead to great methodological criticality when a practitioner tries to use the APV method when valuing an LBO. In LBOs transactions, it would not be trivial to expect that a percentage of these will end up not meeting their debt covenants, and eventually file for bankruptcy (Kaplan & Strömberg, 2008), because the debt payback depends on the effective realization of the cash flows forecasted by the management. Therefore, the alternative of not considering the cost of

financial distress, as done in many textbooks[68], cannot be taken in account, because it will lead to a significant valuation error.

In this section, in order to answer to the question “how large are the expected costs of financial distress?”, the key findings from existing literature will be presented. After that many LBO transaction ended up in bankruptcy[69] during the first LBO wave in 1980s, the financial community started to investigate the reasons and the magnitude of such bankruptcies. But even if in the years LBOs have become a global phenomenon and the academic researches grown with it, the literature about the magnitude of the costs of financial distress in LBOs is still poor.

### 4.3.1 Researches on the probability of default in LBOs

The first to address this problem were (Kaplan & Stein, 1993), whom in their paper analysed 124 MBOs completed between 1980 and 199 and found out that approximately 30% defaulted compared to a 2% default rate for the five-year period before that. A more recent and meaningful research is that of (Strömberg, 2008) where in his paper analyzed global leveraged buyout (LBO) activity, exit behaviour, and holding periods using a data set of more than 21,000 LBO transactions between 1970 and 2007. In his paper, he found out that almost 6% of all LBO transactions and end up in financial distress

[68] For example, in (Ross & Westerfield, 1997) the authors for simplicity don’t consider the present value of the expected costs of financial distress in valuing an LBO transaction.

[69] See more at: (Kaplan & Stein, How risky is the debt in highly leveraged transactions?, 1990) and (Kaplan & Stein, The evolution of buyout pricing and financial structure in the 1980s, 1993).

during the period of the survey[70]. That assuming an average holding period of six years, this works out to an annual default rate of 1.2% per year (Strömberg, 2008). While this number may seem high compared to annual bankruptcy rates among U.S. publicly traded firms in the same period, which is half of the above number, 0.6% (Ben-Ameur, Hind, Roustan, Théoret, & Trablesi, 2008). It is, however; somewhat lower than the average default rates among U.S. corporate bond issuers (1980-2002), which was 1.6% according to Moody's (Hamilton, Varma, Ou, & Cantor, 2006).

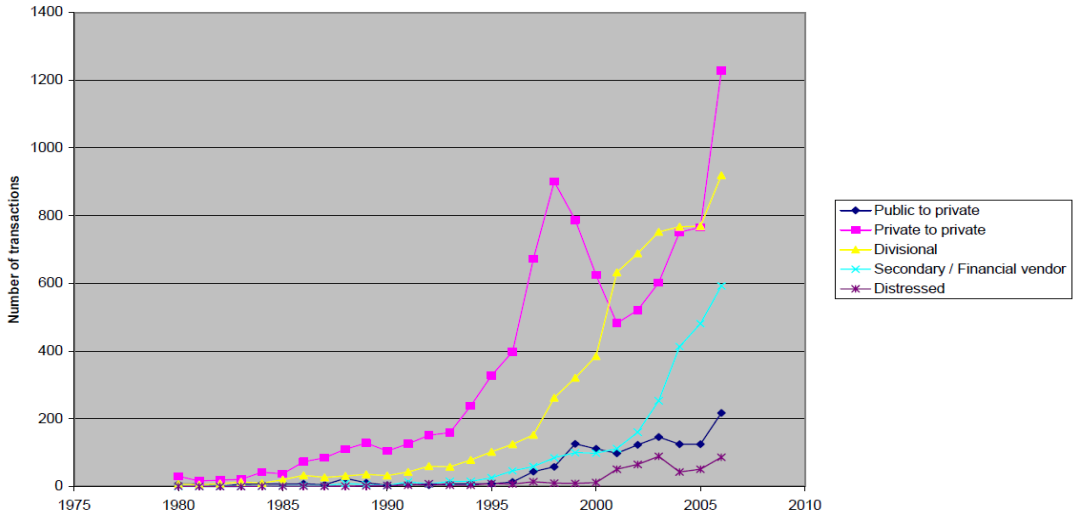


*Figure 32 Number of distressed LBO transactions. Source: (Strömberg, 2008)*

Finally, in contrast with general perception, Strömberg found out that there is no significant difference in likelihood of bankruptcy across boom e bust periods for LBOs.

