# Joint Acquisitions between Private Equity Firms and Strategic Investors

**An Empirical Study in M&A Boom and Bust Cycles with a Case Study on Ubisoft**

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## *Abstract*

The purpose of this study is to investigate unconventional business models of private equity investors, specifically, joint venture deals with strategic investors. The private equity industry experienced an enormous growth from the 1980s until today and is still facing a positive outlook in the current market environment. However, this positive outlook fuels the competition of private equity investors internally and externally with strategic investors, such as corporates. One symptom of a fierce competition is the level of un-invested capital, the so-called *dry powder*. This may raise the question of how private equity firms can unlock their latent value again. In light of this, this study investigates the relationship of external conditions as well as investor-related rationales on the decision to partner with their counterparts. Looking at the period from 2000 to 2016, we investigate the relationship between M&A boom and bust cycles and joint venture transactions to total PE-backed deals. To do so, we apply the Heckman method to infer missing transaction sizes as well as time series models, such as the Augmented Dickey-Fuller test. We conclude that the external market environment does not influence the joint venture deal activity. However, it may impact their rationales to co-operate to either avoid a fierce price competition or to access complementary assets to restructuring firms. As the external environment is only a part of the much more complex picture, we conduct a hypothetical case study of a joint acquisition of the video game publisher Ubisoft between a private equity firm and a strategic investor in order to understand differing rationales and their influence on the decision to enter a partnership. Primarily, we find differences in the operational value creation strategies, risk-return requirements, the valuation of provided assets additional to the funding, and the differing investment horizons most impactful on joint venture deals. By stepping into the field of unconventional business models of private equity investors, our results may provide insights that can be used by researchers in the private equity industry as well as by M&A practitioners while dealing with joint venture deals.

**Key words:** Private Equity; Mergers & Acquisitions; LBO Model; Heckman Correction; Time-Series Modeling

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# Contents

**List of Figures** **4**

**List of Tables** **5**

**1 Introduction** **6**
1.1 Problem Statement . . . 6
1.2 Research Question . . . 7
1.3 Structure of the Study . . . 8

**2 Research Boundaries** **10**
2.1 Different Reserach Philosophies . . . 10
2.2 Different Research Approaches . . . 11

**3 Literature Review of Financial and Strategic Investors** **12**
3.1 Background and History of Financial and Strategic Investors . . . 12
3.2 Financial and Strategic Investors in Comparison . . . 13
3.2.1 Structure of Financial and Strategic Investors . . . 14
3.2.1.1 Structure of the Financial Investor (Private Equity Firm) . . . 14
3.2.1.2 Structure of the Strategic Investor . . . 16
3.2.2 Principles of the Investment Decision . . . 16
3.2.3 Value Creation . . . 18
3.2.3.1 Financial Engineering and Synergies . . . 18
3.2.3.2 Governance Engineering and Synergies . . . 21
3.2.3.3 Operational Engineering and Synergies . . . 22
3.2.3.4 Summary of Value Creation in Comparison . . . 24
3.2.3.5 Payoff Strategies (Exit vs Infinite Investment Horizon) . . . 24
3.3 Financial and Strategic Investors in Competition . . . 26
3.3.1 Price Premia . . . 27
3.3.2 Auctions (Broad and Targeted) . . . 27
3.4 Current Developments and Trends . . . 28
3.5 Chapter Conclusion on the Literature Review . . . 31

**4 Research Methodology** **32**
4.1 Research Philosophy . . . 32
4.2 Research Approach . . . 32
4.3 Research Strategy . . . 33

**5 Theoretical Methods** **34**
5.1 Methods in the Quantitative Study . . . 34
5.1.1 Hypothesis Development . . . 34
5.1.2 Data Collection in the Quantitative Study . . . 35
5.1.3 Econometric Hypothesis Testing . . . 39
5.1.3.1 Transformation to account for Skewness . . . 39
5.1.3.2 Missing Data Problem . . . 40
5.1.3.3 Linear Regression of the Log-Odds . . . 43

5.1.3.4 Time-Series Modeling . . . 45
5.1.3.5 Outlier Test . . . 50
5.1.3.6 Analysis of the Empirical Study . . . 50
5.2 Methods in the Qualitative Study . . . 50
5.3 Chapter Conclusion . . . 52

**6 Empirical Study** **53**
6.1 Analysis . . . 53
6.1.1 Estimating Missing Transaction Size Data . . . 54
6.1.1.1 Estimation of Missing Transaction by Mean Substitution . . . 54
6.1.1.2 Estimation of Missing Transaction by Regression Analysis . . . 55
6.1.1.3 Discussion of Missing Data Problem . . . 62
6.1.2 Time Series Modeling . . . 64
6.1.2.1 Log-Linear Regression Model on the Log-Odds of JV/Tts and JV/Ta 65
6.1.2.2 Stationarity of the Variables . . . 66
6.1.2.3 Co-Integration of the Variables . . . 69
6.1.2.4 Outlier Test . . . 69
6.1.3 Final Regression Model . . . 71
6.2 Discussion and Limitations of the Quantitative Study . . . 72
6.2.1 Summary of Main Findings in the Quantitative Study . . . 72
6.2.2 Discussion of Main Findings in the Quantitative Study . . . 73
6.2.3 Limitations of Findings in the Quantitative Study . . . 75

**7 Case Study: Joint Acquisition of Ubisoft Entertainment SA** **77**
7.1 Due Diligence . . . 78
7.1.1 Commercial Due Diligence . . . 78
7.1.1.1 Brief History and Company Profile of Ubisoft . . . 78
7.1.1.2 Business Model . . . 79
7.1.1.3 Market Analysis . . . 79
7.1.1.4 Growth Drivers and Future Trends . . . 80
7.1.1.5 Consumer Analysis . . . 82
7.1.1.6 Competitive Analysis . . . 83
7.1.2 Financial Due Diligence . . . 83
7.1.2.1 Income Statement Analysis . . . 84
7.1.2.2 Cash Flow Statement Analysis . . . 86
7.1.2.3 Balance Sheet Analysis . . . 87
7.2 Operational Value Creation through Joint Acquisition . . . 90
7.3 Assumption Analysis . . . 93
7.3.1 Operating Scenarios . . . 93
7.3.2 Income Statement Assumptions . . . 93
7.3.3 Cash Flow Statement Assumptions . . . 95
7.3.4 Balance Sheet Assumptions . . . 96
7.4 Joint Acquisition Model (PE-View) . . . 96
7.4.1 Uses of Funds . . . 96
7.4.2 Sources of Funds . . . 98
7.4.2.1 Internal Financing . . . 98
7.4.2.2 External Debt Financing . . . 99
7.4.2.3 External Equity Financing . . . 102
7.4.3 Proceeds to Equity and Return Analysis . . . 104

7.5 Theory Development and Discussion of the Case Study . . . . . 110
7.5.1 Main Findings of the Case Study and Viability of the Joint Acquisition . . . . 110
7.5.2 Discussion of Main Findings in the Qualitative Study . . . . . 112
7.5.3 Limitations of Findings in the Qualitative Study . . . . . 114

**8 Conclusion** **115**

**9 Outlook and Future Research** **118**

**Abbreviations** **I**

**Appendix: Tables** **III**

**Appendix: Figures** **VIII**

**Appendix: Codes** **IX**

**Bibliography** **XIII**

# List of Figures


3.1 Global M&A Activity (Zenner et al., 2009). . . . . 13
3.2 Global PE Activity (Bain & Company, 2016). . . . . 13
3.3 Structure of Financial and Strategic Investors (Jensen, 1989). . . . . 15
3.4 European Yields on Corporate Bonds and IG-HY Spreads (Gatti, Chiarella, and Carefin, 2015). . . . . 29
3.5 European Leveraged Finance New-Issue Volume (Data: S&P Global Capital Markets). 29
3.6 Global PE Dry Powder by Year (in US$b) (EY, 2017; Bain & Company, 2016). . . . . 30
3.7 European Buyout Deal Volumes (Gatti, Chiarella, and Carefin, 2015). . . . . 30

4.1 Research Plan (Own Illustration). . . . . 33

5.1 Log of the Odds (*Logit*) for given Fractions (Fox, 2008). . . . . 44
5.2 Non-Stationary Time-Series and Stationary Differenced Time-Series (Harris and Sollis, 2005). . . . . 46
5.3 Co-Integrated Stock Prices (Strachan, 2011). . . . . 46

6.1 Transaction Size Histogram (Own Illustration). . . . . 56
6.2 E-HY and Total Acitivity from Q1 2000 until Q4 2016 (Own Illustration). . . . . 56
6.3 Buyout Deal Volume Estimations in Comparison. . . . . 63
6.4 Quarterly Shares of JV Strategic/Sponsor Acquisitions to Total PE backed Transactions. 66
6.5 Time Trends in JV/Ta, JV/Tts and E-HY. . . . . 67
6.6 EBITDA/EV of the MSCI World Small Cap Index and Merrill Lynch High Yield Rates (Cash Pay Only) Averages over Quarters. . . . . 67
6.7 Residuals to test for Co-integration. . . . . 70

7.1 2016 Global Games Market per Region (Newzoo, 2017). . . . . 80
7.2 2016 Global Games Market per Segment (Newzoo, 2017). . . . . 80
7.3 Sales Development of Ubisoft. . . . . 84
7.4 Quarterly Sales and Profitability Development of Ubisoft. . . . . 84
7.5 Net Operating Working Capital of Ubisoft. . . . . 88
7.6 Cash Conversion Cycle of Ubisoft. . . . . 88

1 Regional Sales Development of Ubisoft. . . . . VIII
2 EBITDA Margins of the Peer Group. . . . . VIII

# List of Tables


3.1 Overview of Differences in Value Creation of Financial and Strategic Investors. . . . . 25

6.1 Overview of the Data on Transaction Sizes. . . . . 54
6.2 D'Agostino-Pearson Skewness Test. . . . . 55
6.3 Results of the OLS Regression on Given Log Transformed Transaction Sizes. . . . . 57
6.4 Private/Public Firms' Transaction Size Availability and Private/Public Firms Conditional on Transaction Type. . . . . 59
6.5 Probit Model on the Heckman Selection Equation. . . . . 60
6.6 Equation of Interest after the Second Step of the Heckman Procedure. . . . . 61
6.7 Buyout Deal Volume Estimations in Comparison. . . . . 63
6.8 Total Deal Volume per Year for Transactions typed as JV Acquisition in $bn. . . . . 65
6.9 Augmented Dickey Fuller Test (Constant and Trend included). . . . . 68
6.10 Kwiatkowski-Philips-Schmidt-Shin (KPSS) Test (Level-Stationarity Option). . . . . 68
6.11 ADF and KPSS on Residuals. . . . . 70
6.12 DFBETA Test on Outliers . . . . . 71
6.13 Regression Models on the Logit-Transformed JV/Tts. . . . . 72
6.14 Regression Models on the Logit-Transformed JV/Ta. . . . . 72

7.1 Operating Expenses of Ubisoft. . . . . 86
7.2 Cash Flow Statement of Ubisoft. . . . . 86
7.3 Capital Expenditures of Ubisoft. . . . . 87
7.4 Tangible and Intangible Assets of Total Asset Balance of Ubisoft. . . . . 89
7.5 Net Debt of Ubisoft. . . . . 90
7.6 Operational Model of the Joint Acquisition of Ubisoft. . . . . 94
7.7 Uses of Funds. . . . . 97
7.8 Sources of Funds. . . . . 99
7.9 Tax Deductibility Shareholder Loan France. . . . . 104
7.10 Pro-Forma Income Statement (P&L). . . . . 105
7.11 Pro-Forma Cash Flow Statement. . . . . 105
7.12 Pro-Forma Balance Sheet. . . . . 106
7.13 Debt Repayment Schedule. . . . . 107
7.14 Altman's Z"-scores Pre- and Post-Acquisition. . . . . 108
7.15 IRR Sensitivity Analysis. . . . . 110

2 Yearly Volume of Private Equity-Based Deals in $ billion. . . . . III
3 Average Deal Size per Variable in $ million. . . . . IV
4 Regression Model JV/Ta over Time . . . . . IV
5 Regression Model JV/Ta over E-HY . . . . . V
6 Capitilized Intagible Assets Development of Ubisoft. . . . . V
7 Comparable Companies Valuation of Ubisoft. . . . . V
8 Net Working Capital versus Operating Net Working Capital of Ubisoft. . . . . VI
9 Price Premia of Comparable Deals. . . . . VII

# 1 Introduction

## 1.1 Problem Statement

The private equity (PE) industry experienced dramatic changes in the last 30 years. The organizational form of private equity emerged in the 1980s and has experienced an enormous growth to a ubiquitous part of investor's portfolios since then (Sensoy, Wang, and Weisbach, 2014): Studies have shown, that there were 24 private equity firms in 1980 growing to a number of 6,628 private equity firms in 2015, of which 620 were founded that year with a total of $2.4 trillion assets under management (Preqin Ltd, 2016). Despite a high amount of uncertainty within the corporate and political landscape the M&A, and especially the private equity market, seems unstoppable in its boom: The market is flush with liquidity, credit-spreads are at an all-time low, and equity valuations are higher than pre-crisis levels (Gatti, Chiarella, and Carefin, 2015).

Despite this positive outlook, the M&A market changes dramatically. Some private equity limited partners (LPs), such as pension funds, push capital into private equity to generate higher returns on their portfolios as they are facing an aging society in developed countries, stronger regulations and a low interest rate environment (Khort, 2015). Not only private equity, but also strategic investors, such as corporates, sit on a bunch of cash and seek for promising opportunities in volatile business conditions; keeping in mind disruptions such as digitalization and green economy (Smolka, 2016). The high amount of cash held by both types of investors as well as the pressure of finding opportunities in the M&A market leads to a fierce internal competition within the private equity industry (Sensoy, Wang, and Weisbach, 2014) as well as - and even more severe - between both types of investors - financial and strategic (Smolka, 2016). The strong competition in M&A markets in accordance with a low supply of promising targets to meet its demand leads to high amounts of un-invested capital, also known as *dry powder*, which does not create any value (Schneider and Hendricks, 2015). How can this value be unlocked anew?

As it is hard to compete while solely focusing on LBOs, PE general partners could think of new strategies to find ways to mitigate the dry powder problem. Research has recently started to investigate unconventional business models, such as minority investments in family firms (Tappeiner et al., 2012; Davis, Cieniewski, and Birenbaum, 2016), co-investing with limited partners (McCahery and Roode, 2016) or infrastructure and real estate investments (Alcock et al., 2013) rather than classical buyouts. However, an option which has not been investigated thoroughly in the literature so far is partnering with strategic investors in joint deals instead of competing against each other.

Inspired by the acuteness of the dry powder problem as well as the current boom in M&A transactions in times of high equity valuations, a low interest environment and extreme market volatilities (Bain

& Company, 2016), this study concerns the conditions to make private equity partner with their counterparts strategic investors in a combination of empirical research and a case study. The results of an empirical study in this context are in need due to following reasons: Firstly, they unlock insights and provide a clearer picture into the external conditions making private equity expand their investment universe. As research in the past did not thoroughly take into account partnerships between financial and strategic investors and preferred to analyze LBOs, it could motivate other researchers to tap into the field of unconventional business models of private equity investors. Secondly, this type of study can be used by M&A-practitioners to anticipate the investment behavior of competitors to propose or to reject partnerships with each other. However, a precondition to propose or to reject a cooperation is to understand the rationales of the two different groups of investors: While strategic investors could take advantage of learning from private equity's expertise in financial and governance engineering, financial investors could profit from complementary assets as well as industrial know-how provided by the strategic investor (Martos-Vila, Rhodes-Kropf, and Harford, 2013). On the other hand, there are high costs of coordination due to differing interests how to create value. Thus, to understand the differing interests and interplays of the investor types, this study investigates - besides the empirical study on the external conditions to partner - a hypothetical case study between a PE firm and a strategic investor. The tremendous success of the industry in opposition with a more and more competitive market make us believe that the PE industry in itself is an interesting case to elaborate on.

## 1.2 Research Question

There could be several ways to investigate partnerships between financial and strategic investors. To ensure proper focus in our research, we concentrate on the conditions making private equity investors co-operate with strategic investors. We focus on investigating the investment decision and do not center our research on the question how joint venture transactions perform in comparison with e.g. LBOs or in relation with certain stock indices. The focus relies solely on the conditions that make private equity see partnering with strategic investors as a viable option to expand their investment universe. Hence, our leading research question is:

*Which conditions lead private equity firms to enter partnerships with strategic investors?*

More specifically, to guide our research and to clearly focus on the most relevant conditions that make financial investors partner with strategic investors, we split the leading research question into following sub-questions.

1. *Which existing theories can be used to investigate external and internal conditions that make private equity firms partner with strategic investors?*

2. *Which external market environment conditions lead to a higher share of partnerships between PE firms and strategic investors to total PE-backed deals?*

3. *What is the relationship between rationales of both investor types and the decision to enter partnerships?*

We believe, the leading research question combined with our sub-questions serves to create a meaningful discussion about the topic of interest. By analyzing an unconventional business model of private equity, we take a step into a field of studies that seems to be under-investigated so far. Future research can use our study to analyze different rationales as well as the performance of financial and strategic investor partnerships more deeply.

## 1.3 Structure of the Study

To answer our research question, the thesis is split into a number of chapters.

Chapter 2 sets the boundaries of research: It provides an overview of different principles that researchers apply in order to generate knowledge.

Chapter 3 discusses insights and findings from already published literature. This chapter is used to provide a general understanding of the PE and corporate M&A market in order to follow current developments on the market as well as our reasoning in the subsequent studies we conduct. We aim to introduce the different rationales of PE firms and strategic investors by providing a brief history of both investors. Thereafter, we examine differences in their structure, their investment decisions, the post-acquisition value creation strategies as well as their bidding behavior in auctions. Based on the introduction of both investor types, we are able to provide a brief overview of current trends in the PE and M&A market.

Chapter 4 conveys the commitments to research we make throughout our study as well as our principles of methods, leading to our overall research strategy.

In chapter 5, the research process we apply to answer our research question is presented. The presentation of applied tools is split into the different studies we conduct, a quantitative and a qualitative case study. Within the research process of the quantitative study, we present a hypothesis to be tested, our strategy to collect data and the usage of statistical methods, such as the Heckman correction to correct for sample selection biases, and concepts to deal with time series. Thereafter, we briefly discuss the data collection process and tools to be applied for the qualitative case study.

Chapter 6 demonstrates the methods and our results in order to test our hypothesis in the quantitative study. As common, while analyzing private equity backed transactions, we see a lack of data. Therefore, we apply the mean substitution, a simple OLS regression as well as the Heckman procedure to estimate missing data. Based on our prediction we apply concepts of time series modeling.

Subsequently, after accounting for time-trends, we present the final model that is used to test our hypothesis. In a discussion, we seek to answer what the results obtained from the final model may tell us in relation to our second sub-question.

Chapter 7 goes more into detail and provides a case study of a hypothetical joint acquisition of the French video-game publisher Ubisoft Entertainment SA between a PE investor and the strategic investor Activision Blizzard, Inc. operating in the same industry as the target. Therefore, we first provide a commercial and financial due diligence. Based on the due diligence, we discuss - due to our focus on the PE industry - an investment case from the perspective of a PE firm. The chapter closes with a discussion on the implications of the case study to the third sub-question.

Chapter 8 combines a conclusion of our empirical as well as our case study.

Finally, chapter 9 discusses our works implications to researchers and practitioners in the future.

# 2 Research Boundaries

In the following, we present research philosophies which describe how knowledge is developed in academic research. The presentation of research philosophies is followed by a brief overview of different research approaches to answer questions to be investigated. Note that we do not describe the commitments we make through our research agenda already in this chapter. Rather, at this stage of the thesis, we aim to set the boundaries for academic research which we will use later in our research methodology in chapter 4, where we describe our principles to research more into detail.

## 2.1 Different Reserach Philosophies

Research philosophy describes the nature of knowledge and how that knowledge is developed. As researchers, we should emphasize that there exists no explicit philosophy that is *better* than others and be aware of our assumptions about how the world works to evaluate their appropriateness.

**Ontology** The ontology aims to describe the nature of the reality. It raises questions about what kind of social entities exist as well as how they are grouped and subdivided in accordance with their similarities and differences. The two aspects of the ontology, objectivity, and subjectivity, are both accepted to deliver valid knowledge among business and management research. *Objectivism* holds the position that social entities exist in reality independently of the consciousness of social actors such as our own observation of it. While holding this point of view, the structure how entities operate may differ. However, the differences are not created by the thoughts one has. In other words, the mind and consciousness are means of discovering the reality and thus, it is subordinated to the reality itself (Rand, 1961). The *subjective* view, in contrast, holds the standpoint that the reality is limited to the social actors' consciousness (or perception). Hence, phenomena are based on the subjective awareness and consequent actions of these actors. Following, social interactions are a continual process of experiences (Saunders, Lewis, and Thornhill, 2009).

**Epistomology** In contrast to the ontology, epistemology studies the nature, scope, and theory of knowledge and how this knowledge is acceptable in a field of study. The classic paradigm of the objective view of the world is the *positivism* which states that knowledge, such as causal relationships, can be produced if phenomena can be observed. Thus, a positivistic research uses existing theory to develop hypotheses which can be tested by empirical data. The *realistic* paradigm, in contrast, states what one senses is reality and that the reality is quite independent of mind. The *direct realism* holds the position that human senses describe the world accurately whereas the *critical realism* argues that some of our observed data can accurately describe external objects, properties, and events while others do not. In case observed data is insufficient to explain such phenomena, mind-dependent variables may

be sufficient to explain and understand the mind-independent world. In distinction, *interpretivism* is the central paradigm of subjectivism: It interprets social interactions in accordance with the meaning we, as researchers, give to roles of social actors. In this case, research is bound to the values of the researcher itself (Saunders, Lewis, and Thornhill, 2009).

## 2.2 Different Research Approaches

Researchers must choose appropriate approaches in order to develop knowledge. Research approaches are commonly distinguished between *deductive* and *inductive* theory, coming along with a third form, the *abductive* research approach. The deductive approach aims to develop generalizable theories or to revise existing theory in hypotheses tests based upon new data. Thus, quantitative methods are commonly used in deductive research approaches which emphasize the quantification in the collection and analysis of data. It is also used when the research is characterized by an objective view of the world and a positivistic position to knowledge (Bryman and Bell, 2015). The inductive approach, on the other hand, attempts to explore a phenomenon, identify themes and patterns to create a conceptual framework. Hence, the theory is based upon new data (Saunders, Lewis, and Thornhill, 2009). In inductive research approaches, qualitative methods are used which emphasize on understanding the totality of a phenomenon, situation or an event. In other words, inductive research is based on a subjective ontology accompanying with an interpretivist epistemology (Bryman and Bell, 2015). The abductive research approach has elements of both, the deductive and inductive research approach. It moves back and forth from testing theory and generating theory based upon data. It begins with a surprising fact; thereafter, a plausible theory is worked out to explain how the observation could have occurred. In abductive reasoning, a mix of quantitative and qualitative methods are used to come up with the 'best' explanation of a certain event (Saunders, Lewis, and Thornhill, 2009).

# 3 Literature Review of Financial and Strategic Investors

In the literature review of financial and strategic investors, we aim to provide a general understanding of the topic of interest in order to answer the first sub-question of our research. The general understanding enables us to deeply analyze external conditions and rationales that make both investors partner. Therefore, we firstly look at the history of financial and strategic investors in section *3.1 Background and History of Financial and Strategic Investors*. Secondly, in section *3.2 Financial and Strategic Investors in Comparison*, we focus on differences and commonalities of both investor types with reference to their organizational structure, the principles of their investment decisions as well as the value creation of these investors. Third, section *3.3 Financial and Strategic Investors in Competition* concentrates on the competitiveness of different bidding types as well as on the implications of the competition. Last but not least, building on the fundament of financial and strategic investors, we highlight current developments in the PE and M&A market.

## 3.1 Background and History of Financial and Strategic Investors

Since the late $19^{th}$ century, companies have made use of M&A to stimulate growth. During the first half of the $20^{th}$ century, M&A deals were limited to the U.S. (McCarthy and Dolfsma, 2013), and it was not until the second half of the 20th century, when, at the time of economic recovery after World War II, European firms also started getting active with M&A deals (Haleblian et al., 2012). In contrast to the overall M&A history, the special form of PE corporate takeovers is relatively young: The emergence of PE is marked by the establishment of the two venture capital firms American Research & Development Corporation and J.H. Whitney & Company in the Silicon Valley in 1946. However, the first leveraged buyout (LBO) - the common investment model of PE, which is still in use today - may have been the deal of Pan-Atlantic Steamship Company which was purchased by McLean's McLean Industries, Inc. of and Waterman Steamship Corporation in early 1955, although it was not strictly labeled so at the time. In order to acquire Pan-Atlantic Steamship Company, McLean borrowed $ 42 millions and raised $ 7 millions through an issue of preferred stock; $ 20 millions of Waterman cash were then used to retire $ 20 millions of the loan debt (Tripathi, 2014). Even later, funds of PE initially emerged in the early 1980s, pioneered by Kohlberg Kravis and Roberts and Co. who pursued a considerable number of large-scale leveraged buyouts in the US market for corporate control (Kaufman and Englander, 1993).

The 1990s provided the setting for the fifth merger wave driven by globalization and new technologies, first of all, the internet. In this environment, the volume of cross-border mergers and acquisitions,

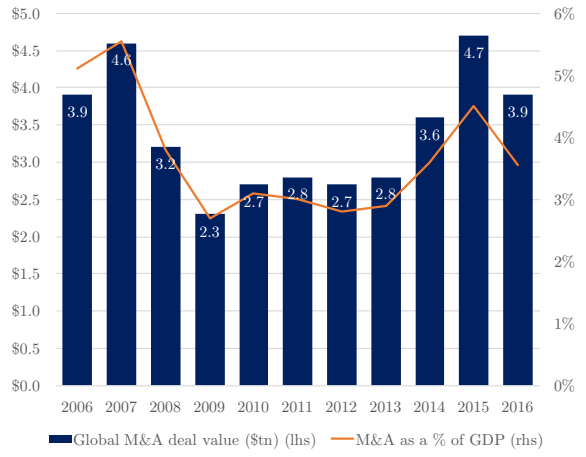


**Figure 3.1:** Global M&A Activity (Zenner et al., 2009).

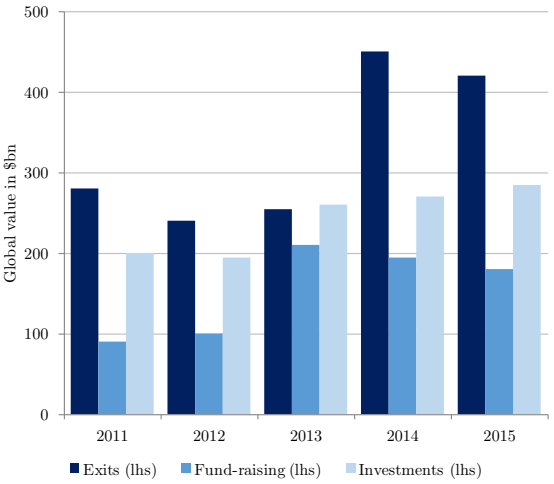


**Figure 3.2:** Global PE Activity (Bain & Company, 2016).

i.e. mergers and acquisitions with companies from two different countries, built up significantly, and M&A activities spread all over the world as a result of global growth ambitions of companies (Ork, 2000; Haleblian et al., 2012). Since then, an increased number of research studies has addressed the question, of what impact the international status has on M&A setup and process, and if the likelihood of value creation and hence the M&A success changes compared to domestic M&As (e.g. Barkema and Vermeulen, 1998; Bresman, Birkinshaw, and Nobel, 2010; Erel, Liao, and Weisbach, 2012). The upward trend since then has also been seen in the PE industry: Investments in PE have developed from a niche in corporate finance with a per-year capital commitment of $ 0.2 billions in 1980 into an essential part of investor's portfolios with a pre-crisis per-year capital commitment of $ 200 billions in 2007. Overall, the years from 2005 to 2007 have seen booming M&A and PE markets and were characterized by high M&A deal values, mega-buyouts, high multiples and extreme leverage ratios. However, the financial crisis in 2007/2008 which was characterized by a collapse of global credit market brought a screeching halt to the boom (Bain & Company, 2016). Nevertheless, as interests decreased to a near-zero level and equity market values lifted assets up, M&A and PE markets could recover to new strength again: As seen in figure 3.1, 2015 was the strongest year regarding global M&A deal values (Zenner et al., 2009). Supplementary, in 2015, PE limited partners committed capital of $ 288 billions into new buyout funds - an all-time peak, as illustrated in figure 3.2 (Preqin Ltd, 2016; Bain & Company, 2016).

## 3.2 Financial and Strategic Investors in Comparison

From the development of corporate M&A and PE markets, it can be concluded that they play a great role in today's financial markets. However, before discussing current challenges, it is essential to provide an understanding for private equity and corporate M&A decisions. To outline the differences and commonalities between financial and strategic investors, we focus on the structure, the principles

of their investment decision, value creation, and on the payoff strategy of each investor in comparison. Note that we split the section of the structure into both investor types as they fundamentally differ (Jensen, 1989). Later on, while analyzing the principles to their investment decision and the value creation we will link the differences more closely.

### 3.2.1 Structure of Financial and Strategic Investors

#### 3.2.1.1 Structure of the Financial Investor (Private Equity Firm)

**Organizational Structure** PE funds are long-term illiquid investments into privately-held (and not traded on an organized exchange) operating companies or assets. Such investments incorporate venture capital (VC) investments, leveraged buyouts (LBOs) as well as growth equity. More specifically, venture capital investments are regarded as a form of financing which is provided for small, early-stage, emerging firms, such as start-ups. In contrast, a leveraged buyout can be seen as the full takeover of a more mature, but still scalable company financed through a small portion of equity accompanying with a relatively large portion of outside debt (Jensen, 1989). Adjacent, growth equity is a minority investment in a mature business, that is usually seeking for capital to expand or restructure their activities without any change in control - contrary to the LBO. Other investment types include distress, infrastructure, mezzanine and real estate. The main forms to invest into PE include PE funds, direct investments (solo- or co-investment along with a PE fund) or funds-of-funds (Cumming, 2012).

PE funds are seen as the typical financial investors in corporate M&A markets in the literature (Martos-Vila, Rhodes-Kropf, and Harford, 2013). We thus use these terms interchangeably. As can be obtained from figure 3.3, PE funds are typically organized as limited liability partnerships consisting of limited partners and a general partner. Commonly, limited partners provide capital that is invested into the fund but are not involved in the management or the operations of the PE fund. Limited partners are typically long-term institutional investors, such as pension funds, insurance companies, asset managers, banks, sovereign wealth funds or wealthy investors (Kaplan and Strömberg, 2009). Thereof, pension funds are most dominant investors into PE (Bain & Company, 2016). General partners on the other hand are PE professionals. They are typically organized in a specialized investment firm, so-called PE firm. The largest and best known PE firms include The Carlyle Group, KKR Co. & L.P. and The Blackstone Group (PE International, 2014). Jensen (1989) described PE firms as decentralized associations with a relatively small number of professionals or employees. Notwithstanding, recent developments in PE show a higher degree of specialization with higher numbers of employees - however, still small in comparison with huge public corporations (Kaplan and Strömberg, 2009). As these firms are too small to manage day-to-day activities of the operating companies invested into by the fund, they are rather engaged in strategic oversight and monitoring roles of the fund (Jensen, 1989; Gompers, Kaplan, and Mukharlyamov, 2016).

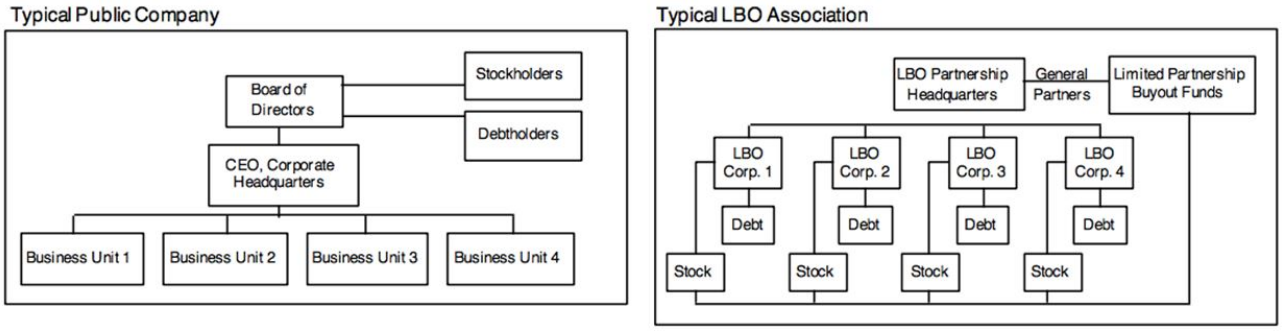


**Figure 3.3:** Structure of Financial and Strategic Investors (Jensen, 1989).

**Interest Alignment** Agency conflicts could arise due to information asymmetries between limited and general partners. General partners usually have information about their time spent on monitoring their investments as well as the potential to exit. (Robinson and Sensoy, 2013). A limited partnership agreement specifies the terms of limited partners' investments into the fund, expected payments to the general partner, and the lifetime of the fund. Generally, distributions to limited partners consist of the proceeds from the sale of portfolio companies which can be distributed by cash or shares (Phalippou and Gottschalg, 2009). One of the most detailed studies of the compensation structure of PE firms has been conducted by Metrick and Yasuda (2010). Metrick and Yasuda (2010) find that payments to the general partner consist of two components; fixed and performance-based variables. The fixed component mainly incorporates management fees followed by transaction fees. Variable payments are based on carried interest and monitoring fees. Note that charging portfolio companies a monitoring fee stands at odds as "funds are effectively paying themselves a fee to run companies they own". However, by sharing the fee, LPs use it to pay GPs indirectly and it is immaterial whether the payments come from management or monitoring fees or from the proceeds of an exit (Metrick and Yasuda, 2010). Note, that we analyze the interest alignment between PE firms and the management of portfolio companies in section *3.2.3 Value Creation* as it is one way to create value in portfolio companies. The lifetime of a fund usually amounts to 10 or even up to 13 years and must be liquidated afterward (Metrick and Yasuda, 2010; Robinson and Sensoy, 2013). Generally, the holding period of portfolio companies is around 4 to 6 years, which has however slightly increased since the 1990s (Kaplan and Strömberg, 2009).

There are not only potential agency conflicts with limited partners but also with debt suppliers: There could be the incentive of PE firms to execute a risky investment and aggressive dividend policy to the detriments of bondholders to increase return on equity. To avoid expropriation by PE firms, bondholders can price-protect themselves: An expropriation of bondholders could lead to higher costs of debt to other portfolio companies the PE firm invested in. Thus, evidence states that PE firms do follow an investment and payout policy aligned with the interests of bondholders due to reputational issues (Huang, Ritter, and Zhang, 2014).

#### 3.2.1.2 Structure of the Strategic Investor

**Organizational Structure** In contrast to PE partnerships, strategic investor's primary owners are not large institutional investors but households (Jensen, 1989). Fama and Jensen (1983) see a corporation as a nexus of contracts, written and unwritten, among owners of factors of production and customers. One of these contracts is the separation of ownership and control: As shown in figure 3.3, the board of managers of a firm act on behalf of the shareholders to create shareholder value. Shareholder value is defined as the value that is delivered to its shareholders and strongly depends on the management's strategic decisions. One of these decisions is to merge with another corporate or to acquire targets. The added-value in M&A decisions is created through synergies, which means that two companies combined generate more value than the two individually. By e.g. seeking cost economies, diversification into new industries, and market power, companies are able to raise their margins through economies of scale and economies of scope by combining production of one or a range of products, and to execute pricing power over both suppliers and customers (Grant, 2016; The Economist, 2014). Since M&A is an instrument which companies utilize to implement corporate strategies, M&As are considered as tools of strategy and not as strategies itself (Grant, 2016). Through these strategies, companies aim to create additional shareholder value.

**Interest Alignment** The shareholders are compensated for the risk either by dividends which are paid out regularly or by growth in value of the firm. M&A as a tool to boost company growth directly affect shareholder value. Therefore, the interests of management and shareholders have to be aligned. The initial research on payout or dividend policy by Fama and Miller (1974) and Miller and Modigliani (1961) assumes symmetrical information between shareholders and management and thus, suggest that dividend policy does not affect the value of the firm. Miller and Rock (1985) however discuss the dividend policy under information asymmetries between management and shareholders as well as the potential of exploiting information asymmetries from insiders (management) who possess better information on the company's cash flows. When interests between management (insiders) and shareholders (outsiders) are aligned, management may only prefer acquisitions if the expected value creation is higher than the opportunity cost of shareholder's capital. However, identifying the value created through an acquisition is difficult due to the post-merger integration costs, which we will discuss later in section *3.2.3.3 Operational Engineering*.

### 3.2.2 Principles of the Investment Decision

Estimating future cash flows and discounting them by an appropriate discount factor are widely accepted asset pricing models in finance theory (e.g. the *capital asset pricing model* (CAPM) or Fama and French three factor model). While valuing targets in M&A situations, strategic investors apply the broadly used method *discounted cash flow analysis* (DCF) (Vild and Zeisberger, 2014). The idea of a DCF analysis is that the *intrinsic value* of the target can be derived from the present value of its projected *free cash flows* (FCF). The FCF takes the financial performance of a firm, such as

sales growth rates, profit margins, capital expenditures, and net working capital, into considerations whereas it excludes any impacts of a firms' financing decision. To discount the FCF to the present, the *weighted average cost of capital* (WACC) is employed as the discount rate. The assumptions for WACC are highly relevant as small changes affect the final valuation considerably. WACC also includes the business and financial risk of a target as well as tax consequences. Thus, the capital structure of a firm directly affects the WACC and consequently, the valuation of the target as well (Rosenbaum and Pearl, 2009).

In the valuation of a firm or a stock, one particular measure plays a key role in estimating the WACC and thus, influence the price of the stock - namely equity risk premium (Damodaran, 2006). Note, that there is an inverse relation between the stock price and the equity risk premium: An increasing equity risk premium leads to a higher cost of equity as well as to a higher WACC. This, in turn, leads to a higher discount factor on future FCFs and consequently, to a lower stock price.