Another study is that conducted by (Tykvová & Borell, 2012), where they analyzed the probability of bankruptcy of 1,842 European LBO

[70] 6% of deals have ended in bankruptcy or reorganization. Excluding the LBOs occurring after 2002, which may not have had enough time to enter financial distress, the average rate is 7%. (Strömberg, 2008)

transactions during the period 2000-2008. The two scholars found out three interesting results. The former is that, there was no substantial different in the probability of bankruptcy between LBO firms and other companies, in years when cheap debt financing was available. The following result is that LBOs sponsored by experienced PE firms, compared to inexperienced investors, showed lower probability of default, due to their ability to invest in companies which initially have lower bankruptcy likelihoods. Finally, the third result is that this probability of default increases immediately after the buyout, but, three years after the buyout was yet lower compared to comparable non-buyout companies.

### 4.3.2 Is there any cultural bias in assessing the probability of default?

In assessing the probability of default of an LBO transaction, it must be considered not only the amount of leverage used in the operation, but also the cultural environment of the geographical area where the operation takes place. As the data provided by (Strömberg, 2008) suggest, it is not unreasonable to think that there is a cultural bias in assessing the probability of default. The author. indeed, found out that the eventual bankruptcy rates differ from region to region. In the U.S. (9%) and the U.K. (8%) LBOs are considerably higher than in continental Europe and Scandinavia (2%). These data, on one hand, suggests that the large difference is due to more aggressive use of leverage in more developed private equity countries, and on the other hand, because Anglo-Saxon PE firms used to invest more in early stage companies unlike the European ones. This is confirmed also by the reports of EVCA and NVCA, where can be noticed that in Europe only 4,7% of the investments regards early stage companies. In the US almost $6bn, only in the first quarter, were invested in early-stage

companies, while in Europe in 2016 the entire amount of Venture Capital were almost €4.3 bn.

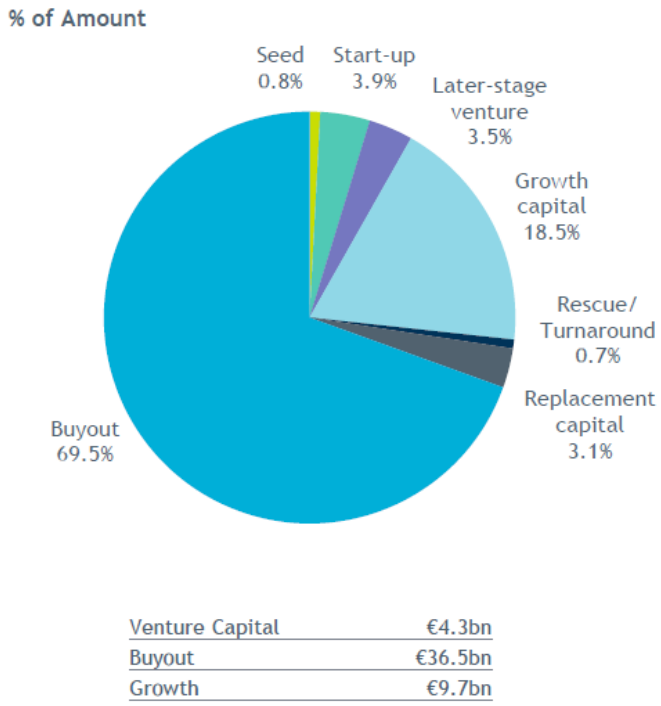


*Figure 33 European PE investments by stage. Source: (EVCA, 2017)*

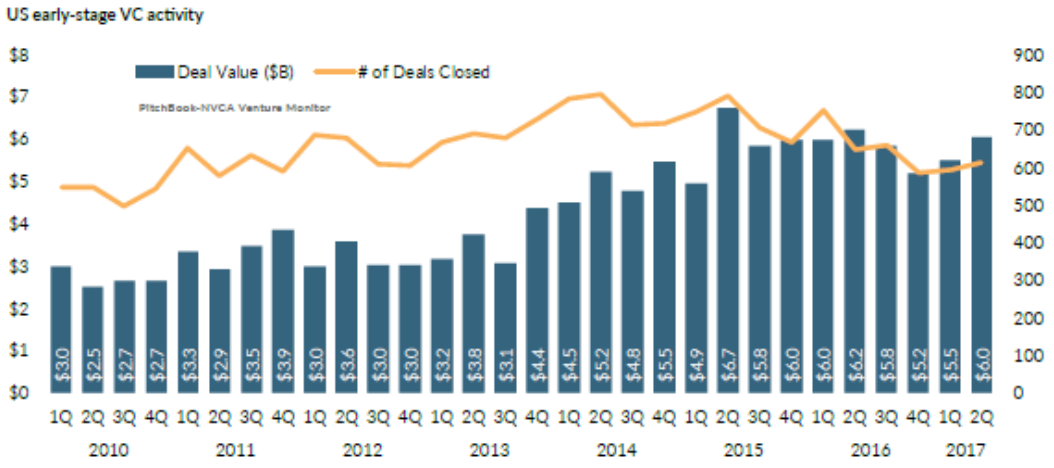


*Figure 34 US early stage PE deals. Source: (NVCA, 2017)*

### 4.3.3 Researches on the costs of financial distress in LBOs

For what concerns the literature about the costs of financial distress, the milestone is represented by the work of (Andrade & Kaplan, 1998). Whom, in their famous paper *"How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed"* studied the effects and sources of financial distress of the thirty-one HLTs that become financially, not economically, distressed from the samples used by (Kaplan & Stein, 1990) and (Kaplan & Stein, 1993). In the paper, the two authors highlight that in order to examine the key sources of distress for buyout companies, it is indispensable to differentiate financial distress[71] from economic distress[72]. Indeed, the two scholars affirm that, in papers previous to their work[73], a large fraction of the firms analysed in the samples are not only financially distressed, but also economically. In this way, the results obtained are not significant because it is difficult to identify whether they measure costs of financial distress, economic distress, or an interaction of them (Andrade & Kaplan, 1998). In the sample, therefore, only firms with positive operating margins were selected, in order to assess only the costs of pure financial distress. Moreover, they found out that the firms analysed, increased their value from pre-transaction to resolution of distress and that operating margins exceed the industry averages at the time of distress. Therefore, the two authors suggest that the opinion that LBOs in the 1980s were unsuccessful is inconsistent.

---

[71] The two scholars define financial distress as. "the first year that a firm has EBITDA less than interest expense, attempts to restructure its debt, or default" (Andrade & Kaplan, 1998)

[72] In the paper, economic distress is defined as poor operating margin and industry performance that reflect the state of the industry or economic climate

[73] For example, see (Altman E. I., 1984), (Asquith, Gertner, & Scharfstein, 1994) and (Gilson, 1997)

From the sample utilized, has arisen that the magnitude of the net costs of financial distress is on average less than 10% of firm value and that never exceed 25%. These results are very lower compared to the 25%-30% of firm value caused by indirect costs of bankruptcy estimated by (Altman E. I., 1984) (Titman, 1984) and (Shapiro, 1989), summed up to the estimates of the direct costs on the order of 3% (Weiss, 1990) or of 5% (Warner, 1977). Moreover, (Andrade & Kaplan, 1998) finding out that these costs of financial distress are positively related to high leverage but are not related to capital structure complexity, the presence of junk bonds, the presence of buyout sponsors, time in distress, or industry performance, they suggest that costs of financial distress have a fixed component.

Finally, the authors having seen that, in sample firms or in firms like them, these costs of financial distress seem low compared to the tax and incentive benefits of debt, they conclude these firms should have a highly leveraged capital structure because the low cost of financial distress they found out (Andrade & Kaplan, 1998).