Private equity general partners, in contrast, rarely base their investment decisions on DCF criteria. The great majority of PE firms rely on the *internal rate of return* (IRR) and *multiples of invested capital* (MOIC) as well as comparable company multiples, such as EV/EBITDA, for their investment decisions. The IRR is a discount rate that makes the *net present value* (NPV) of expected future flows equal to zero. While calculating IRR, PE firms base cash flows on levered equity which contradicts teaching in finance courses to use unlevered equity to calculate the IRR. Usually, PE firms target an IRR of 20 percent (Gompers, Kaplan, and Mukharlyamov, 2016). Besides the widely discussed pitfalls of IRR calculations (to study them, we refer to the corporate finance literature e.g. Brealey, Myers, and Allen (2014), some PE-related pitfalls to be cautious about are prevalent. These include timing incentives for general partners on the detriments of limited partners, upward volatility biases, an overall upward bias in performance, and the alteration of cash flows while paying favorable rewards (kick-backs) (Phalippou and Gottschalg, 2009). We will not deepen into the discussion of these pitfalls due to the scope of this work and the usage of IRR as an industry standard; however, they should be noted. IRR measures also lack the consideration of any risk which should be considered while planning an investment decision in an LBO case.[1] However, PE firms adjust the compensation structure between GP and LPs on behalf of non-systematic as well as systematic risks associated with the investment. Cash flows are forecasted on a 5-year horizon which matches the investment horizon of PE firms as described above. Risk-adjusting compensation as well as forecasting cash flows on a 5-year horizon indicates that IRR measures can better be tied to the investment fund structure which imposes limited holding periods. In contrast to general partners, limited partners decide to invest into PE funds on behalf of absolute performance measures as opposed risk-adjusted returns. Net IRR and MOIC are generally used among limited partners. These measures are usually used to benchmark general partners (Gompers, Kaplan, and Mukharlyamov, 2016). Further note that the

[1] As the IRR lacks the consideration of any risk, we need to apply tools to measure the risk of an investment while conducting the case study. As will be shown in chapter 5 and chapter 7, we rely on Altman's Z-score.

required returns of LPs have increased due to high lossess in the financial crisis 2008 and challenges funding the pensions of an aging society (Khort, 2015).

### 3.2.3 Value Creation

The vast majority of research confirms that PE investments have outperformed public market benchmarks net of fees since the mid-1980s (Gompers, Kaplan, and Mukharlyamov, 2016). The outperformance of PE amounts to 20 percent over the lifetime of a fund and around 4 percent per year over the S&P 500 index according to Harris, Jenkinson, and Kaplan (2014). Gross of fees an outperformance over the S&P 500 of 8 percent per year is found by Axelson et al. (2013). The outperformance could indicate that limited partners require an illiquidity premium to invest as private equity cannot be readily traded contrary to public equity (Franzoni, Nowak, and Phalippou, 2012). The results should however be regarded carefully as these studies compare PE performance with the performance of the S&P 500 index which we believe not being suitable as PE firms tend to invest on average into small-cap companies rather than large-cap companies (Bain & Company, 2016; Preqin Ltd, 2016).

Similarly, the ultimate goal of strategic M&A deals is to create value for shareholders. Studies also focused on finding evidence on short-term added-value Kaplan and Schoar (2005). However, since strategic investors aim for synergies, the potential short-term gains of an M&A announcement are minor and the acquirer focused on tools to integrate the target and maximize the gains. The long-term value creation of M&A is thus highly inconclusive among scholars due to the difficulty to measure the costs of the post-merger integration (De Noble, Gustafson, and Hergert, 1988).

Martos-Vila, Rhodes-Kropf, and Harford (2013) consider the ability to detect market mispricing, different governance systems in targets as well as exploiting synergies by combining targets with ongoing projects within the firm as the most prevalent differences between financial and strategic investors. Therefore, the value creation of the two investor types can be originated from three sources - namely financial, governance and operational engineering. As we discussed the valuation and performance evaluations in section *3.2.2 Principles of the Investment Decisions*, we can start by looking into financial engineering followed by governance and operational engineering. This section closes with a table summarizing the main differences and commonalities of the value creation strategies of both investors and a description on the exit strategy on behalf of PE firms after they have increased the value in portfolio companies.

#### 3.2.3.1 Financial Engineering and Synergies

Financial engineering is based on three pillars. The first pillar states that value is created through leverage which bears the advantages of tax optimization and pressurizing the management to not waste money e.g. for empire building. As a second pillar, PE firms provide strong equity incentives for the management of portfolio companies. The third pillar is based on identifying targets that could

possibly be purchased at an attractive price and sold at a higher price later (Gompers, Kaplan, and Mukharlyamov, 2016).

**First Pillar: Leverage** Three prominent and still controversy discussed theories attempt to explain leverage ratios and capital structures of firms: First, the trade-off theory predicts that the amount of debt is chosen to trade-off interest tax shields against costs of financial distress (Myers et al., 1977). Second, the pecking order theory predicts that firms first finance projects by internal cash flows, afterward they issue safe debt and use risky equity finance as an option of last resort (Myers and Majluf, 1984). Last but not least, the market timing theory focuses on mispricing of equity or debt. In case interests are perceived to be low relative to fundamentals, PE firms issue debt; if equity markets are perceived to be overvalued, investors may prefer to finance projects by equity (Baker and Wurgler, 2002).

Studies have shown that debt-to-total capital ratios of PE-backed firms decreased from a median of 70 percent and debt-to-EBITDA ratios of 5.2 times in the 1980s to 60 percent and 4.0 times in 2012/2013, respectively. These ratios are however strongly driven by the cost of debt and this underlines the market timing theory in PE deals (Gompers, Kaplan, and Mukharlyamov, 2016). Credit markets provide several types of financing solutions: Bank loans (typically facility credit lines, amortized/balloon term loans - *Term Loan A*), institutional loans (Bullet term loans - *Term Loans B* - and bonds) and *mezzanine* debt. Note that the focus of this chapter still lies on differences between financial and strategic investors. Therefore, we only provide a brief overview of the different instruments and analyze them more deeply in the case study part of this thesis. Whereas bank loans provide money borrowed by banks, term loans B and bonds are issued by the acquirer (the PE firm) itself to finance an acquisition. As the risk of default is high due to the high leverage, bonds are often referred as *junk* or *high-yield* debt in LBOs. The third form, mezzanine debt, is a hybrid between stocks and bonds and offer investors the opportunity to take a striking risk in return for attractive financial returns. This form has however disappeared from credit markets over the last couple of years (Afme/Finance for Europe, 2016). Another debt-like form that is frequently used in LBOs are *shareholder loans*: Shareholder loans are instruments provided by shareholders and are the most junior loans in a corporation's loan portfolio. However, as these loans are provided by shareholders, they should be treated as equity (Bongaerts and Charlier, 2009). We believe that exploiting debt mispricing is not only restricted to the general attractiveness of debt compared to equity, but also to the pricing of several types of debt itself.

Strategic investors, in contrast, seem less to be following market pricing patterns as they are generally more reluctant to finance by using debt as well as they set weaker incentives for management to take on more debt contrary to PE firms (Kaplan and Strömberg, 2009; Demiroglu and James, 2007). Moreover, Kaplan and Strömberg (2009) argue that PE firms have stronger access to credit markets compared to strategic investors as they are repeated borrowers at the market. Thus, the weaker access to credit markets may be another reason to strategic investors' ability to take advantage of

debt mispricing. However, in M&A deals, companies with attractive investment opportunities but poor cash situation or weak access to credit markets can acquire firms with better access to credit markets to gain excess capital as well as benefit from excess debt capacity of the combined firm. In other words, improved access to capital markets can be supplemented by an enhanced overall capital allocation in the acquired company to build financial flexibility synergies (Myers and Majluf, 1984; Damodaran, 2006; Zenner et al., 2009).

Other findings in research show that the leverage ratio of PE-backed firms is related to those of public firms operating within the same industry. As industries differ in cash flow volatility and investment opportunities, these findings confirm the trade-off theory for both, the financial and strategic investors (Axelson et al., 2013; Damodaran, 2016). This is in line with Damodaran (2016): He provides evidence for a correlation between credit rating and tighter debt. Thus, the credit risk, as well as the cost of debt for merged companies, decrease. However, a minimized cost of capital does not necessarily lead to an ideal capital structure as levered firms provide additional benefits, such as better access to capital markets and better use of tax-deductibility of interests on debt in many countries (the so-called *tax shield*). A further implication is that the management of portfolio companies is forced to pay out funds as interests they would otherwise possibly retain or invest into projects which may have low or even negative returns (also called empire building). Leverage also has the advantage to make managers worrying about servicing debt either through cash flows of the firm or by profits made through an exit of the company, which in turn makes them rethink their overall strategy and structure (Jensen, 1989).

PE minority investments however, are less levered than majority investments - hence, the disciplining role is much smaller as cutting the cost of debt is the first action in high leverage (Battistin et al., 2013; Chen et al., 2014). Further, in family firms, none of the three theories is underlined. Capital raising through PE is not considered as a financial resource. It is rather treated as an access to non-financial resources, such as expertise in growing a business with the need to cede control over the firm (as minority investments are more prevalent in these firms) (Tappeiner et al., 2012). Disadvantages of the high leverage ratios in LBO deals are among others the inflexibility to pay interest and principals (compared to paying dividends on equity). Besides, as leverage increases the volatility of a firm, costs associated with a greater chance of financial distress are another disadvantage of high leverage ratios (Kaplan and Strömberg, 2009). However, as Strömberg, Hotchkiss, and Smith (2011) point out, PE-backed firms are less likely to default compared to strategic firms with similar leverage as they are better able to restructure the firm in distress, which is the disciplining role of leverage.

**Second Pillar: Equity Incentives** The second pillar of financial engineering, providing strong equity incentives, aims to align interests of the shareholders with those of the management and employees. Equity incentives, the so-called *sweet equity*, are instruments to increase executives' pay-for-performance sensitivity. Although it could also be viewed as a governance tool, we refer equity incentives as a financial engineering tool as it describes ways to distribute stakes among shareholders. As the management could have private information about their effort spent, possible agency conflicts

could arise. Therefore, PE firms give the management a large equity upside through stocks and options in order to align interests: 17 percent of the overall company equity is allocated to the management and employees which are significantly higher compared to public strategic firms (Gompers, Kaplan, and Mukharlyamov, 2016). Strategic investors, such as public corporates, criticize equity incentives as managers could manipulate short-term performance or take excessive risk in order to increase values of given stocks or options (Bebchuk and Fried, 2003). This phenomenon is however mitigated in PE as managers' equity is private and thus, illiquid: Management cannot sell its equity or exercise given options until the value is proved by an exit transaction (Kaplan and Strömberg, 2009).

**Third Pillar: Identifying Misvaluation** Last but not least, PE investors aim to create value by identifying undervalued assets and sell them at a higher price later on. Indeed, research has shown that PE investors have superior skills compared to strategic acquirers in identifying targets with much potential for value improvement as well as negotiating M&A deals (Dittmar, Li, and Nain, 2017). However, as the overall PE industry grew, the competition for promising targets became fiercer among PE investors as well as strategic investors. This could have affected the ability to acquire targets at a cheap price negatively (Gompers, Kaplan, and Mukharlyamov, 2016). We will discuss this effect later more into depth while investigating the competition between financial and strategic investors.

#### 3.2.3.2 Governance Engineering and Synergies

The second area in which financial and strategic investors can create value through is the governance system of a firm. Besides financial engineering, governance engineering is a key tool for private equity firms to procure change. As mentioned above, equity incentives could also be categorized as governance engineering tools. However, we focus on the board composition to analyze how PE firms execute control and whether and how they are actively involved in the management of the firms. In comparison to public companies, boards of PE portfolio companies are much smaller (Cornelli and Karakas, 2008). Boards of PE portfolio companies consist of five to seven members; thereof, three members are allocated by the PE investor. Out of these three members, one or two are linked to the management and one or two are outside directors that are not affiliated with the PE investor (Gompers, Kaplan, and Mukharlyamov, 2016). Thus, PE firms are highly empowered in terms of voting power within the boards (Acharya et al., 2013). Further, general partners assist the firm in its strategic direction, act as advisors, draw in their expertise in restructuring and bring in their contacts within the target's industry to create value (Masulis and Thomas, 2009). As boards of private equity portfolio companies meet more frequently than non-PE backed companies, the information flow between shareholders and the management may be more efficient (Cornelli and Karakas, 2008).

In contrast, strategic investors aim to create governance synergies which can be described as benefits of a change in control - thus, directly aiming for a change in management. Initially, this idea of value creation through a better management was described by Manne (1965). He states that the attractiveness

of an acquisition increases with the potential to increase the value of a firm through a more efficient management and that this potential returns can be "enormous" (Manne, 1965). Meanwhile, many studies attempt to prove governance synergies after an M&A. Wang and Xie (2009) show that when a well-managed company acquires a firm with governance issues, additional value is being created.

However, research is inconclusive regarding the governance synergies of M&A activities: Lang, Stulz, and Walkling (1989) and Servaes (1991) present results in which synergies of acquisitions increase governance quality of buyers and decrease governance quality of targets. Contrary, the majority of PE firms (70 percent) tend to invest into the existing top management and do not recruit their own management prior to the investment to appear friendly towards portfolio companies in transaction processes (Gompers, Kaplan, and Mukharlyamov, 2016). However, replacements of the existing management are frequently seen after investments: After a four-year period almost two-thirds of chief executive officers are replaced; especially if they perform poorly. It is also evident that these replacements of the management are executed more frequently by PE firms than strategic acquirers (Kaplan and Strömberg, 2009; Chen et al., 2014). It has also been shown that PE firms are likely to appoint managers with finance expertise if monitoring of the existing managements seems to be important (e.g. if the existing managements executes empire building activities). If the existing management is in need for advisory, PE firms tend to replace the management by managers with experience within the target's industry (Gompers, Kaplan, and Mukharlyamov, 2016).

#### 3.2.3.3 Operational Engineering and Synergies

Operational synergies are at the center of an M&A decision for strategic investors while, for private equity firms, research had focused only on financial and governance engineering as possible value sources for a long time. (Kaplan and Strömberg, 2009) however were among the first who identified a third source of value creation: Operational engineering.

Strategic investors use M&A to gain operational synergies to improve their business as well as build a competitive advantage. These motives of M&A can be categorized into three corporate strategy decisions concerning the scope of the firm: (1) diversification, (2) vertical integration, and (3) global strategy. *Diversification* of companies is mainly motivated by the quest for growth. The number of companies active in only one business has dropped from the 1950s during the following decades and simultaneously, the portion of diversified companies has increased (Rumelt, 1982; Whittington, Mayer, and Curto, 1999). There was a trend to the opposite direction during the 1980s when the focus went away from growth. Additionally, evidence shows that financial conglomerates suffer from a so-called diversification discount as markets believe advantages of diversification cannot be utilized and additional agency problems arise (Laeven and Levine, 2007). The second strategy of *vertical integration* is mostly motivated by transaction cost considerations based on findings ofCoase (1937). The implication of this is that companies would choose vertical integration if transaction costs exceed costs of vertical integration (Klein, Crawford, and Alchian, 1978). Some of the disadvantages of

vertically integrated firms are the problems arising due to difficulties in managing different businesses or incentive alignment. Last but not least, the *global strategy* may also be a reasoning for M&A since it is a solid way to enter a new market. Benefits of a global strategy include possible cost advantages and access to national resources. At a disadvantage, firms need to align their products and services with the needs and preferences of the new market (Grant, 2016).

In contrast, private equity firms increasingly apply industry and operational expertise to create value in their investments by taking an advisory role in restructuring programs to targets. Specialized private equity firms use their know-how to identify attractive targets as well as to develop and implement value creation plans (Kaplan and Strömberg, 2009). There is evidence that operating performance of portfolio companies improves after a buyout; e.g. in terms of operating income-to-sales ratios (Kaplan, 1989), total factor productivity (Davis et al., 2014), or growth of total sales (Bernstein et al., 2017). The most important factor to evaluate whether a firm is a promising investment is the competitive position and the business model of the firm (Gompers, Kaplan, and Mukharlyamov, 2016).

But how do strategic and PE investors focus on operational value in their targets? Operational value can either be created through revenue increasing or cost cutting. The literature of strategic M&A concordantly point out that operational value is created through both. In contrast, even though ancient research argued that PE firms aim to cut agency costs (Jensen, 1989), today's PE firms prefer targets with promising opportunities to grow rather than cutting costs.

**Revenue Growth** Economies of scope, such as combining different capabilities or products, growth in new markets, and enhanced pricing power, target on increasing the revenues of the firm (Damodaran, 2006). By combining capabilities, a merger of e.g. a firm with good marketing and a firm with attractive products will lead to higher returns for the combined entity. Combining complementary products (cross-selling) can also result in a better service and consequently in higher returns. A horizontal merger, which leads to an increase in market share provides a greater pricing power towards customers and suppliers (Damodaran, 2006). This kind of merger can be disputable as they can lead to oligopolies in a business with fewer firms. Thus, regulators are watching and approving these mergers before the deal goes through. One recent prominent example is the merger of the breweries Anheuser-Busch InBev and SABMiller, which would lead to a combined firm with about 30 percent of the global beer market (Bray, 2016). Finally, operational synergies can result from a companies' ambitions to grow. A takeover of a firm in a new market with the distribution network and a brand eases the entry into the market (Damodaran, 2006).

While evaluating the business model of targets, PE investors seek opportunities to change the firm's strategy (Gompers, Kaplan, and Mukharlyamov, 2016). It is often criticized that the value of PE comes with job losses. Findings in research are however inconclusive - studies show an employment growth of portfolio companies comparable to those of similar non-buyout firms as well as modest net job losses (Kaplan and Strömberg, 2009; Davis et al., 2014). These findings could indicate that PE

investors aim to reallocate resources such as its workforce (Gompers, Kaplan, and Mukharlyamov, 2016). Growth opportunities are not only important factors while identifying promising targets. Indeed, PE-backed firms increase revenues within the post-investment period (Kaplan and Strömberg, 2009). Nevertheless, wages of the staff may increase more slowly after a buyout compared to non-buyout firms which are consistent with more efficient processes (Kaplan and Strömberg, 2009). To improve operating performance of portfolio companies within the post-investment phase, PE firms especially make use of their operating partners rather than their financial partners. Compared to the 1980s and 1990s, today's PE firms expect to add more value through operational engineering instead of financial engineering (Gompers, Kaplan, and Mukharlyamov, 2016). Again, as in the case of governance engineering, PE firms create a huge part of value by applying operational engineering tools rather than financial engineering tools in minority deals (Chen et al., 2014). These findings should however be regarded carefully: Current cash flows could have been improved while hurting future cash flows. Research on this point is however inconclusive: Lerner, Sörensen, and Strömberg (2011) find no evidence that PE firms sacrifice long-term investments such as investments in R&D or patents.

**Cost Savings** Cost savings which result from efficiency through synergies are the most common used justification for strategic takeovers. These financial and operational benefits from synergies may arise from economies of scale and scope, greater power against supplier or customer, and prevention of duplication of tasks in the production (Ork, 2000; Larsson and Finkelstein, 1999). In the case of horizontal integration (mergers or takeovers in the same business) economies of scale is a typical strategic objective as the production can be scaled and become more cost-efficient as well as profitable (Damodaran, 2006; Vogel, 2002).