# 5 CONCLUSION

The main objective of the study has been to analyze, first, the LBO phenomenon in its entirety, and then the adjusted present value (APV), as to highlight the main criticalities when it is utilized as an LBO valuation model. All these efforts have been made to identify a model, which in relation to the different characteristics and problems, can best assess an LBO transaction. The model chosen reflects the main characteristics of the APV as proposed by Myers, such as that the value of the levered company is obtained from the sum of three factors, but small changes are made to adapt it to the characteristics of the LBOs. The choice to use the Adjusted Present Value, as the basic model, was made because it is the model that best fits with either the management's desire to maximize the value of the company thanks to the benefits of debt and either with a capital structure that changes over time. Indeed, as seen in the first part of the analysis, increase tax shield is almost always the core reason for adopting an LBO scheme. Therefore, when valuing an LBO, for the management or for the debt providers it is crucial to know exactly the present value of the future stream of tax shields. The APV, indeed, can help managers analyze not only how much that particular transaction is worth but also where the value, exactly, comes from. For what concerns the capital structure that change over time, it has been argued that the classical DCF-WACC approach presents application problems in cases where significant changes in the level of debt are expected to occur over the years. Indeed, the DCF-WACC model considers the effects of financing policy implicitly in the discount rate. While the APV approach considers these changes in capital structure explicitly in cash flows. In short in the classic DCF, in the event of significant changes in the financial structure from one year to the next,

a correct and rigorous application of the DCF would require an estimate of a different WACC for each year. In order to overcome this criticality, it has been therefore decided to use the separate valuation of both the tax benefits and costs of the debt.

In showing the results of the research, and therefore the model that for us better fit with the LBO valuation, it will be used the same scheme used in the previous chapters. First, it will be shown the most suitable model for the plan horizon and then the one for the terminal value.

In the plan horizon, the only problems come from the choice of the right rate at which to discount tax shield, in fact, it will depend on the debt repayment plan agreed with financial institutions. If debt service is fixed in advance and, therefore, is independent of the annual cash flow generation, the dollar amount of debt in each period of the plan is known and so the TS is a function of the debt, and should be discounted at $R_D$. If, as in many LBO transactions, debt covenants require that the entire future cash flows will be dedicated to interests and principal repayment, the amount of debt outstanding and, therefore, the interests tax shield at any point in time, except at the beginning of the first year ($D_0$), are a direct function of the unlevered FCFO. This means that the TS, after the first year of the plan, must be discounted at the unlevered cost of equity, reflecting the riskiness of operating assets. For what concerns the value of the unlevered company, no issues arise, indeed, as seen, target companies usually are mature firms with stable and predictable cash flows. In estimating the present value of the costs of financial distress, instead, must be considered the insights of (Tykvová & Borell, 2012). They find that while the risk of financial distress increases immediately after the buyout, three years after the buyout the risk levels are lower compared to comparable non-buyout companies. Indeed, they argued that this

depends to private equity firms' tendency to invest in companies which initially have lower probability of bankruptcy, especially in Europe, for the motivation already stated. Therefore, even if immediately after the transaction the financial distress risk of buyout companies increases, the risk level incrementally decreases and goes below the non-buyout peer companies level already three years after the transaction. In practice:

- If the debt repayment will follow a pre-arranged schedule, the value of the levered company during the plan horizon will result as follows:

$$W_{L\,plan} = \sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t} + \sum_{t=1}^{n} \frac{R_D \times D_t \times t_c}{(1+R_D)^t} + CD \tag{5.1}$$

- If, instead, all the FCFO will be used to payback interests and principals, the value of the levered company during the plan horizon will result as follows:

$$W_{L\,plan} = \left(\sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t}\right) + \left(\frac{R_D \times D_0 \times t_c}{(1+R_D)^1}\right) + \left(\sum_{t=2}^{n} \frac{R_D \times D_t \times t_c}{(1+R_{eu})^t}\right) + CD \tag{5.2}$$

Where:

$n$= the number of years of the plan horizon

$FCFO_t$= the operating cash flow at year (t) of the plan

$R_{eu}$= unlevered cost of equity capital

$R_D$= cost of debt capital

$D_t$= amount of debt at time (t)

$t_c$= marginal corporate tax rate

$D_0$=amount of debt at the beginning of the plan

$CD$= present value of possible costs of financial distress

After the plan horizon, instead, the debate is not any more about the repayment schedule, but is about which is the most reasonable leverage trend in the long run. As seen in Figure (31), empirical studies have found out that in the long run firms (Newcos), that have faced a LBO, revert to more conventional capital structure in the years following the buyout, usually after 5-7 years. And this conventional capital structure cannot be represented by a fix amount of debt maintain in perpetuity, because in the long run the investment in assets and R&D, which had been cut to maximise cash flows during the plan, will have to restart in order not to lead the economic to the economic distress. Therefore, it will be more reasonable that the amount of debt in future periods could increase or decrease. Of course, the amount of debt cannot be known in advance, therefore, it is assumed that the debt to value ratio is maintained constant, according to the market value of company. Based on these considerations, it follows that the future level of debt depends on the value of the levered company, and consequently the riskiness of debt is assimilated to the riskiness of operating activities, reflected in the unlevered cost of capital. Since the tax shield by its nature is as risky as debt, it should also be discounted at the $R_{eu}$ rate. For what concerns the likelihood of default, as already said for the plan horizon, after the first three years the probability of bankruptcy incrementally decreases and goes below the non-buyout peer companies level.

While, as found out by (Andrade & Kaplan, 1998) the entire costs of financial distress for an LBO company are on average 10% of the enterprise value before it faced the LBO transaction. Moreover, in estimating the costs of financial distress, must also be considered the cultural environment of the region where operate the PE firms that undertake the LBO operation.

The discounted terminal value (DTV) would result as follows:

$$DTV = \frac{FCFO_{n+1}}{(R_{eu} + g)\times(1 + R_{eu})^{n}} + \frac{R_D \times D^{*} \times t_c}{R_{eu}\times(1 + R_{eu})^{n}} + CD \qquad (5.3)$$

Where:

$FCFO_{n+1}$= is the operating cash flow of the first year after the plan

$g$= is the perpetual real or nominal growth rate of the FCFO in the long run

$D^{*}$= is the conventional leverage ratio in the years following the buyout.

Now, knowing either the value of the levered firm during the plan horizon, and either beyond it, it is possible to derive a single formulation for each of the assumptions made for the repayment schedule:

- If the debt repayment will follow a pre-arranged schedule:

$$W_L = \left[\sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t} + \frac{FCFO_{n+1}}{(R_{eu}+g)\times(1+R_{eu})^n}\right] + \left[\sum_{t=1}^{n} \frac{R_D \times D_t \times t_c}{(1+R_D)^t} + \frac{R_D \times D^* \times t_c}{R_{eu}\times(1+R_{eu})^n}\right] + CD \tag{5.4}$$

- If all the FCFO will be used to payback interests and principals:

$$W_L = \left[\left(\sum_{t=1}^{n} \frac{FCFO_t}{(1+R_{eu})^t}\right) + \left(\frac{FCFO_{n+1}}{(R_{eu}+g)\times(1+R_{eu})^n}\right)\right] + \left[\left(\frac{R_D \times D_0 \times t_c}{(1+R_D)^1}\right) + \left(\sum_{t=2}^{n} \frac{R_D \times D_t \times t_c}{(1+R_{eu})^t}\right) + \left(\frac{R_D \times D^* \times t_c}{R_{eu}\times(1+R_{eu})^n}\right)\right] + CD \tag{5.5}$$

# 6 BIBLIOGRAPHY


Acharya, V., Franks, J., & Servaes, H. (2007). Private equity: boom and bust? *Journal of Applied Corporate Finance 19 (4)*, 44–53.

Altman, E. (2008). *The Default Experience of U.S. Bonds.* Working Paper, Salomon Center, New York University.