#### 3.2.3.4 Summary of Value Creation in Comparison

Table 3.1 summarizes all the differences between financial and strategic investors in financial, governance, and operational engineering and synergies. To keep the same structure, it is split into these areas.

#### 3.2.3.5 Payoff Strategies (Exit vs Infinite Investment Horizon)

The preceding section describes how PE firms and strategic investors create value in its targets. We could provide similarities and differences in their value creation plans. This is directly linked to the payoff strategy. How and in which time frame do the investor types expect their plans to pay off?

As PE funds have a limited contractual lifetime, the exit also plays a major role in the whole transaction process to pay off their efforts in value creation. In the literature, there are three types of exits discussed: Sale to a strategic investor, sale to another PE firm (secondary/tertiary buyout) and, last but not least, a placement on a public stock exchange (IPO). Given the high leverage ratios of LBOs, one might expect that a large fraction of PE-backed firms ends in bankruptcy. Pre-crisis levels

**Financial Engineering and Synergies**

| | Financial Investor | Strategic Investor |
|---|---|---|
| Leverage | - Higher leverage (however, decreased over time)<br>- Driven by cost of debt<br>- Stronger access to credit markets | - Less leverage<br>- Following Less the market pricing of debt and weaker access to credit markets<br>- Possibility of credit market access driven M&A |
| Tax Shield | - High leverage ratio leads to high tax shields for the target company a way of value creation | - Less use of tax shield |
| Pressure on Management | - High leverage ratio increases pressure on management to not waste money | - No Incentives for management to increase leverage ratio |
| Equity Incentives for Management | - Large equity upside for management<br>- More use of equity incentives as equity illiquid for private companies | - Less equity Incentives for management<br>- Being criticized as it may motivate short-term performance at cost of long-term |
| Valuation | - Superior skills in identifying undervalued companies and negotiating M&A Deals | - Inferior valuation skills and less experience in negotiating M&A deals |

**Governance Engineering and Synergies**

| | Financial Investor | Strategic Investor |
|---|---|---|
| Board Composition | - Smaller boards<br>- Seats for PE firm with strong voting power<br>- Less outsider<br>- GP act as advisor<br>- Meet more frequently | - Larger boards<br>- More outsider and thus, Less concentrated control |
| Management | - Management retention as key strategy when acquiring<br>- After acquisition fraction of management changes high | - Change in control is key driver of synergies as more efficient management can create value |

**Operational Engineering and Synergies**

| | Financial Investor | Strategic Investor |
|---|---|---|
| Cost cutting | - Initial stereotypical cost cutting through job losses in research inconclusive | - Economies of Scale: Cost cutting through M&A with supplier or clients (decrease transaction costs) |
| Revenue growth | - Preference for targets with promising opportunities to grow<br>- Increasing of post-investment operational performance as key to increase returns<br>- Steady cash flows needed to cover interest and repayment of debt | - Economies of Scope: Diversification with focus on cross-selling<br>- Increase of market share to increase bargaining power towards customer and supplier (horizontal merger) |

**Table 3.1:** Overview of Differences in Value Creation of Financial and Strategic Investors.

of PE-backed firms defaulting are however relatively low: Kaplan and Strömberg (2009) found an annual default rate of 1.2 percent compared to an average default rate of 1.6 percent that Moody's reports for all US corporate bond issuers from 1980-2002 (Kaplan and Strömberg, 2009; Hamilton and Cantor, 2006). This finding underlines again that PE firms have strong capabilities and set incentives to restructure companies in financial distress successfully (Strömberg, Hotchkiss, and Smith, 2011). By considering exited deals only, a sale to a strategic acquirer is the most common form to exit followed by a secondary buyout and an IPO (Kaplan and Strömberg, 2009). Interestingly, Hege et al. (2009) find that PE firms' bidding behavior is related to the expected exit timing and type of a portfolio company. More specifically, an exit through an IPO is placed fastest (2.1 years) followed by a trade sale to strategic buyers (3.2 years) and secondary buyouts (5.0 years) (Hege et al., 2009). However, it should be noted that the average time to exit (3.4 years) is much shorter compared to other studies investigating the investment horizon (usually 4-6 years (Kaplan and Strömberg, 2009; Gompers, Kaplan, and Mukharlyamov, 2016). For firms exiting by an IPO, the highest annual growth rates of enterprise value (EV) were observed (median of 43.64 percent), followed by exits via trade sales to strategic buyers (median of 24,78 percent) and secondary buyouts (median of 10.38 percent). The longer holding period in secondary buyouts, as well as the relatively low growth of the enterprise value, indicates that selling to another PE firm is an exit of "last resort": Secondary buyouts offer PE firms the opportunity for fresh liquidity in case the fund terminates its lifetime and strategic acquirers are scarce (Kaplan and Schoar, 2005). However, seller excess returns (or price premiums over fair values) in secondary buyouts are relatively high: This may be due to the pressure to exit in favorable debt market conditions suggesting buyer's greater ability to borrow (Hege et al., 2009; Wang, 2012).

On the contrary, strategic investors do not have an exit strategy  they invest to integrate the company and to compass synergies, mostly operational. By not having an exit planned, strategic investors are able to change the target's business with a long-term view and are able to fetch all future returns - additional to the synergies they generate. Financial investors however can suffer from an investor myopia after exiting an investment. This can a be a positive long-term effect of target's improvements, in which the investor can not participate (Vild and Zeisberger, 2014).

## 3.3 Financial and Strategic Investors in Competition

After comparing the two investor types, we now discuss the competition between them. An M&A deal or a buyout can be initiated from both sides - sell-side or buy-side. When the target's decision to sell the companies has been made, the board of directors gets to choose the way how the company will be sold to reach both maximize price and promote deal realization (Brams and Mitts, 2014). We concentrate on maximizing the price as the essential rationale behind selling a stake. Note however, that maximizing the price is not always the rationale of selling. As has been shown above, family firms may sell stakes in their companies in order to gain access to non-financial resources by still ceding control over the firm (Tappeiner et al., 2012).

As evidence shows, there is not a process which fits all sales. Broadly, there are two possibilities for the sale of a target - auctions or private placements. Auctions can also be separated into two categories, namely broad and targeted auctions - which leads to a total of three options to choose from (Boone and Mulherin, 2009). However, in private placements the seller selects the buyer to negotiate with. Hence, private placements are characterized by a low - if any, a latent - degree of competition between bidders (Aktas, Bodt, and Roll, 2010). Following, as the interest of our research question lies on the external market environment, such as the degree of competition between investors, we do not go more into detail of private placements.

To assess advantages and disadvantages of these sale processes for financial and strategic investors, we first define a price premium of a deal. Subsequently, we look at the bidding behavior in auctions.

### 3.3.1 Price Premia

An acquisition premium (also called price premium) is an overpayment to firm's actual market value. To convince the current shareholders to sell, a premium has to be paid (Laamanen, 2007). Since the price premium is a part of the value the bidder estimated of, one would expect that the winning bidder is the one with the highest valuation. Consequently, the premium depends on the valuation of all bidders since the buyer has to outbid all other bidders (Gorbenko and Malenko, 2014). Such a premium still anticipates or requires a certain level of performance of the acquisition. Besides being a financial figure for the deal and the market, the price premium has an effect on the management of the bidder by the business gamble of earning or surpassing it with synergies (Sirower, 1997). The determinants of price premia are not fully understood, although strategy and finance scholars focused on identifying relationships between synergies and price premia (Laamanen, 2007).

### 3.3.2 Auctions (Broad and Targeted)

An auction is a bidding process in which all potential (*broad auctions*) or a chosen group of (*targeted auctions*) bidders can participate. The selling firm's management decides together with an investment bank how many potential buyers they contact (Hansen, 2001).

Due to the competitive nature of auctions, a common understanding is that strategic investors are willing to pay higher prices than financial investors as they see additional synergies, which can not be realized by financial investors. This also implies that, on average, strategic investors value targets more than financial investors do. Gorbenko and Malenko (2014) investigate auctions with estimating valuations of each investor group to differ these group of investors and found some contrary solutions. A significant part of private equity firms valued the target more. This was mostly the case with poorly performing mature targets. One possible explanation for this phenomenon might be the expertise of financial investors in restructuring poorly performing companies (Gorbenko and Malenko, 2014). Another argument may be the better access to capital markets which make the financial investor

finance the acquisition at a lower cost of debt compared to the strategic investor (Demiroglu and James, 2010; Ivashina and Kovner, 2011).

For strategic acquirers, the valuations of targets are highly diffused: First, managers of an overvalued firm can exploit their private information by issuing shares at inflated prices to buy undervalued, or less overvalued, targets. Second, valuation differences may stem from managers aspiring empire building ambitions (Erel, Liao, and Weisbach, 2012; Jensen, 1989). Contrary, financial investors' valuations are more correlated to general economic conditions, such as stock markets and cost of debt, and less diffused than strategic buyer's (Gorbenko and Malenko, 2014). This correlation can be explained by financial investor's exploiting of debt misevaluation, as already discussed in section *3.2.3.1 Financial Engineering and Synergies*. Not only the valuation of the target by financial investors in linked to the availability and cost of debt, but also the capital structure decision when conducting a buyout is dependent on the cost of debt  lower cost of debt indicates a higher leverage ratio (Axelson et al., 2013). Further note that the chosen selling type also affects the decision whether the target is being sold to a financial or strategic investor (Fidrmuc et al., 2012).

Since financial investors do not compass synergies and they aim to reach IRRs after a certain amount of years, fierce competition causes private equity firms not being able to compete. As limited partners still push capital into PE funds, general partners sit on a bunch of un-invested capital, also known as the dry powder (Preqin Ltd, 2016).

## 3.4 Current Developments and Trends

Above, we investigated the fundamental differences between financial and strategic acquirers in competitive auctions. In this chapter, we focus on discovering the conditions which trigger the activity of both investors. Note that we analyze the European market environment although the European PE market may be develop differently compared to global markets (PwC, 2016). We do so in anticipation of our case study conducted in Chapter 6, as the target of interest operates in France.

**Main Drivers of Current Buyout Activities** Buyout activities depend on three triggers: (1) credit availability, (2) stock market valuation, and (3) risk appetite of investors (Gatti, Chiarella, and Carefin, 2015). Following these triggers, we discuss the current investment environment for leveraged buyouts.

First, as a key macroeconomic driver, credit availability has changed through the reaction to the financial crisis. Quantitative easing measures, a monetary policy tool applied by central banks, increase the availability of credit by lending to financial institutions and by buying long-term securities. The aim is to stimulate the market with high liquidity. Thus, we are currently observing the cheapest debt levels ever and narrowest spreads between investment grade and high yield investments as we can see in figure 3.4 for the European debt market. Gatti, Chiarella, and Carefin (2015) state that cheap and abundant credit enables more leveraged transactions with low costs of debt. This also affects PE

firm's search of target companies as with lower costs the cash flow requirements decrease accordingly Gatti, Chiarella, and Carefin (2015). By looking at the high yield spreads in figure 3.4 in comparison with government bonds, we notice that the spread is even higher than the effective yield for high yield investments. This is due to negative yield levels of government bonds. Before using high yield bonds, PE firms can make use of term loans and so-called leveraged loans, respectively. Term loan lenders are entitled to equal repayment rights upon bankruptcy as the debtors of revolving credit lines. Leveraged loans also have a mandatory specified repayment schedule and these repayments cannot be re-borrowed. As we see in figure 3.5, leveraged loans had the same size in new issuance as high yield bonds with around €65 millions each in Europe.

Secondly, stock market valuations also play key roles in buyout activities. (Gatti, Chiarella, and Carefin, 2015) argue that PE firms prefer high valuations in good economies as they tend to believe in increasing the companies' valuation even further. Moreover, the premium of illiquid investments, such as PE investments, increase with high stock market valuations (Gatti, Chiarella, and Carefin, 2015). In this background, we have seen that European stocks in the Euro Stoxx 600 index have increased around 40 percent in the last 5 years (Data: Bloomberg). In a similar vein, the average P/E ratio in developed Europe was 15.2x by end of March 2016 (Keimling, 2017), compared to a P/E ratio of 10.9x in 2008 (Gatti, Chiarella, and Carefin, 2015). Considering the stimulation by the above-mentioned monetary policy of central banks, we see these moves in the market as its likely consequences and hence, as a further reason for the increased attractiveness of PE activities. The last driver of buyouts, investors' risk appetite, is mostly affected by the first two triggers credit availability and stock market valuations. In an investment environment with high liquidity, low interest rates, and high valuations, PE limited partner's quest for attractive investment opportunities peaks and so does their appetite for additional risk. This leads to a currently strong period for fund-raising.

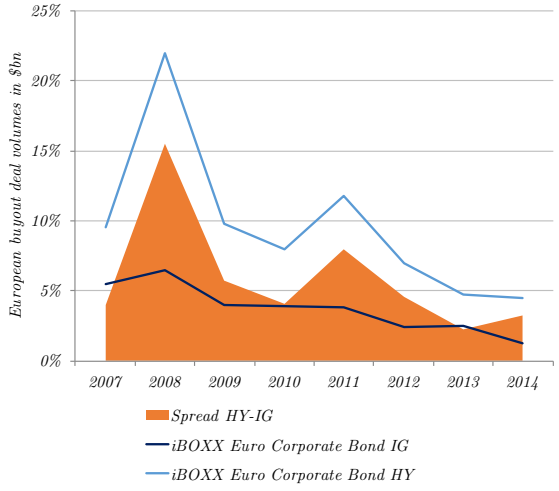


**Figure 3.4:** European Yields on Corporate Bonds and IG-HY Spreads (Gatti, Chiarella, and Carefin, 2015).

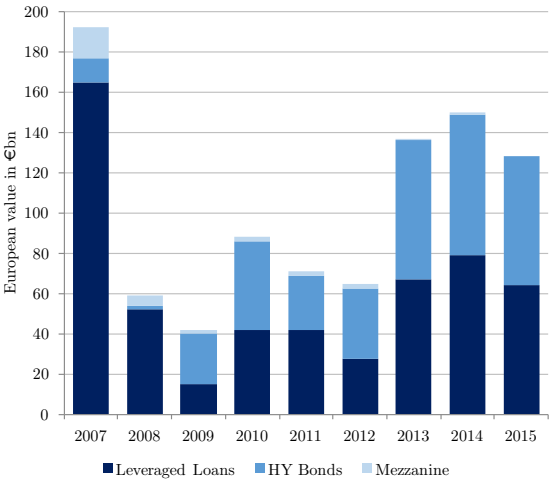


**Figure 3.5:** European Leveraged Finance New-Issue Volume (Data: S&P Global Capital Markets).

**Main Drivers of Current M&A activities** When looking at current market conditions to find reasons for the high M&A activity of strategic investors, we can point out two main triggers: (1) low growth and (2) low funding costs (Kengelback, Keienburg, and Schmid, 2016). In times of low organic growth opportunities, companies seek inorganic growth through M&A activities (Zenner et al., 2009). The same studies from Kengelback, Keienburg, and Schmid (2016) and Zenner et al. (2009) point also out that in the current credit environment (low interest rates), companies finance acquisitions less with cash and prefer debt or equity issuance. The credit availability and a possible debt misvaluation are, as already discussed above, drivers of PE activities and subsequently leads to fiercer competition for potential targets.

**Dry Powder in the Buyout Market** Above, we have seen that the current market environment triggers both, PE investments and corporate M&A activity. This leads to the high competition on corporate takeovers. As we have shown in section *3.3.2 Auctions (Broad and Targeted)*, the level of dry powder of PE firms is a symptom of a fierce competition in the market. On this account, we currently observe a 9 percent increase of dry powder between 2014 and 2015, leading to $755 billions of cash reserves in June 2015 (Preqin Ltd, 2016). The three columns in figure 3.6 highlight this trend in the buyout market. We notice that the number of exits is high and PE firms are still successful in fund-raising. The investments also show us the size of the buyout market globally. Worth noticing is the relatively low amount of new investments compared to the number of exits.

The record levels of unused cash reserves, as illustrated by the red line in figure 3.6, also lead to severe issues for PE companies. While dry powder is on an upward path, analysts await a collision of the pressure to eventually invest the cash reserves and PE's principle to not overpay for an LBO candidate. The risk of overpaying is also a result of increased competition in the buyout market, which may further explain why the value of the European buyout market is increasing since 2012, while the

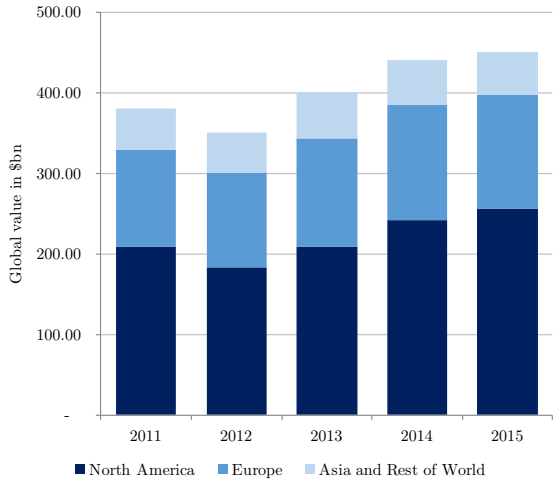


**Figure 3.6:** Global PE Dry Powder by Year (in US$b) (EY, 2017; Bain & Company, 2016).

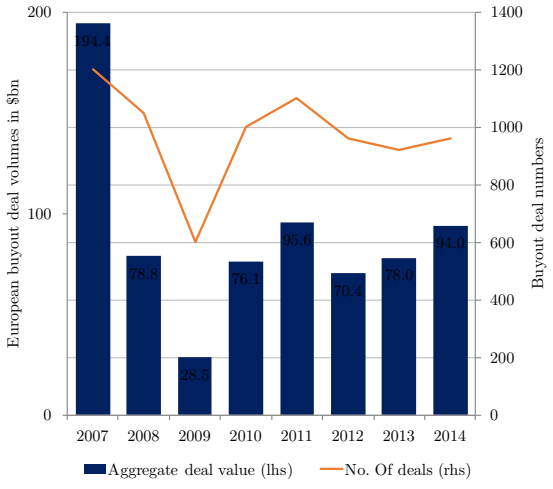


**Figure 3.7:** European Buyout Deal Volumes (Gatti, Chiarella, and Carefin, 2015).

number of deals is not moving proportionally. We acknowledge that figure 3.7 represents the trend in the European buyout market, while figure 3.6 is illustrating levels of dry powder globally, divided into three regions: North America, Europe, and Asia and Rest of the World.

## 3.5 Chapter Conclusion on the Literature Review

By providing an overview of existing theories that may describe internal and external conditions which could influence the PE firms and strategic investors decision to partner, we aim to answer the first sub-question of our research. Thereby, we found differences and commonalities between both types of investors in their structure, investment principles, their strategies to create value as well as their bidding behavior in auctions. On top, we provided an overview of the current market environment which may have further impacts on joint ventures between PE firms and strategic investors. Here, we find market valuations and credit availability most relevant as an external factor influencing the decision to partner as both factors strongly trigger the activity of PE firms and strategic investors.

# 4 Research Methodology

In chapter 2, we have set the research boundaries. As shown, in order to produce reliability, generalizability and valid findings in our research, it is essential to have a critical attitude about assumptions we make on human knowledge and the nature of the realities we encounter (Crotty, 1998). On basis of the literature review in the preceding chapter, we emphasize on the philosophical commitments we make through our research and which we find most suitable to answer our research question.

## 4.1 Research Philosophy

In our research, we do not believe in an exclusively objectivistic reality. We do so, as we have seen that investors attach their own rationales to invest into certain targets; some of them may even be private information. We believe that what we see, such as the external market environment, is only part of the bigger and much more complex picture. Hence, we can only generate valid knowledge if we understand the social structures that have given rise to phenomena (Bhaskar, 1989; Saunders, Lewis, and Thornhill, 2009). Thus, developed knowledge in our research is based on a *critical realistic* attitude: Data is collected on an observable reality to search for regularities and causalities. To understand the more complex surroundings of phenomena and provide more satisfactory explanations, we analyze the social structures, such as specific rationales of individuals, behind observed events "which offers the prospect of change that can transform the status quo" (Bryman and Bell, 2015).

## 4.2 Research Approach

Since the deductive approach is based on existing theory to imply hypotheses that will be either confirmed or rejected by new evidence on data, our approach could be considered as deductive. However, due to our critical realistic standpoint, we aim to gain novel insights into the more complex picture by conducting a qualitative case study. Thus, our research could also be considered as inductive which allows a theory emerged from new data. Nevertheless, in our case study, we heavily rely on existing theories highlighted above in the literature review that were developed and established based on quantitative methods. We do not confirm or test them. Rather, we assume robustness of these theories even though we discuss our choice to use certain models as well as their implications on our results. Due to the polarity of the deductive and inductive research approaches, our study cannot be considered exclusively as either deductive or inductive. Rather, we follow a continuous interplay of both and make use of generalizable existing theory on the external market environment as well as case specific data. Thus, as we move back and forth to come up with the best explanation to our research question, we consider our research approach as abductive.

The chosen research approach is subject to limitations. Critics of the deductive approach argue that it relies on a strict logic of theory-testing and falsifying hypotheses. A problem however arises because it is not clear how to select the theory to be tested. In other words, quantitative research lacks the detail to specific problems. Critics concerning inductive research, on the other hand, argue that empirical data to generalize for specific problems is missing (Bryman and Bell, 2015). Moreover, inductive research is impacted by the values of the researcher itself. Hence, it may be likely that other researchers with different values may draw their own conclusions and recommendations in this particular kind of research (Saunders, Lewis, and Thornhill, 2009). Although we acknowledge that an abductive approach is still exposed to parts of the before-mentioned limitations, we believe that it is the best way to overcome the weaknesses associated with deductive and inductive reasoning.

## 4.3 Research Strategy

As shown in the preceding two parts of this chapter, the way how to answer our research question is influenced by our research philosophy and our research approach. Using the literature review as a fundament, we have set the principles we make through our research. We find an abductive research approach based on a critical realistic attitude, most suitable for our kind of research. Thus, we conduct a mix-methods research strategy, outlined by a quantitative study which is followed by a qualitative case study, as illustrated in figure 4.1. Although the qualitative study includes numerical parts and knowledge drawn from empirical studies presented in the literature review to a huge part, its focus lies on developing contextual knowledge on details. This is in line with the critical realistic principle to research.

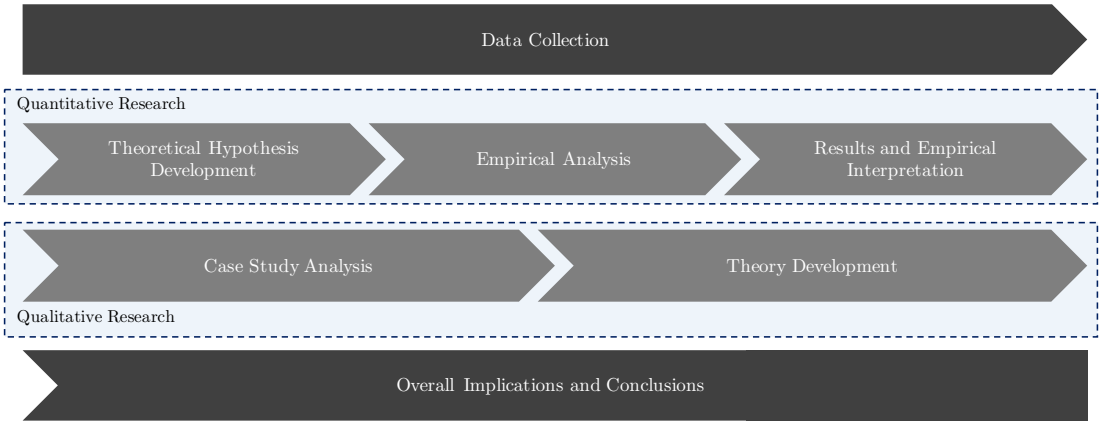


**Figure 4.1:** Research Plan (Own Illustration).

# 5 Theoretical Methods

Based on the research strategy we have set in the preceding chapter, we now elaborate on the theoretical methods and tools we apply in order to answer our research question. We start with a presentation of the research process of the quantitative study. Subsequently, we present the process for the case study briefly.

## 5.1 Methods in the Quantitative Study

### 5.1.1 Hypothesis Development

The quantitative study aims to answer our second sub-question on which external market environment conditions make PE firms partner with strategic investors. As shown in the previous chapter, quantitative research tests a hypothesis in order to agree with or to reject existing theory. Hence, we need to translate the question on external market conditions leading to a higher share of joint acquisitions to total PE-backed deals into a testable hypothesis. As outlined in chapter *3 Literature Review of Financial and Strategic Investors*, research has shown that PE firms tend to invest in new business models more likely if certain conditions are given: For instance, Kaplan and Schoar (2005) find that PE firms invest in secondary buyouts more frequently in times of an attractive interest environment and if strategic acquirers are scarce. In this case, PE firms see secondary buyouts as an investment of last resort in order to turn bounded capital into fresh liquidity. But what if strategic acquirers and private equity compete against the same targets? As shown in section *3.4 Current Developments and Trends*, the same sources trigger the M&A activity of financial and strategic investors, namely high market values and credit availability, which, in turn, lead to a high degree of competition. When competing among the same targets in auctions, the strategic acquirer offers complementary assets. As a consequence of the synergy potential between targets and themselves, they pay on average higher price premiums. PE firms, on the other hand cannot offer complementary assets. Thus, on average, they are also more price-sensitive than their strategic counterparts. Due to a higher price-premium as well as to the access to complementary resources, targets prefer to sell to strategic acquirers, which is marked by high levels of un-invested capital of PE firms (dry powder) (Gorbenko and Malenko, 2014). A solution for PE firms to invest into these promising targets is however to offer a partnership with their strategic competitors. This could be advantageous in following ways: The strategic investor could benefit from the PE firm's efficient management systems and their financial as well as governance know-how whereas the PE firm could profit from complementary assets offered by the strategic investor and a less competitive bidding process (Masulis and Nahata, 2009; Gorbenko and Malenko, 2014). While entering a partnership PE firms could unlock the value of capital that remains otherwise un-invested. Thus our hypothesis becomes:

*In times of high competition between private equity and strategic investors within the M&A market, the share of joint venture deals between both types of investors to total PE-backed transactions is higher than in times characterized by low competition.*

One explicit point to mention is that our hypothesis can either be measured by joint venture activity but also by its transaction sizes. Build on this hypothesis, we turn to the data collection process and the presentation of methods that seem to be most suitable in order to test our hypothesis.

### 5.1.2 Data Collection in the Quantitative Study

The quantitative study concentrates heavily on external data gathered from widely used databases within the M&A and Finance research area. As we are interested into the patterns of the entire private equity industry worldwide, our research must be built on a huge data sample of PE-transactions. Therefore, we rely on the internet-based database S&P CapitalIQ owned by S&P Global Inc. (prior to April 2016 known as McGraw-Hill Financial, Inc.). As CapitalIQ is one of the leading data sources for M&A and financing transactions and offers detailed information about individual deals, we construct a base sample of PE transactions provided by CapitalIQ. Further economic data we use through our empirical research is based on Bloomberg Professional Services (Bloomberg). Bloomberg is the leading provider of financial software tools such as an analytics and equity trading platform, data services, and news to financial companies and organizations. As these databases are widely used within economic and business research as well as under practitioners, we believe in its reliability.

In our quantitative study, we aim to test the hypothesis that the share of joint venture transactions between financial and strategic investors to total PE-backed transactions (JV/T) increases in times of fierce competition. As our hypothesis can either be measured by activity or transaction sizes, we have to make sure to gather joint venture transaction numbers and transaction sizes to total PE-backed transactions numbers and transaction sizes. Moreover, we have to define how we measure M&A boom and bust cycles. In the following, we present the data collection process to validly test our hypothesis.

**Transactions** As seen in the overview of the PE industry, the private equity industry shaped itself dramatically within the last centuries. PE's motivation is no longer primarily about solving governance issues in large public firms; rather PE concentrates on a variety of different industries with an increasing amount of different transaction types than LBOs (Kaplan and Strömberg, 2009). The period from January 1$^{st}$, 2000 until December 31$^{st}$, 2016 seems interesting to us as this period takes into account the shape of the PE industry. Moreover, it incorporates M&A booms such as the years prior to the financial crisis 2007/2008 and the years from 2014 until 2016 as well as bust cycles like after the *Dotcom bubble* in the early 2000s and the financial crisis 2007/2008. More specifically, we look at quarterly transaction sizes and numbers within the above-mentioned time frame.

All transactions are obtained from the CapitalIQ database. We collect all *M&A transactions* that occurred between January 1st, 2000 until December 31st, 2016. Further, we only look at M&A

transactions and do not incorporate *Private Placements* into our study as buyers are usually passive in this transaction type (as shown in Chapter *3.3.2 Auctions (Broad and Targeted)*), there is a low degree of competition about targets). We exclude all transactions that were *unsuccessful*, *canceled* or *announced* but not completed to make sure the transactions were successfully completed. As we are interested in PE/VC-backed investments, we characterize the investments firm type (Buyers/Investors) as *PE/VC* leaving 40,957 transactions. CapitalIQ also provides the types of each transaction. In order to make sure we compare joint venture transactions between strategic and PE investors with all other transactions a PE firm could invest in, we have to include every single transaction type that could be backed by a PE firm. The number of transactions typed by *Sponsor/Strategic JV Acquisition*, *Leveraged Buy Out (LBO)*, *Management Buyout*, *Secondary LBO*, *Acquisition of Majority Stake* and *Acquisition of Minority Stake* matches the number of transactions of 40,957, we have obtained before typing the transactions. This indicates, that these are all transaction types a PE firm invests into. [1]

If a transaction is characterized by more than one type, we obtain the one that is mentioned first by CapitalIQ. However, *Sponsor/Strategic JV Acquisitions* may be of special interest for testing our hypothesis as we are interested into the share of partnership transactions between strategic and PE investors. CapitalIQ defines *Sponsor/Strategic JV Acquisition* as "a scenario where a strategic firm and a financial buyer work together or are funding together to start a new company or acquire an existing business. The percentage sought in the M&A transaction must be 100 percent. There can be two or more acquirers as long as one of them is a strategic buyer along with private investment firms. If management and/or individual(s) are also a part of the buyer group along with at least one sponsor and at least one strategic buyer and the percent sought is equal to 100, then the Sponsor/Strategic JV Acquisition type is applicable. The stake acquired by each buyer is immaterial." (Standard and Poor's Capital IQ, 2017). Despite the definition of a joint venture transaction, CapitalIQ does not provide any further information how it defines *financial sponsors*. However, it uses *financial buyer* and *private investment firm* interchangeably. *private investment firm* is defined as "a privately held firm that makes investments in the form of purchase and sale of public or private equity or debt and other securities, as well as real estate assets. Private investment firms may be institutional asset managers, mutual or hedge fund sponsors, pension fund managers, private equity sponsors, or real estate investment firms". Hence, *private investment firms* include PE sponsors. Moreover, although a direct definition of *strategic buyers* is not provided, CapitalIQ lists corporations (private/public), individuals/insiders, company controlled foundations, internally managed pension funds, state-owned shares, as well as hedge fund managers, PE firms and sovereign wealth funds[2], under *strategic owners* (Standard and Poor's Capital IQ, 2017). By following the definition of a *Sponsor/Strategic JV Acquisition*, *private investment firm* and *strategic owner* as well as by looking at transactions that are backed by *PE/VC firms*, we ensure that at least one *PE/VC firm* and a *strategic buyer* invest into a

[1] However, we do not claim completeness of transaction types.

[2] For hedge funds, PE firms and sovereign wealth funds a stake of more than 5 percent is required to be listed as a "strategic owner" (Standard and Poor's Capital IQ, 2017).

target. By doing so, *Sponsor/Strategic JV Acquisitions* become ubiquitous to calculate the share of PE/Strategic partnerships to total deals. Consequently, we prioritize this acquisition type: If e.g. a transaction is typed by both, a *Majority Acquisition* as well as a *Sponsor/Strategic JV Acquisition*, we characterize the transaction as a *Sponsor/Strategic JV Acquisition*. Nevertheless, a drawback of CapitalIQ's definition of *Sponsor/Strategic JV Acquisition* is that the stake acquired by each buyer is immaterial. It does not report the capital or share invested by each investor in joint venture deals between financial and strategic investors. This also means that due to CapitalIQ's definition of a *private investment firm* which incorporates several investment firm types, we cannot guarantee that next to a PE firm also e.g. a *Hedge Fund Manager* as a financial sponsor invests into the target.

For the purpose of this thesis and our interest in investments in enterprises, we then choose targets classified as *Public and Private Companies* leaving 36,023 transactions. The majority of transactions we lose by this step are investments into *Assets/Products* rather than entire businesses.

One of the main challenges while working with privately held companies is the lack of data. We see that transaction sizes are not given for the entire population of transactions[3]. To account for non-availability of transaction sizes of certain deals, we include some further explanatory data into our analysis, namely the geographic locations of the targets (characterized by *Africa*, *Asia Pacific*, *Europe*, *Latin America and Caribbean* and *United States and Canada*) and the primary industry classification of the targets (characterized by *Energy*, *Real Estate*, *Materials*, *Industrials*, *Consumer (Discretionary)*, *Consumer Staples*, *Healthcare*, *Financials*, *Information Technology*, *Telecommunication Services* and *Utilities*). The aim of including the geographic and industrial information about targets is to estimate missing transaction sizes. The disadvantage of this step is to exclude 698 transactions as information on the industrial classification of the targets is not provided by CapitalIQ. However, we believe the value of estimating missing transaction sizes based on the industrial classification of targets is higher than excluding the above-mentioned number of transactions. Summarizing, our data sample consists of 35,325 total transactions into public and private companies backed by PE firms within the time frame of interest backed by geographic and industrial information. Although we believe in the reliability of data provided by CapitalIQ, we briefly cross-check the total number of PE-backed transactions within the time frame of interest as well as randomly selected transaction sizes with data provided by the data source *Mergermarket*, another widely used database for transaction information. Mergermarket offers slightly less PE-backed transactions (35,198). Given transaction sizes differ only of rounding errors. Hence, we believe the CapitalIQ sample provides a good fundament for our research.

**Boom and Bust Cycles** We consider M&A boom and bust cycles as a market environment that boosts/harms the investment behavior of PE and strategic investors in the market. In section *3.4 Current Developments and Trends*, we have seen that market values and credit availability strongly trigger PE firms' and strategic investors' investment behavior. Following Kaplan and Strömberg

[3]Note that we elaborate on this problem more deeply in the empirical study conducted in Chapter 6.

(2009), we use the measure EBITDA to enterprise value (EV) less high yield rates to describe boom and bust cycles in M&A-markets. The measure can be understood as the excess/deficit from financing the purchase of an entire company with high-yield bonds and indicates whether costs of debt financing are mispriced compared to equity returns. We use the measure as Kaplan and Strömberg (2009) provided evidence that PE-activity tends to be higher in years operating earning yields exceed interest rates on high-yield bonds. An excess thus implies favorable M&A market conditions compared to the high-yield bond market. Although public firms do not take advantage of favorable credit markets as much as PE firms do, the pattern of strategic M&A activity is similar to PE boom and bust cycles, indicating fiercer competition for promising targets between the investor types within these cycles (Kaplan and Strömberg, 2009; Martos-Vila, Rhodes-Kropf, and Harford, 2013). Nevertheless, it should be noted that the higher share of PE activity to overall M&A activity in times of favorable debt misevaluation may lead to noises in our analysis. Moreover, the measure only determines M&A competition indirectly: We acknowledge that it would be appropriate to analyze the bidding behavior of both investor types about targets to infer conclusions about the competition. However, as seen above, we gathered 36,023 total successful PE-backed M&A transactions from 2000 until 2016. Adding the transactions in which strategic investors assert themselves results into a number of transactions that is not practical to be analyzed. Another, in the literature widely applied, proxy for competition within a market is the Herfindahl-Index (DeFond and Park, 1999). It measures the sum of the squared market shares of firms within a specific industry. With reference to a huge amount of actors in the M&A market, it is however not practical to draw on the Herfindahl-Index in order to measure the competition in the worldwide M&A market. Thus, for the purpose of this study, we believe the applied measure is a sound indicator of the overall M&A activity of financial and strategic investors.

We use EBITDA to enterprise values (EV) as a proxy for the operating cash flow generated per dollar of the market value of the median company in the MSCI World Small Cap Index. Although it is discussable to use EBITDA as a proxy for a company's cash flow as it does not account for capital investments, we make use of it because it strips away the external impacts of a company's debt structure and indicates a firm's operating performance (Eastman, 1996). In contrast to Kaplan and Strömberg (2009), who use the S&P 500 index, we apply the MSCI World Small Cap Index as PE firms tend to invest on average into small-cap companies rather than large-cap companies (Bain & Company, 2016; Preqin Ltd, 2016). We further acknowledge that buyout debt may be financed by bank senior loans, high-yield bonds and mezzanine. Thus, it would be appropriate to use a weighted average of costs for the different types of debt. However, as shown by Demiroglu and James (2007), there are dynamics of the debt structure expressed by proportions of bank senior loans, high-yield bonds as well as mezzanine debt instruments of PE firms due to their behavior to take advantage of debt mispricing. Moreover, the debt structure of PE firms is highly under-investigated in the literature: There is little evidence on the proportions of certain debt instruments within the total debt structure of LBOs. Thus, we follow Kaplan and Strömberg (2009) to apply Merrill Lynch High-Yield rates (Cash Pay Bonds). Note that the index tracks the performance of non-investment grade coupons and thus does not depict a spread.

This is important to us in order to indicate the total cost of financing with high-yield bonds. Both, EBITDA/EV ratios of the MSCI World Small Cap Index and Merrill Lynch High Yield Rates (Cash Pay Bonds) are drawn from Bloomberg. We use EBITDA/EV ratios of the MSCI World Small Cap Index on a quarterly base and take the quarterly average of Merrill Lynch High Yield Rates (Cash Pay Bonds) within the time frame of interest. To obtain the final measure, we then take the difference of both sub-measures.