Altman, E. I. (1984). A further empirical investigation of the bankruptcy cost question. *The Journal of Finance, 39(4)*, 1067-1089.

Altman, E., & Kishore, V. (1998 ). *Defaults and Returns on High Yield Bonds: Analysis Through 1995.* working paper series NYU Stern.

Andrade, G., & Kaplan, S. N. (1998). How Costly is Financial (Not Economic) Distress? Evidence from Highly Leveraged Transactions that Became Distressed. *J Finance, 53*, 1443-1493.

Arzac, E. R. (1992). On the Capital Structure of Leveraged Buouts. *Financial Management, 21(1)*, 16-26.

Arzac, E. R. (1996). Valuation of Highly Leveraged Firms. *Financial Analysts Journal*, 42-50.

Arzac, E. R. (1996, Jul/Aug). Valuation of Highly Leveraged Firms. *Financial Analysts Journal*, 42-50.

Asquith, P., Gertner, R., & Scharfstein, D. (1994). Anatomy of financial distress: An examination of junk-bond issuers. *The Quarterly Journal of Economics, 109(3)*, 625-658.

Bain & Company. (2011). *Global Private Equity Report 2011.*

Bain & Company. (2014). *Global Private Equity Report 2014.*

Bain & Company. (2017). *Global Private Equity Report 2017.*

Baker, G., & Wruck, K. (1989). ORGANIZATIONAL CHANGES AND VALUE CREATION IN LEVERAGED BUYOUTS: The Case of The O.M. Scott & Sons Company. *Journal of Financial Economics, 25 (2)*, 163-190.

Baldi, F. (2005). Valuing a Leveraged Buyout: Expansion of the Adjusted Present Value by Means of Real Options Analysis. *The Journal of Private Equity, 8 (4)*, 64-81.

Baldi, F. (2015). *The Economics of Leveraged Buyouts.* G. Giappichelli Editore.

Ben-Ameur, H., Hind, B., Roustan, P., Théoret, R., & Trablesi, S. (2008). *Assessing bankrupt probability on American firms: A logistic approach.* University of Montreal, Working Paper.

Brealey, R. A., & Myers, S. C. (2003). *Capital investment and valuation.* McGraw Hill Professional.

Carey, D., & Morris, J. (2012). *King of Capital: The Remarkable Rise, Fall, and Rise Again of.* Random House LLC.

Citigroup corporate & investment banking. (2006). *Everything You Always Wanted To Know About LBOs.* Citigroup.

Cooper, I. A., & Nyborg, K. G. (2004, August). Discount Rate and Tax. *London Business School*, 1-39.

Copeland, T., Koller, T., & Murrin, J. (2000). *Valuation. Measuring and Managing the Value of Companies.* John Wiley & Sons.

Damodaran, A. (2015). *Applied corporate finance.* John Wiley & Sons.

Denis, D. (1994). Organizational form and the consequences of highly leveraged transactions Kroger's recapitalization and Safeway's LBO. *Journal of Financial Economics, 36 (2)*, 193-224.

Deutsche Bank. (2008). *Leveraged Buy-out (LBO) analysis.* Deutsche Bank.

Edward I, A., & Smith, R. (1993). “Ristrutturazioni per mezzo di leveraged buy-out: un ruolo per l’Europa". *Economia e management, fascicolo n.1, volume n.4*, 114.

EVCA. (2017). *The Invest Europe Yearbook - 2016 European Private Equity Activity.*

Fava, P., & Fuschino, P. (2003). *Leveraged buy-out: orientamenti giurisprudenziali civili penali.* Piacenza: La Tribuna.

Gallea, M. (1993). “Il LBO nelle fasi recessive”. *in Amministrazione & Finanza, n.5*, 309.

Gatti, S., & Chiarella, C. (2015). *Private Equity Investments- Financial Markets, Macroeconomic Trends and the Return of Leveraged Buyouts.* Università Bocconi in collaboration with Goldman Sachs International. Milan: BAFFI CAREFIN Centre for Applied Research on International Markets, Banking, Finance and Regulation.