### 5.1.3 Econometric Hypothesis Testing

Based on the dataset we obtained above, we now discuss statistical tools we apply in order to validly test our hypothesis.

#### 5.1.3.1 Transformation to account for Skewness

In highly skewed distributions, observations are confined to a small part of the range of the data. Hence, in a positively-skewed distribution (the tail on the right side of the distributions is longer than on the left side) the mean lies on the right of the peak of the distribution. A common example of a positive skewness is data on people's income which is bound from below by zero with only a few extremely high-income values. Controversy, in a negatively-skewed distribution (the tail on the left side of the distributions is longer than on the right side) the mean lies on the left of the peak of the distribution. This leads to the fact that the mean is a problematic measure of the center of skewed distributions. OLS regressions however model the mean as a measure of central tendency. Thus, non-symmetric data must be corrected before running regressions on it. Before correcting for skewness, it is nevertheless necessary to test for skewness (Fox, 2008). We briefly describe the D'Agostino-Pearson Skewness Test as well as the log transformation for positive-skewed data. Due to the wide appliance in the literature and the high power of the D'Agostino-Pearson Skewness Test, we do not discuss any other approaches to test for normality.

The D'Agostino-Pearson Skewness Test (DAP) describes the skewness of a distribution as follows:

$$[h]\sqrt{\beta_1} = \frac{E(X-\mu)^3}{[E(X-\mu)^2]^{\frac{3}{2}}} = \frac{E(X-\mu)^3}{\delta^3} \tag{5.1}$$

*where E is the expected value operator*

For a normal distribution, the moment $\sqrt{\beta_1}$ of the above measure is equal to 0. Controversy, a distribution is non-symmetric if $\sqrt{\beta_1} \neq 0$, respectively, skewed to the right if $\sqrt{\beta_1} > 0$ and to the left, if $\sqrt{\beta_1} < 0$. The DAP tests whether $H_0$ (normality $\sqrt{\beta_1} = 0$) can be rejected against $H_1$(non-normality due to skewness $\sqrt{\beta_1} \neq 0$) following a $\chi^2$-statistic (D'agostino, Belanger, and D'agostino, 1990). As most common statistical methods such as the OLS regression summarize distributions using means, the data must be transformed to account for non-symmetry if the null (normality) can be rejected by

the DAP. Fox (2008) shows that descending the ladder of powers of variables (e.g. to $log(X)$) tends to correct a positive skew whereas ascending the ladder of powers (e.g. to $X^2$) tends to correct a negative skew.

#### 5.1.3.2 Missing Data Problem

One of the essential components of the wider scientific process is the generalization on data: Researchers are usually interested in making inferences about the entire target population, rather than a portion of the target population. However, providing generalization could be troubling when individuals may refuse to report data; which depicts the so-called *missing data problem* (Little and Rubin, 2014). If only a few variables are missing, which are not critical to the analysis, missing values could profitably be dropped. However, if missing data is critical to the analysis, distortions of the sample could occur if they are deleted. Thus, it becomes essential to impute missing data. The literature discusses the approaches replacing missing data by the mean values implied from given data, regression analysis, expectation maximization and multiple imputations as possible ways to overcome the missing data problem. The first method is easy to implement and provides the best guess in the absence of all other information. Regression analysis is a more sophisticated approach but requires good independent variables to estimate missing values. The latter two methods are iterative approaches that provide very accurate predictions about missing data. However, the expected maximization method requires that data is missing at random (Tabachnick and Fidell, 2001). Multiple imputations can be used even if data is not missing at random (e.g. biased) but standard statistical software packages use chained equations that only work with the assumption of randomization of missing data (StataCorp, 2013). Data is missing at random in the situation some members of the population being less likely to be included than others; respectively, the sample is biased in the direction of its selection. In the following, we describe this problem more in detail and present the Nobel-prized (2000) *Heckman Correction* (Heckman, 1979a) for regression analysis to overcome this problem.

**Sample Selection Bias** The problem of sample selection bias may arise due to two reasons. First, individuals with certain characteristics may self-select themselves to be investigated. In case individuals select themselves not to be investigated, they may underreport data. In other words, the sample of interest may be truncated by economic variables. Heckman (1979b) illustrates the problem by the following example: One observes market wages of women who are working. However, certain women decide not to work as their productivity at home exceeds their productivity on the labor market. Analyzing observed market wages of working women only would thus ignore potential market wages of non-working women. Moreover, certain stability assumptions over given data series must be made. If individuals self-select themselves, or the analyst may take falsified assumptions over the stability of the economic variables, a regression on available data would not fit on a randomly selected member of the entire population (Heckman, 1979b). Let us specify the problem. Suppose equation 5.2 describes

the equation of interest and 5.3 and 5.4 the selection of data (equations obtained from Greene, 2006):

$$y_i = \boldsymbol{x_i'}\boldsymbol{\beta} + \varepsilon_i \tag{5.2}$$

*where $x_i$ denotes a vector of independent variables which are exogenously given. $\varepsilon_i$ denotes an error-term*

$$z_i^* = \boldsymbol{w_i'}\boldsymbol{\gamma} + u_i \tag{5.3}$$

$$z_i = \begin{cases} 1, \text{if } z_i^* \geq 0 \\ 0, \text{otherwise} \end{cases} \tag{5.4}$$

*where $z_i$ = 1 if $y_i$ is observed; otherwise 0. $w_i$ denotes all variables of $x_i$ plus some additional variables. We assume to observe $y_i$ and $x_i$ (exogenously given) at any state. $u_i$ denotes an error-term*

A sample selection bias occurs if the parameter $\beta$ of equation 5.2 cannot be estimated correctly by an OLS regression over available data. This occurs in the following situation: Assume the error terms $\varepsilon_i$ and $u_i$ are distributed $\sim BivariatNormal[0, 0, 1, \delta, \rho]$. This implies:

$$E(\varepsilon_i|u_i) = \beta_\lambda u_i \tag{5.5}$$

*where $\beta_\lambda$ denotes the covariance between $\varepsilon_i$ and $u_i$*

If $\beta_\lambda \neq 0$ the residuals $\varepsilon_i$ of the equation of interest are correlated with the residuals $u_i$ of the selection equation, the sample selection has an endogenous impact onto the equation of interest (Heckman, 1979b). With reference to Heckman (1979b) example of women's market wages, the above equation means that women without a job also have different market wages compared to women with a job. This may be due to certain characteristics valued by the market that predominantly determine their decision not to work. Such a characteristic could e.g. be the number of children the woman has to take care for instead of working. Hence, as $w_i$ is exogenous given and a bivariate normal distribution for the error terms is assumed, the equation of interest yields to:

$$E(y_i|\boldsymbol{w_i}, u_i) = \boldsymbol{x_i'}\boldsymbol{\beta} + E(\varepsilon_i|\boldsymbol{w_i}, u_i)$$

$$E(y_i|\boldsymbol{w_i}, u_i) = \boldsymbol{x_i'}\boldsymbol{\beta} + \beta_\lambda u_i \tag{5.6}$$

Yet, the error terms $u_i$ cannot be observed (not exogenously given). We only can observe $w_i$ and data availability by $z_i$. Using the law of iterated expectation[4] (Wooldridge, 1995), equation 5.6 leads to:

$$E(y_i|\boldsymbol{w_i}, z_i) = E(\boldsymbol{x_i'}\boldsymbol{\beta} + \beta_\lambda u_i|\boldsymbol{w_i}, z_i)$$

[4]The law of iterated expectations states that one cannot gain a better estimation of the dependent variable if a more specified independent variable is itself dependent on an original independent variable (Wooldridge, 1995). In our case iterated expectations is expressed by: $E(y_i|w_i, z_i) = E[(y_i|w_i, u_i)|w_i, z_i]$.

$$E(y_i|\boldsymbol{w_i}, z_i) = \boldsymbol{x_i'\beta} + \beta_\lambda E(u_i|\boldsymbol{w_i}, z_i) \tag{5.7}$$

As available data is used (which means $z_i = 1$), $E(u_i|w_i, z_i = 1)$ has to be estimated. In other words, the mean error of predicting data unavailability although data is actually given has to be estimated:

$$E(u_i|\boldsymbol{w_i}, z_i = 1) = E(u_i \geq -\boldsymbol{w_i'\gamma}) \tag{5.8}$$

Due to the assumption of joint normality of the error terms, the *inverse* Mills Ratio[5] can be used to solve equation 5.8 (Heckman, 1979b):

$$E(u_i|\boldsymbol{w_i}, z_i = 1) = \frac{\phi(w_i'\gamma)}{\Phi(\boldsymbol{w_i'\gamma})} = \lambda(\boldsymbol{w_i'\gamma}) \tag{5.9}$$

where $\lambda(\boldsymbol{w_i'\gamma})$ denotes the inverse Mills Ratio

Inserting equation 5.9 into 5.7 leads to equation 5.10:

$$E(y_i|\boldsymbol{w_i}, z_i) = \boldsymbol{x_i'\beta} + \beta_\lambda \lambda(\boldsymbol{w_i'\gamma}) \tag{5.10}$$

Thus, an OLS regression with a dependent variable $y_i$ and explanatory variables $x_i'$ would ignore the correlation between $x_i'$ and $\lambda(w_i'\gamma)$ as expressed by $\beta_\lambda$ (unless $\beta_\lambda = 0$). Specifically, the statistical analysis of the data would be distorted due to the sample selection (Fox, 2016). Back to the example of women's market wages, $\beta_\lambda$ incorporates the influence of the characteristics, such as the number of children at home, that determine the woman's decision to (not) work as well as their market wages.

**Heckman Correction for Sample Selection Bias** In case the residuals $u_i$ could be observed, they could simply be included in an OLS regression. However, this is rarely the case. To estimate $y_i$ properly, making use of equation 5.10 is critical. As expressed by equation 5.9, taking into account $\lambda(w_i'\gamma)$ is needed to correct for a sample selection bias. As it is assumed to observe $w_i', \gamma$ has thus to be estimated. As a first step, Heckman (1979a) proposes to estimate $\gamma$ by a probit model [6]. Based on the estimated regressors $\gamma$ for the selection equation, the inverse Mills Ratio $\frac{\phi(\boldsymbol{w_i'\gamma})}{\Phi(\boldsymbol{w_i'\gamma})} = \lambda(\boldsymbol{w_i'\gamma})$ for each observation can be calculated.

As a second step, an OLS regression over all *observed* $y_i$ as the dependent variable (thus, for all data points where $z_i = 1$) while using $x_i'$ and $\lambda(\boldsymbol{w_i'\gamma})$ as independent variables has to be run to estimate $\beta$. After estimating consistent $\beta$ as well as $\lambda(\boldsymbol{w_i'\gamma})$ for each observation, missing data can be properly (that means corrected for sample selection bias) predicted by the final regression model (Fox, 2008). For a proper usage of the Heckman two-step model, at least one variable that has a strong influence on the selection with no (or only a minor) effect on $y_i$ should be excluded from the instrument vector $w_i'$ to derive the vector of independent variables $x_i$. This has to be done to avoid any collinearity

[5] The Mills Ratio expresses the ratio of the cumulative normal distribution function $\Phi$ to the normal probability density function $\phi$. Due to the scope of this work, we do not deepen into the derivation to use the Mills Ratio for such an equation. Therefore, we refer to Johnson (1972).

[6] A probit model is a regression model where the dependent variable is dichotonomous (it can only take the values 0 or 1) as expressed by equation 5.2 and 5.3.

problems[7] which could lead to imprecise estimates as a result. If such a variable does not exist, it may be hard to correct for selection bias. Moreover, it should be noted, that if collinearity problems between dependent variables are not prevalent, the full-information maximum likelihood may deliver better statistical estimates (Puhani, 2000). However, as the Heckman Correction is a very popular and relatively easy implementable method, we decide to correct potential sample selection biases by using this method. Furthermore, it should be noted that in principle an estimation of the validity of the instruments has to be conducted. This should be done by a SARGAN[8] test for over-identification. However, in case we only have one instrument that is not included in $x_i$, the SARGAN test cannot be done as we only have one instrument which itself lowers the degree of over-identification (Holly and Sargan, 1982).

#### 5.1.3.3 Linear Regression of the Log-Odds

The choice of a model which is bounded to have a value between 0 and 1 has severe implications on the regression model to be applied. Such a variable could e.g. be a fraction of certain individuals to the entire population - like, in our case, the share of joint acquisitions to total PE-backed deals. For instance, a common linear regression model may generate predictions outside the admissible interval of $[0, 1]$. Consequently, the effect of a particular independent variable $x_i$ on a dependent variable $y_i$ "cannot be constant throughout the range of $x$". By estimating a linear model in non-linear function of $x$, the problem could possibly be mitigated but the predicted values of the OLS are not guaranteed to lie in the unit interval (Papke and Wooldridge, 1996).

We have to acknowledge that Papke and Wooldridge (1996) developed an advanced quasi-likelihood estimation method for cross-sectional fractional regression models which scales the dependent variable within the interval of $[0, 1]$. However, to not overload the thesis with econometric derivations for extremely rare occasions, we base our work on a simple, in empirical work commonly applied, linear function of the log-odds ratio (Papke and Wooldridge, 1996). Nevertheless, after illustrating the concept, we discuss potential drawbacks of the applied method.

The commonly applied transformation employed for proportions, such as percentages or fractions, is the *logit* transformation. More specifically, the *logit* expresses the log of the "odds" $\frac{y_i}{1-y_1}$ where the odds itself denote relative chances of gambling: $y_i$ stands for the probability that a certain event occurs (e.g. $Y_i = 1$) vs. it does not occur ($Y_i = 0$). The logit is defined as follows (equations obtained from Fox, 2008):

$$logit(z_i) = log_e\left(\frac{y_i}{1 - y_i}\right) \tag{5.11}$$

[7] Collinearity arises if one explanatory variable can be expressed as a linear function of one or several of the other explanatory variables in the model. A variable $x_i'$ that has effects on $y_i$ as well as on $z_i^*$ enters linearly the equation of interest and non-linearly the Mills ratio. Thus, perfect collinearity is impossible. However, as the Mills ratio is linear over a wide range of values, there may be a severe degree of collinearity (Heckman, 1979a).

[8] It is a test that investigates the degree to which the instrument is exogenous to the equation of interest.

The *logit* transformation is attractive because it can take any real value as $y_i$ varies between 0 and 1; making the resulting quantities symmetric about 0, although the relationship between $y_i$ and its *logit* transformation is non-linear as shown in figure 5.1. Despite the non-linear relationship, it should be noted that the slope is nearly constant for $y_i$ being in a range of $[0.2, 0.8]$. Thus, if the data lies within this range, as a rule of thumb, OLS regressions can be used to predict fractions (Fox, 2008). However,

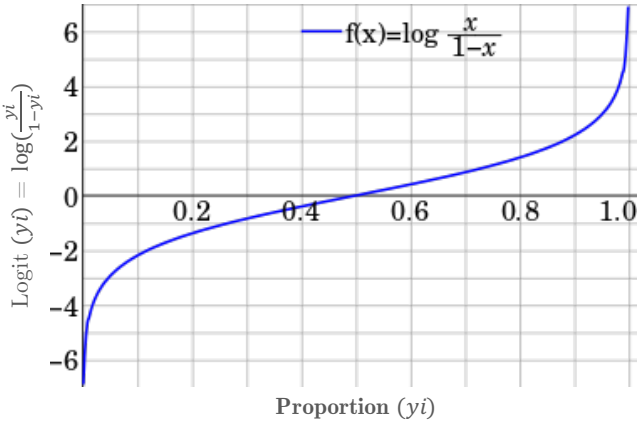


**Figure 5.1:** Log of the Odds (*Logit*) for given Fractions (Fox, 2008).

if the data lies outside the range of $[0.2, 0.8]$, the non-linear relationship must be accounted. In this case, the *logit* can be used to make a relationship between two variables linear (Fox, 2008). The *logit* transformation implies following regression model:

$$E\left(log_e\left(\frac{y_i}{1-y_i}\right)|x\right) = \alpha + x\beta^9 \tag{5.12}$$

Despite its common use in econometrics, the logit as a linear function is exposed to some drawbacks which we should highlight: As shown by Papke and Wooldridge (1996) the equation is not true if $y_i$ can take on the values 0 or 1 with positive probability: If the dataset contains such values, the logit ratios need to be adjusted. Further, recovering $E(y|x)$ is only possible under certain assumptions about the distribution of possible error terms[10] (Papke and Wooldridge, 1996). However, in applied work, it is frequently assumed that $y_i$ follows the logistic distribution $E(y_i) = F(\alpha + x\beta) = \frac{e^{\alpha+x\beta}}{1+e^{\alpha+x\beta}}$ for given $x$ with error terms being independent of $x$ (the logit is thus an inverse linearized transformation of the logistic distribution $F^{-1}(y_i) = log_e\left(\frac{y_i}{1-y_i}\right)$ and relatively easy to compute) (Fox, 2008; Papke and Wooldridge, 1996).

[9] The above model is an additive model for the log-odds and can be expressed as a multiplicative model for the odds (Fox, 2008): $E\left(\frac{y_i}{1-y_i}\right) = exp(\alpha + x\beta) = exp(\alpha)exp(x\beta) = e^{\alpha}(e^{\beta})^x$ Thus, increasing $x_i$ by 1 changes the *logit* by $\beta$ and multiplies the odds by $e^{\beta}$. Consequently, the non-linear slope of the odds of $y_i$ is taken into account by the above model.

[10] We excluded error-terms by modelling the expected value of $y_i$ to above equation.

#### 5.1.3.4 Time-Series Modeling

While analyzing time-series data, stationarity is a critical underlying assumption in order to generate proper statistical properties. Basically, stationarity means that the joint probability distribution (expressed by mean, variance and covariance) of a statistical process does not change over time. However, it is widely accepted that most financial variables are non-stationary over time and are thus exposed to spurious correlations while analyzing relations between them. More specifically, results obtained from a regression model could indicate a statistically significant causal relationship between variables although the relationship is "evidence of contemporaneous correlations" (Harris and Sollis, 2005). Thus, it becomes important to formally test on long-run relations between variables in order to investigate causal relationships between non-stationary variables.

In the following, we investigate the problem of non-stationary time-series by a first-order autoregressive (AR(1)) process as well as the problem of co-integration more into detail. Before investigating long-run relationships between non-stationary variables, it however becomes important to formally test whether variables are non-stationary or stationary over time. Therefore, we present the *Augmented Dickey-Fuller* (ADF) method to test for non-stationarity in an AR(p) process as well as the *Kwiatkowski-Philips-Schmidt-Shin* (KPSS) method to test for stationarity. Using the ADF and KPSS as a fundament, we are able to introduce the *Engle-Granger* (EG) co-integration approach to test for long-run relationships between non-stationary variables.

**Non-stationary time-series and co-integration** Consider a discrete-time process with a variable $y_t$ depending on its last period's value $y_{t-1}$ (equations obtained from Harris and Sollis, 2005):

$$y_t = \rho y_{t-1} + u_t \tag{5.13}$$

where $u_t$ is an error-term encapsulating all other stochastic influences

It is assumed that the error-term $u_t$ comprises T random numbers and is distributed Normal $[0, \sigma^2]$. A stationary process tends to return to its mean value and tends to have a constant variance over time. Hence, the process is stationary if $|\rho| < 1$. In case $|\rho| = 1$ the time-series is non-stationary which means that its mean will have different values over time as well as an increasing variance with the sample size. If $|\rho| > 1$ the time-series is considered to be non-stationary and explosive (it will tend to either $\pm\infty$). However, after differencing[11] ($\Delta y_t = y_t - y_{t-1}$), the time-series becomes stationary. Figure 5.2 depicts a non-stationary time-series which becomes stationary (it fluctuates around its mean with a finite variance) after differencing it (Harris and Sollis, 2005).

[11] The time-series does not necessarily become stationary after *first-differencing*. The number of times a variable needs to be differenced to induce stationarity depends on the number of unit roots it contains (Harris and Sollis, 2005).

Unit-roots are stochastic processes that describe whether a time-series is stationary or non-stationary. We rewrite equation 5.13 to following equation to describe unit-roots more deeply:

$$(1 - \rho L)y_t = u_t \tag{5.14}$$

where L is the lag-operator (while $L^k y_t = y_{\text{t-k}}$, etc.)

Hence, if the roots of the *characteristic* polynomial (in this case $(1 - \rho L) = 0$) lie outside the unit circle (a circle with a radius of one centered at the origin (0,0)), $y_t$ is stationary as the requirement for stationarity $|\rho| < 1$ is fulfilled. The non-stationarity of a variable may be due to persistent long-term movements (trends) over time, either a stochastic or a deterministic trend. Deterministic and stochastic trends can be illustrated by the allowance of a non-zero intercept $\beta$:

$$y_t = \beta + \rho y_{\text{t-1}} u_t \tag{5.15}$$

If $\rho = 1$, and accumulating $y_t$ for different periods, equation 5.14 can be rewritten as:

$$y_t = y_0 + \beta t + \sum_{j=1}^{t} u_j \tag{5.16}$$

As the error-terms will be accumulated, $y_t$ does not return to a fixed deterministic trend $(y_0 + \beta t)$. However, taking the first difference of $y_t$ provides $\Delta y_t = \beta + u_t$ which is stationary ($\Delta y_t$ fluctuates around the mean $\beta$ with a finite variance). In contrast, a variable $x_t$ with $u_t \sim Normal[0, 1]$ is said to be deterministic (trend-stationary):

$$x_t = x_0 + \beta t + u_t \tag{5.17}$$

The variable $x_t$ is said to be deterministic as it returns to a fixed deterministic trend $(x_0 + \beta t)$ with $u_t$ being a non-trend (stochastic) component. Time trends in deterministic variables can easily be removed by regressing the variable on time, or by including a deterministic time trend as one of the regressors. Then, standard regression models can be used to regress the deterministic variable with a stationary variable. Statistical inferences (based on e.g. t-tests) are valid in this case.

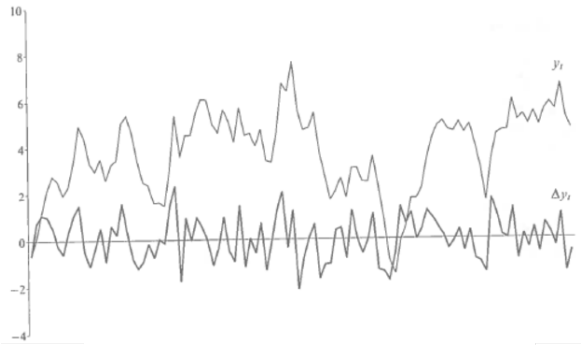


**Figure 5.2:** Non-Stationary Time-Series and Stationary Differenced Time-Series (Harris and Sollis, 2005).

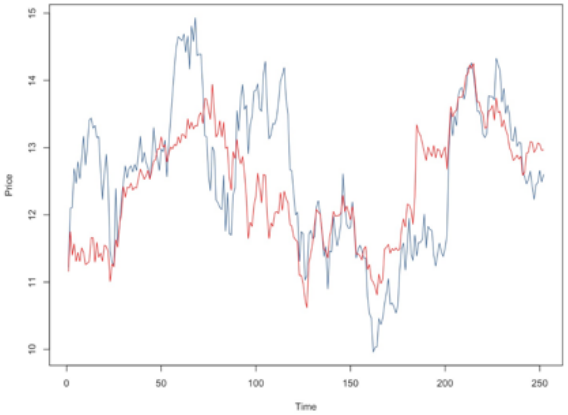


**Figure 5.3:** Co-Integrated Stock Prices (Strachan, 2011).

However, if there is a stochastic trend, and the variable is regressed on a deterministic trend, spurious regressions involving invalid inferences about the correlation may occur. The reason, therefore, is the tendency for both time-series to be growing even though each grows for different reasons and at rates that are uncorrelated (Harris and Sollis, 2005).

A time-series that must be differenced d times to become stationary is considered to be integrated of $I(d)$. Two time-series $y_t$ and $x_t$ which are both of $I(d)$ generally form a linear combination which is also $I(d)$. However, there may be a vector $\beta$ so that the difference of the combination of $y_t$ and $x_t(u_t = y_t - \beta x_t)$ is of a lower order of integration $I(d-b)$,$b > 0$. In this case, Engle and Granger (1987) define the linear combination of $y_t$ and $x_t$ as co-integrated of order $CI(d, b)$. In other words, the two time-series $y_t$ and $x_t$ form a long-run equilibrium relationship with a dis-equilibrium error $u_t$ (Harris and Sollis, 2005) although both series themselves may contain stochastic trends (i.e. be non-stationary) rather than deterministic trends. Figure 5.3 provides an example of two co-integrated stocks which prices move closely together although they follow stochastic trends. Note that the shown stock prices exhibit a positive correlation to each other. Two variables may also form a long-run relationship in case they are negatively correlated over time as shown by MacDonald and Nagayasu (2000) in an example of real exchange rates and real interest rate differentials.

Following this definition, there should be no underlying co-integration issues if the variable $y_t$ is integrated of order $I(0)$ and $x_t$ of order $I(1)$ as the error ($u_t = y_t - \beta x_t$ $I(1)$) would not be constant over time (Harris and Sollis, 2005).

That said, it is necessary to formally test whether the variables are stationary around a deterministic trend and we easily can remove the deterministic trend or whether they contain unit-roots which imply difference-stationarity.

**Testing for unit-roots** Above, we introduced the problem of non-stationarity by a simple AR(1) model. However, time-series could possibly follow an AR($p$) process so that even the errors are serially auto-correlated (equations obtained from Harris and Sollis, 2005):

$$y_t = \psi_1 y_{\text{t-1}} + \psi_2 y_{\text{t-2}} + \cdots + \psi_p y_{\text{t-p}} + u$$

$$\Delta y = \psi^* y_{\text{t-1}} + \psi_1 \Delta y_{\text{t-1}} + \psi_2 \Delta y_{\text{t-2}} + \cdots + \psi_{\text{p-1}} \Delta y_{\text{t-p+1}} + u_t \tag{5.18}$$

$$\text{where } \psi^* = (\psi_1 + \psi_2 + \cdots + \psi_p) - 1 \text{ and } u_t \sim IID(0, \delta^2)$$

The ADF method tests whether the $H_0$ ($\psi^* = 0$ implying $y_t$ contains a unit-root) against $H_1(\psi^* < 0)$ can be rejected[12]. To test such a hypothesis, typically a t-test is constructed. The underlying statistic

[12]Note that this does not mean that we accept $H_1$.

however does not follow a t-distribution, but rather a DF distribution of $[\psi^*/\delta_{\psi^*}]$ with lower critical values than the t-test for given confidence intervals[13] (Fuller, 1996). The equation 5.18 needs to take into account that it possibly contains deterministic components to avoid accepting the null hypothesis (implying the series follows a stochastic trend) although it truly follows a deterministic one:

$$\Delta y_t = \psi^* y_{\text{t-1}} + \sum_{i=1}^{p-1} \psi_i \Delta z_{\text{t-i}} + \mu + \gamma t + u_t \tag{5.19}$$

where $\mu + \gamma t + u_t$ is the deterministic trend component

The difficulty of the ADF is that the number of lagged first differences of the dependent variable is unknown. To capture auto-correlated omitted variables that would otherwise, by default, enter the error term $u_t$, adding lagged first-differences is critical. We could possibly test from high orders down and examine the t-values and coefficients. However, in large samples, the order could become extremely high. On the other side of the coin, in finite sample sizes, it can be shown that deterministic processes can be approximated well by a unit root process and vice versa (Harris and Sollis, 2005). Consequently, when applied to *near* stationary processes, the ADF approach could falsely reject the null hypothesis due to asymptotic critical values (Type 1 error). Thus, the disadvantage of the chosen approach is that there is a trade-off between sample size and power of the ADF (Blough, 1992). However, we choose to conduct the ADF in favor to alternative unit roots tests such as *Phillips-Perron Method*[14] (where we do not have to specify the lag-length) as Davidson and MacKinnon (2004) showed that the alternative method performs worse in finite samples than the applied one. In order to specify the lag length, Schwert (2002) discusses two different numbers of lags of the residual autocorrelations:

$$p_4 = int\left[4\left(\frac{T}{100}\right)^{\frac{1}{4}}\right] \tag{5.20}$$

$$p_{12} = int\left[12\left(\frac{T}{100}\right)^{\frac{1}{4}}\right] \tag{5.21}$$

with T total number of observations

He provides evidence that $p_4$ works better for smaller samples ($T = 25 - 50$) whereas $p_{12}$ is superior in larger samples ($T = 250$ or more). Thus, to overcome the trade-off problems, we rely on Schwert's (2002) findings which are consistent with findings drawn from other studies (Harris and Sollis, 2005).

The procedure of the ADF is structured as follows: To obtain the orders of integration for our variables, we have to run the test on original data first. If we are not able to reject the null, we will have to run the test on the differences of our data again until we are able to reject the null hypothesis.

[13] A t-test would thus over-reject the null-hypothesis (Harris and Sollis, 2005).

[14] The *Phillips-Perron Test* makes a non-parametric correction to the t-test statistics to account for the auto-correlation in the error term of the DF-distribution that will be present (Harris and Sollis, 2005).

**Kwiatkowski-Philips-Schmidt-Shin Method** As shown above, the ADF only tests on non-stationarity. However, rejecting $H_0$ ($y_t$ contains a unit-root) does not necessarily mean that we can accept $H_1$($y_t$ is stationary). For this purpose, the KPSS approach has been developed to complement the ADF. As we use the KPSS to cross-validate our results from the ADF, we will introduce the approach briefly by a simple autoregressive process.

In contrast to the ADF, the KPSS has stationarity under the null hypothesis and non-stationarity under the alternative hypothesis. Consider a data-generating process (Kwiatkowski et al., 1992):

$$Y_t = \mu + \gamma t + \xi_t + e_t \tag{5.22}$$

where $e_t$ is stationary and $\xi_t$ follows a random walk of the form $\xi_t = \xi_{\text{t-1}} + v_t, v_t \sim IID(0, \delta_v^2)$

Note that equation 5.22 includes a deterministic trend component ($\mu + \gamma t$) so that we are able to test on stationarity (which is stricter than trend-stationarity which could possibly contain a deterministic trend). If $\delta_v^2 = 0$, it follows that $\xi_t = \xi_{t-1}$ which means that $Y_t$ is stationary for all $t$. A simple linear regression of the form $Y_t = \mu +$ ($e_t$ could be used to find the estimated stochastic component. Under the null hypothesis $H_0(\delta_v^2 = 0)$ (against $H_1(\delta_v^2 > 0)$), $e_t$ is stationary. Note that the test statistic follows a one-sided LM distribution $\left(\frac{\sum_{j=1}^{t} e_j}{\delta_e^2}\right)$ and the test statistics needs to be higher than the critical values in order to reject the null. As the KPSS is used as a complement to the ADF, the same input parameters should be used. Hence, as we rely on Schwert's (2002) proposal to use a number of lags of $p_4$ in small samples and $p_{12}$ in large samples, we do so here as well.

**Engle-Granger (EG) Method** While presenting non-stationary time-series, it has been shown that two variables of the order of integration $I(d)$ could be co-integrated if there exists a vector  so that the disturbance term of a linear combination ($y_t = \beta x_t + u_t$) is of a lower order of integration $I(d - b)$ with $b > 0$.

The EG and the *Johansen Test* are two approaches to correct for co-integration issues. The EG has the drawbacks that it only corrects for one co-integration relationship which could be overcome by the Johansen Test as it tests for more than one co-integration relationship. The Johansen Test is however only applicable in large samples (Harris and Sollis, 2005). Hence, we apply the EG approach as we investigate the relationship between two variables from a single equation regression in a relatively small sample which we show later while conducting the quantitative study.

The EG framework applies an ADF[15] test to determine whether the error terms $u_t$ of the linear combination contain unit-roots. In case the null ($u_t$ is non-stationary/no underlying co-integration) against the alternative ($u_t$ is stationary / underlying co-integration) can be rejected, we can conclude

[15]The *Phillips-Perron Method* could also be applied to determine whether the error terms of the linear combination of $y_t$ and $x_t$ contain unit-roots.

that $y_t$ and $x_t$ may be co-integrated of $I(d, b)$ which has then to be accounted in further tests. To correct for co-integration, the error terms $u_t$ obtained from the initial OLS regression on the variables $y_t$ and $x_t$ must be saved. Thereafter, a second regression needs to be run on the first differenced variables including the lagged residuals $u_{t-1}$ as dynamic short-run adjustments to correct for the long-run equilibrium, giving Engle and Granger's (1987) error correction model (ECM). This procedure will be repeated until the differenced variables become stationary or the null ($u_t$ in non-stationary/ no underlying co-integration) cannot be rejected. If no co-integration issues are underlying, a simple regression on the differenced variables can be run (Harris and Sollis, 2005).

#### 5.1.3.5 Outlier Test

**DFBETA Outlier Test** The above models show that we need to account for time trends in our final model. However, this is not all we have to account for. Our model may also be exposed to possible outliers. An outlier is an observation with an abnormal distance from other values in a random sample from a population. These outliers may have strong impacts on regressions and could distort its analysis. Generally, it is up to an analyst to decide whether an observation is an outlier or not as well as how to deal with them. Therefore, researchers developed multiple approaches to detect outliers. One commonly applied method in regression analysis is Belsley, Kuh, and Welsch (2004) *DFBETA* influence measurement approach. The DFBETA measures the difference between the regression coefficient $\beta$ when the $i^{th}$ observation is included in the sample compared to a sample where the observation is excluded. An observation with $|DFBETA_i| > \frac{2}{\sqrt{n}}$ and n being the sample size should be regarded carefully as it has a high influence to pull the regression line into its direction. In case we detect outliers that may heavily distort our analysis, we need to exclude them. After accounting for outliers, we are able to build the final model in order to investigate causal relationships between our variables.

#### 5.1.3.6 Analysis of the Empirical Study

Above, we have presented the methods to build a model that is suitable to test our hypothesis. In an analysis, we aim to summarize main findings and inform a discussion on what the results of the final model may tell us. Therefore, we aim to underline/revise insights from the literature review presented in chapter 3 by our research. We believe these insights to be highly valuable in order to answer our research question which conditions PE firms make partner with strategic investors.

## 5.2 Methods in the Qualitative Study

The qualitative study aims to elaborate on rationales of both investor types to enter a partnership which is expressed by our third sub-question. In this part of the chapter, we briefly present the process of data collection as well as methods to be applied to the case study. The case study aims to investigate a hypothetical joint acquisition of the French video game publisher *Ubisoft Entertainment*

*SA* (Ubisoft) between a PE firm and *Activision Blizzard* as a strategic investor. Note that we aim to investigate the case out of the perspective of a PE firm as the focus of the thesis lies in the PE industry. We keep this part of the chapter short as we find it appropriate to elaborate on the methods more deeply within the case study. Nevertheless, to provide a holistic view on the methods applied throughout the thesis, we shortly introduce them already at this stage of the thesis.

**Data Collection in the Qualitative Study** In contrast to the empirical study, the case study relies more heavily on internal data such as financial statements and investor presentations than external data.

In order to conduct an investment case, it is first important to understand the business model, the market environment as well as the historical financial performance. Our main data sources to do so are the last 4 annual reports published so far, provided by Ubisoft (2013, 2014, 2015, 2016). The last 4 annual reports on Ubisoft include its financial years (FY) FY13 until FY16. Note that Ubisoft's financial year ends on March 31$^{st}$. Further note that the annual report of FY17 has not been published at the time of conducting the case study. Thus, we assume the acquisition takes place on March 31$^{st}$, 2016. Hence, we do not incorporate any information that has been published thereafter. There is no common rule on how many historical financial statements to include in a due diligence process. We consider a time frame of 4 years appropriate in order to analyze any trends and shapes in Ubisoft's business model and financial performance as well as to account for any year-specific conditions. Further, we gather information about recent developments of the company and the market information from wide-spread online and print news.

In section *3.2.2 Principles of the Investment Decision*, we have seen that PE investors apply comparable company multiples such as EV/EBITDA to evaluate their targets. In order to compose a peer group for Ubisoft, we apply CapitalIQ's *Quick Comps* function. Quick Comps is an algorithm that provides a list of 10 or fewer companies with an overlap of information in the sell-side coverage, company and location compatibility and industry depth and breadth" to a target (Standard and Poor's Capital IQ, 2017). We again rely on financial information on the comparable company list provided by CapitalIQ.

For further economic data, such as EURIBOR rates or interest spreads on certain debt instruments, we rely on information provided by Bloomberg, as already done in the quantitative study, as well as Thomson Reuters, the major competitor of Bloomberg.

**Approach to build an Investment Model** Our approach to build an investment model for the joint acquisition is based on Rosenbaum and Pearl's (2009) suggestion on an LBO analysis. Relevant steps include:

1. Analyzing necessary information in a due diligence

2. Building a Pre-LBO model including historical and projected operational model
3. Completion of the transaction structure (uses and sources of the funding)
4. Completion of the Post-LBO model (pro-forma debt repayment schedule, income statements, cash flow statements and balance sheets)
5. Performance of an LBO Return and Valuation Analysis

As the suggestion is provided for a typical LBO rather than a joint acquisition, we may slightly deviate from Rosenbaum and Pearl's (2009) approach. However, overall, we believe this approach being appropriate to investigate an investment decision out of the perspective of a PE firm. Further, as has been shown in *3.2.3 Principles of the Investment Decision*, the IRR as the performance measure applied by PE firms does not consider any risk. However, we are also interested in the risk of this investment type. Therefore, we rely on Altman's (2000) Z-Score. We considered the Z-score in favor to e.g. the Merton Model Credit Risk Model (Merton, 1974) as it is a quick and easy-to-implement measure which is frequently used by practitioners. The Z-Score is a multivariate formula on accounting items to predict bankruptcy of a public manufacturing firm. The formula has later been amended by the Z"-Score in order to analyze the likelihood of insolvency for a private non-manufacturing firm. We believe the Z"-score to be relevant for Ubisoft as it is a non-manufacturing video game publisher. Following $Z$"-values indicate a firms' risk: A $Z" > 3.00$ indicates an *adequate capacity* to meet financial obligations, a value of $2.99 > Z" > 1.80$ predicts a *capacity "on alert"* to meet financial obligations and if $1.79 > Z"$, there is a *high probability of default* (Altman, 2000).