Gilson, S. C. (1997). Transactions costs and capital structure choice: Evidence from financially distressed firms. *The Journal of Finance, 52(1)*, 161-196.

Gordon, M., & Shapiro, E. (1956, October). Capital Equipment Analysis: The required Rate of Profit. *Management Science, 3*, 102-110.

Graham, J. R. (2000, October). How Big Are the Tax Benefits of Debt? *The Journal of Finance*, 1901-42.

Hamilton, D., Varma, P., Ou, S., & Cantor, R. (2006). *Default and recovery rates of corporate bondissuers, 1920-2005.* Special Comment, Moody's Investors Service Global Credit Research.

Harris, R. S., & Pringle, J. J. (1985). Risk-Adjusted Discount Rates. Extensions From the Average-Risk Case. *The Journal of Financial Research, VIII, No. 3*, 237-244.

Inselbalg, I., & Kaufold, H. (1989). How to Value Recapitalization and Leveraged Buyouts. *Journal of Applied Corporate Finance, 2 (2)*, 87-96.

Jensen, M. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review, 76 (2)*, 323.

Jensen, M. (1991). Eclipse of the public corporation. *McKinsey Quarterly, (1)*, 117-144.

Jensen, M. C. (1991). Corporate control and the politics of finance. *Journal of Applied Corporate Finance*, 13-33.

Jensen, M., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics, 3 (4)*, 305-360.

Kaplan, S. (1989). The Effects of Management Buyouts on Operating Performance and Value. *Journal of Financial Economics, 24 (2),* , 217-254.

Kaplan, S. N., & Ruback, R. S. (1995). The valuation of cash flow forecasts: An empirical analysis. *The Journal of Finance, 50 (4)*, 1059-1093.

Kaplan, S. N., & Stein, J. C. (1990). How risky is the debt in highly leveraged transactions? *Journal of Financial Economics*, 215-245.

Kaplan, S. N., & Stein, J. C. (1993). The evolution of buyout pricing and financial structure in the 1980s. *The Quarterly Journal of Economics*, 313-357.

Kaplan, S., & Rubback, R. (1995, September). The Valuation of Cash Flow Forecasts: An Empirical Analysis. *The Journal of Finance, 50 (4)*, 1059-93.

Kaplan, S., & Strömberg, P. (2008). Leveraged Buyouts and Private Equity. *Journal of Economic Perspectives, 22 (4)*.

Koller, T., Goedhart, M., & Wessels, D. (2005). *Valuation: Measuring and Managing the Value of Companies* (4th ed.). Wiley.

Lehn, K., & Poulsen, A. (1989). Free Cash Flow and Stockholder Grains in Going Private Transactions. *Journal of Finance, 44 (3)*, 771-787.

Luehrman, T. A. (1997, May-June). Using APV: A better tool for valuing operations. *Harvard Business Review*.

Massari, M., & Zanetti, L. (1998). *Valutazione Finanziaria.* McGraw-Hill.

Mayers, S. (1974, March). Interactions of Corporate Financing and Investement Decisions. Implication for Capital Budgeting. *Jurnal of Finance, 29*, 1-25.

Mayers, S. (1984). The Capital Structure Puzzle. *The Journal of Finance, 39 (3)*, 575-92.

Miles, A., & Ezzel, J. (1980). The Weighted Average Cost of Capital, Perfect Capital Markets, and Project Life: A Clarification. *Journal of Financial and Quantitative Analysis*, 719-30.

Miles, J. A., & Ezzell, J. R. (1983, March). Capital Project Analysis and the Debt Transaction Plan. *The Journal of Financial Research, 6*, 25-31.

Modigliani, F., & Miller, M. (1963). "Corporate income taxes and the cost of capital: a correction". *American Economic Review. 53 (3)*, 433–443.

Modigliani, F., & Miller, M. H. (1958, June). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review, 48 (3)*, 261-297.

Moody's. (2009). *Rating Symbols & Definitions.* Moody's.

Morano, A. (1989). *Leveraged buy out. Aspetti finanziari giuridici e contrattuali.* Milano: Ipsoas S.p.A.

NVCA. (2017). *Venture Monitor 2Q 2017.*

Olsen, J. (2002). *http://pages.stern.nyu.edu/~igiddy/LBO_Note.pdf*.

Pignataro, P. (2014). *Leveraged buyouts.* New Jersey: Eliy Finance.

Pindur, D. (2007). *Value Creation in Successful LBOs.* Springer.

Pitchbook. (2014). *Annual Private Equity Breakdown Report.* Retrieved from pitchbook.com: http://pitchbook.com

Probitas Partners . (2014). *Private Equity Institutional Investor Trends for 2015 Survey.*

PWC. (2017). *Private Equity Trends Report 2017: Rising above uncertainty.* PWC.de.

Rosenbaum, J., Pearl, J., & Perella, J. (2009). Investment Banking.. Valuation, Leveraged Buyouts, and Mergers and Acquisitions. Wiley.

Ross, S. A., & Westerfield, J. F. (2005). *Corporate Finance* (7th ed.). The McGraw-Hill.

Ross, S., & Westerfield, R. (1997). *Finanza Aziendale.* il Mulino.

Ruback, R. S. (2002). Capital Cash Flows: A Simple Approach to Valuing Risky Cash Flows. *Financial management*, 85-103.

Shapiro, A. (1989). *Modern Corporate Finance.* New York: Macmillan.

Shleifer, A., & Vishny, R. W. (1997). A Survey of Corporate Governance. *Journal of Finance 52 (2):* , 737-783.

Smith, A. (1990). Corporate ownership structure and performance: The case of management buyouts. *Journal of Financial Economics, 27 (1)*, 143-164.

Standard & Poor's. (2009). *Understanding Standard & Poor's Rating Definitions.* Standard & Poor's.

Strömberg, P. (2008). *The new demography of private equity.*

T. Koller, M. G. (2015). *Valuation: Measuring And Managing The Value Of Companies.* John Wiley & Sons.

Titman, S. (1984). The Effect of Capital Structure on a Firm's Liquidation Decision. *Journal of Financial Economics, 13*, 1371–51.

TorreyCove Capital Partners. (2016). *2016 Private Equity Market Outlook.*

Tykvová, T., & Borell, M. (2012). Do private equity owners increase risk of financial distress and bankruptcy? *Journal of Corporate Finance, 18(1)*, 138-150.

Vivas, N. U., & Leardini, M. U. (2015). Valutazione d'impresa quando cambia la struttura di capitale: un caso, due approcci. *Amministrazione & Finanza, 4/2015*, 65-73.

Warner, J. (1977). Bankruptcy Costs: Some Evidence. *Journal of Finance, 32*, 337–347.

Weiss, L. A. (1990). Bankruptcy resolution: Direct costs and violation of priority of claims. *Journal of Financial Economics, 27(2)*, 285-314.

Williams, J. B. (1938). The Theory of Investment Value. *Harvard University Press*.

Wruck, K. (1994). Financial policy, internal control, and performance Sealed Air Corporation's leveraged special dividend. *Journal of Financial Economics, 36 (2)*, 157-1

## 7 SITOGRAPHY

http://www.accountingnotes.net/working-capital/working-capital-meaning-and-components-business/11033

http://www.investopedia.com/terms/c/cdo.asp

http://www.investopedia.com/terms/u/underwriting.asp

http://www.investopedia.com/terms/r/revolvingcredit.asp

http://www.investopedia.com/terms/w/warrant.asp#ixzz4ribEcIWb

http://www.investopedia.com/terms/d/drypowder.asp

http://www.investopedia.com/terms/s/secureddebt.asp

http://www.investopedia.com/terms/j/junkbond.asp

http://www.investopedia.com/terms/u/unsecuredloan.asp

http://www.mjxam.com/glossary.php

http://www.nasdaq.com/investing/glossary/p/privateequity-firm

http://valuation-methods.net/definition/b-term-loans/

http://valuation-methods.net/definition/term-loan-a/