## 5.3 Chapter Conclusion

In the preceding parts of the chapter, we have highlighted the means of data collection and methods we consider most suitable to answer our overall research question. Based on a critical realistic principle, we test the hypothesis highlighted in section *5.1.1 Hypothesis Development* by an empirical study and aim to gain further insights by conducting a qualitative case study.

Within our quantitative study which aims to answer the second sub-question, we make use of the Heckman regression model to circumvent the missing data problem as well as methods of time-series modeling and outlier tests to build a model that is suitable to find meaningful results to test our hypothesis. These findings are then used to underline/revise existing theory. In the case study of a hypothetical joint acquisition of the French video game publisher Ubisoft, we aim to gain deeper insights into the rationales of financial and strategic investors to partner which is expressed by our third sub-question. We perform the case study on basis of an investment model out of the perspective of a PE firm. Following, we compare existing theory presented in the literature review with the insights from the case. Built on that, we believe to infer new contextualized theories.

# 6 Empirical Study

The empirical study tests our hypothesis whether the share of joint venture transactions to total transactions between financial and strategic investors is higher in M&A boom cycles and lower in M&A bust cycle, respectively. The hypothesis test is then used to answer the second sub-question of our research on external conditions that make PE firms shake hands with strategic investors. Before we can do so, we however need to estimate missing data and account for time trends as well as outliers to provide valid and generalizable results. After testing the hypothesis, we aim to discuss our findings and provide explanations for our observations.

## 6.1 Analysis

Our hypothesis leaves room to test on total invested capital per year backed by PE firms (transaction sizes of the deals) or on the number of deals executed (total activity) by private equity firms. Both are connected with pros and cons. As seen in section *5.1.2 Data Collection in the Quantitative Study*, while dealing with privately held companies, there could possibly be a lack of data.

First, CapitalIQ does not report the capital invested by financial investors in joint venture deals between financial and strategic investors. Hence, at this stage of the thesis, we assume full alignment of interests between financial and strategic investors in joint venture deals to account for the fact that invested capital between both groups may differ. We however acknowledge that this assumption may lead to noises in our analysis. Therefore, we relax this assumption of interest-alignment between both investor types in our case study in chapter 7 to investigate possible misalignments.

Second, we lack information about transactions sizes for 64.20 percent of a total of 35,325 deals backed by PE firms. In a first step, we estimate missing transaction values by substituting missing values by the mean of given data. Before estimating missing transaction sizes by regression analyses, we make adjustments to given transaction sizes to account for non-normality. Thereafter, we estimate missing transaction sizes by making use of OLS regression models as well as a Heckman Regression in section *6.1.1.*

In contrast, analyzing the activity of private equity firms into certain transaction types shows the behavior of PE firms' action. However, it does not fully reflect the financial commitment to invest into certain targets. Although the activity may be correlated with the financial commitment, we cannot guarantee that firms are highly active in the market but only invest a small amount of money per transaction. To account for noises that may result due to the lack of data in transaction sizes as well as the problem of activity being a variable that does not reflect the commitment of PE firms to certain targets, we test our hypothesis on transaction sizes as well as on activity.

In this section, we first estimate missing transaction sizes. Thereafter, we include the activity in our analysis again and investigate possible time trends in our data. After accounting for time trends and outliers, we present our final model to test our hypothesis.

### 6.1.1 Estimating Missing Transaction Size Data

One of the essential components of the wider scientific process is the generalization on data; in other words, testing a hypothesis on a representative population (Saunders, Lewis, and Thornhill, 2009). In contrast to the activity of PE firms, we lack information about transaction sizes. If we leave transactions without information on transaction sizes out of our analysis, we could not provide the requirement of generalization. This part of the chapter thus concentrates on estimating transaction sizes. In order to estimate transaction sizes, we can make use of modern statistical models. As described in the presentation of methods, there are four ways to overcome the missing data problem: Mean substitution, regression analyses, expectation maximization and multitude imputation. In the following, we apply the first two methods, mean substitution and regression analysis. We do so because - as we will see - data is not missing at random. In this case, the latter two methods are not applicable as outlined in the presentation of methods in section *5.1.3.2 Missing Data Problem*. In context with regression analyses, we start with a simple OLS regression followed by a Heckman sample selection correction. The procedure of estimating missing data is followed by a discussion which model delivers the most suitable results for our analysis.

#### 6.1.1.1 Estimation of Missing Transaction by Mean Substitution

Table 6.1 delivers a quick overview of the data on transaction sizes that is provided by CapitalIQ.

In total, we obtain 12,986 transaction sizes from a sample of 35,325. Thus, we miss data on transaction sizes in 22,679 cases (64.20 percent). Under the sample of transactions with data on transaction sizes; the mean transaction size amounts to $ 319.60 millions with a standard deviation of $ 1,271.83 millions. Following the mean substitution method, we use the mean transaction size to impute transaction sizes in which information is not given. This leaves a deal volume backed by PE/VC firms per year as shown in appendix 2. However, as we also collected further explanatory variables to estimate transaction sizes, we can make use of regression models.

| Variable | Observations | Mean (m$) | Std. Dev. (m$) | Min. (m$) | Max. (m$) |
|---|---|---|---|---|---|
| Transaction Size | 12,986 | 319.60 | 1,271.83 | 0.001 | 44,492.24 |

**Table 6.1:** Overview of the Data on Transaction Sizes.

#### 6.1.1.2 Estimation of Missing Transaction by Regression Analysis

**Skewness and Log Transformation** Before estimating missing transaction sizes by regression models, we need to test whether these models are applicable to our data. A precondition to make use of regression models is that data is distributed symmetrically. Before we start to formally test for skewness, we begin with an informal test of skewness by graphing a histogram of transaction sizes that are given in our sample. We do so as there is a chance of error (Type 1 and Type 2) in any mathematical test. A visualization of data enables us to critically reflect the results of mathematical tests.

As one can see in figure 6.1, the number of mega-buyouts with a transaction size in an amount of $ 10,000 million to $ 45,000 millions is fairly small in contrast to small-cap buyouts in an amount of $ 0 million to $ 1,000 millions. The histogram indicates that transaction sizes are positively skewed with a longer tail to the right than to the left. Thus, predicting transaction sizes by regression models could lead, for instance, to negative transaction sizes as it assumes a symmetric distribution around the mean.

The positive skewness not only indicates that we have to transform the given transaction sizes by descending the ladder, it also indicates that PE firms tend to invest in small cap firms unless minority deals into large-cap companies may depict the main part of total deals. Our data analysis however shows that total minority deals depict a minority part of all deals (22.5 percent). Thus, although we follow Kaplan and Strömberg (2009) in the usage of EBITDA/EV less high yield rates as an appropriate measure to describe boom and bust cycles, we believe, it is appropriate to make the adjustment to draw on EBITDA/EV of the MSCI World Small Cap Index instead of the S&P500 due to the tendency of PE firms to invest into small cap buyouts.

To confirm that transactions are positively skewed, we perform the D'Agostino-Pearson (DAP) skewness test. Table 6.2 provides the test statistic. The p-value of 0.00 indicates that transaction sizes are skewed on a significance level of 99 percent. Thus, we can reject $H_0$ (normality $\sqrt{\beta_1} = 0$) against $H_1$ (non-normality due to skewness $\sqrt{\beta_1} \neq 0$). The skewness value $\sqrt{\beta_1}$ in an amount of 16.14 provides evidence for positive skewness (longer tail to the right than to the left) as already hypothesized by our graphical analysis. Thus, to account for the positive skewness, we need to descend the ladder of the transaction sizes by taking its logs before running any regression models on our data. Though, we account for any extreme values in our dataset (Fox, 2008).

| Variable | Observations | Mean (m$) | Std. Dev. (m$) | p-value | Skewness |
|---|---|---|---|---|---|
| Transaction Size | 12,986 | 319.60 | 1,271.84 | 0.00*** | 16.14 |

**Table 6.2:** D'Agostino-Pearson Skewness Test.

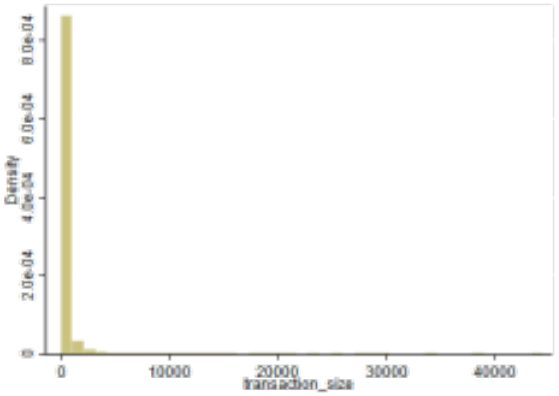


**Figure 6.1:** Transaction Size Histogram (Own Illustration).

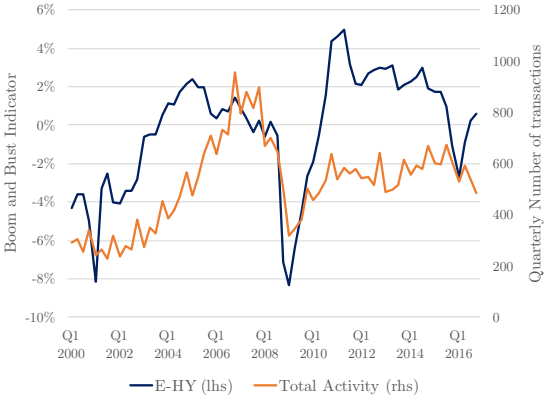


**Figure 6.2:** E-HY and Total Acitivity from Q1 2000 until Q4 2016 (Own Illustration).

**OLS Regression on Given Transaction Sizes** In a first step, we assume that transaction sizes are missing at random. We use data that is provided on transactions where transaction sizes are missing as independent variables. After running a simple OLS regression, we replace the missing values by our estimates obtained from the regression.

We run the OLS regression on transaction sizes by assigning dummy variables to following information: First, we determine whether the target is private (dummy=0) or public (dummy=1) at the time of the takeover. Second, we incorporate the period of time the transaction took place. We split the time period from January 1$^{st}$, 2000 until December 31$^{st}$, 2016 by the overall PE activity as follows: The first period lasts from Q1 2000 until Q4 2003 which was characterized by the early 2000s global recession and relatively low PE activity. The early 2000s bust is followed by an M&A boom from Q1 2004 until Q3 2008 and incorporates the *Golden Age* of private equity characterized by strong activity as well as the financial crisis 2007/2008. We incorporate the financial crisis into the second time split as write-downs on big PE funds and extremely increasing high yield rates became evident not until Q4 2008. Hence, the third split depicts the time frame from Q4 2008 until Q3 2010 when the PE activity slowed down. From Q4 2010 PE LPs started to enjoy positive cash flows enabling them to reinvest into PE. This period lasted until Q3 2015 (Bain & Company, 2016) and thus, depicts the fourth time frame. Thereafter, in the fifth split from Q4 2015 until Q4 2016, global PE activity slightly slowed down again (Campos, 2015). Interestingly, the time splits of PE activity match PE boom and bust cycles obtained from the measure E-HY rates as shown in figures 6.2 and 6.6. The patterns underline Kaplan and Strömberg's (2009) position that PE firms' activity is higher in times of favorable debt mispricing. Hence, we believe the time splits may be an important factor to explain transaction sizes. Note that we analyze potential trends of the boom and bust cycles more deeply in the time series modeling part of this chapter. Here, we focus on the missing data problem.

As further explanatory variables, we incorporated the transaction type, the geographic location as well as the industry the target operates in, as presented in section *5.1.2 Data Collection in the Quantitative*

| R-squared = 0.1396<br>Adj. R-squared = 0.1380<br><br>Log (transaction size) | $\beta$ Coef. | Std. Dev. | t | $P > \|t\|$ | [95% Conf. | Internval] |
|---|---|---|---|---|---|---|
| private_public | 0.5471 | 0.0629 | 8.70 | 0.0000*** | 0.4239 | 0.6704 |
| time_1 | 0.0540 | 0.0709 | 0.76 | 0.4460 | -0.0850 | 0.1930 |
| time_2 | 0.5675 | 0.0636 | 8.92 | 0.0000*** | 0.4428 | 0.6923 |
| time_3 | 0.0000 | (omitted) | | | | |
| time_4 | 0.5821 | 0.0660 | 8.82 | 0.0000*** | 0.4527 | 0.7114 |
| time_5 | 0.4230 | 0.0978 | 4.33 | 0.0000*** | 0.2314 | 0.6146 |
| t_lbo | -1.0852 | 0.3581 | -3.03 | 0.0020*** | -1.7872 | -0.3832 |
| t_mbo | -1.2515 | 0.3694 | -3.39 | 0.0010*** | -1.9756 | -0.5275 |
| t_jv | -0.6477 | 0.3673 | -1.76 | 0.0780* | -1.3676 | 0.0722 |
| t_minority | -2.7896 | 0.3593 | -7.76 | 0.0000*** | -3.4939 | -2.0854 |
| t_majority | -1.1609 | 0.3578 | -3.24 | 0.0010*** | -1.8623 | -0.4596 |
| t_secondary | 0.0000 | (omitted) | | | | |
| r_africa | 0.0000 | (omitted) | | | | |
| r_europe | 0.4285 | 0.0834 | 5.14 | 0.0000*** | 0.2650 | 0.5921 |
| r_unitedstates | 0.6436 | 0.0866 | 7.43 | 0.0000*** | 0.4738 | 0.8133 |
| r_asia | 0.4348 | 0.0924 | 4.70 | 0.0000*** | 0.2536 | 0.6161 |
| r_latinamerica | 0.6465 | 0.1543 | 4.19 | 0.0000*** | 0.3440 | 0.9490 |
| i_energy | -0.5334 | 0.1686 | -3.16 | 0.0020*** | -0.8640 | -0.2029 |
| i_realestate | -0.9421 | 0.1777 | -5.30 | 0.0000*** | -1.2903 | -0.5939 |
| i_materials | -1.0263 | 0.1433 | -7.16 | 0.0000*** | -1.3071 | -0.7455 |
| i_industrials | -1.0672 | 0.1332 | -8.01 | 0.0000*** | -1.3282 | -0.8062 |
| i_consumerdiscretionary | -0.9175 | 0.1327 | -6.91 | 0.0000*** | -1.1777 | -0.6574 |
| i_consumerstaples | -0.9390 | 0.1474 | -6.37 | 0.0000*** | -1.2279 | -0.6501 |
| i_healthcare | -0.8627 | 0.1427 | -6.05 | 0.0000*** | -1.1425 | -0.5830 |
| i_financials | -0.7861 | 0.1508 | -5.21 | 0.0000*** | -1.0817 | -0.4905 |
| i_informationtechnology | -1.4316 | 0.1366 | -10.48 | 0.0000*** | -1.6993 | -1.1639 |
| i_telecommunication | 0.0000 | (omitted) | | | | |
| i_utilities | -0.1565 | 0.1717 | -0.91 | 0.3620 | -0.4930 | 0.1801 |
| _cons | 5.3719 | 0.3905 | 13.76 | 0.0000*** | 4.6065 | 6.1374 |

**Table 6.3:** Results of the OLS Regression on Given Log Transformed Transaction Sizes.

*Study.*

Table 6.3 provides the results of the regression. The $R^2$ of the model amounts to 0.1396 (the adjusted $R^2$ to 0.1380). Note that the results of $\beta$ in column 2 are on the log-transformed transaction sizes. These are not economically interpretable in $ million.

As can be obtained, the strongest influence on transaction sizes may have the transaction type Acquisition of Minority Stake with a $\beta$ coefficient of -2.7896. Also note, that all $\beta$ coefficients on the transaction types are negative. Therefore, we should compare the $\beta$ coefficients among transaction

types. The highly negative coefficient on Acquisitions of Minority Stake makes sense, as less than 50 percent of a company's equity is acquired in this type whereas the target's equity is taken over to 50 percent or more in the other transaction types. The transaction size of an Acquisition of Minority Stake would only exceed those of the other transaction types in the case that the capitalization of targets in this acquisition type severely exceeds those of the other types.

Further note that the variables time split 1, the transaction type Sponsor/Strategic JV Acquisition and the industry sector Utilities seem not having a significant influence on the transaction size ($p-value > 0.05$). Note that all time splits are indicating a positive $\beta$ coefficient except of time split 1 (and time split 3 which has been omitted). Hence, exemplary, the insignificance of time split 1 indicates that transaction sizes were generally lower in the early 2000s than in subsequent time splits. This may be due to the early 2000s recession in accordance with the bursting of the Dotcom bubble which led to low market values. The insignificance should further be kept in mind as it becomes a critical argument in our Heckman model later on.

Moreover, in all categories regardless of whether the target is public or private, one variable has been omitted due to collinearity; namely, time split 3, Secondary Buyouts, Africa and the Telecommunication Services industry sector. For instance, Africa may have been omitted as the majority (55 percent compared to 23 percent globally) of transactions occurred in Africa are typed as an Acquisition of Minority Stake. Following, the transaction sizes in Africa may have already been explained by the transaction types.

As a next step, we estimate the 22,679 missing transaction sizes by the above-mentioned regression model. The regression model delivers estimations about log transformed transaction sizes. Thus, we need to re-transform the estimations by ascending the power to $e^{log(y_i)}$. After re-transforming, the model leaves a total deal volume backed by PE/VC firms per year as shown in appendix 2. Moreover, appendix 3 provides mean transaction sizes for each variable.

**Heckman-Correction for Selection Bias** We anticipated the missing data problem as we deal with privately held companies. However, from Table 6.4, we can observe 2,412 investments into public firms out of the total 35,235 (6.85 percent) over the time period of interest. Public firms generally report more data than private firms: Conditional on whether the target is private or public, data on transaction sizes is available on 11,617 private firms (35.4 percent) and on 1,369 public firms (56.8 percent). From the first look onto the data, there could possibly a sample selection bias be underlying. As only 17 out of 1,110 deals (1.4 percent) of our transaction type of interest Sponsor/Strategic JV Acquisition are public in contrast to 2,395 out of the remaining 34,125 deals (7.0 percent), the sample selection bias may severely distort our analysis if not corrected.

As seen in the in the presentation of the missing data problem in section *5.1.3.2 Missing Data Problem*, the Heckman two-step model corrects for sample selection bias. The first step builds on a probit model on the selection equation and determines data availability.

| Private/Public | in# | in % | Data availability in# | in % | Private/Public cond. on transaction type Sponsor/Strategic JV in# | in % | Remaining in# | in % |
|---|---|---|---|---|---|---|---|---|
| Private | 32.823 | 93.15 | 11.617 | 35.39 | 1.093 | 98.47 | 31.730 | 92.98 |
| Public | 2.412 | 6.85 | 1.369 | 56.76 | 17 | 1.53 | 2.395 | 7.02 |
| Total | 35.235 | 100.00 | 12.986 | 36.86 | 1.110 | 100.00 | 34.125 | 100.00 |

**Table 6.4:** Private/Public Firms' Transaction Size Availability and Private/Public Firms Conditional on Transaction Type.

We apply the independent variables from our OLS regression as instruments in the selection equation. The second step provides the final regression model that incorporates the correction $\beta_\lambda$ for sample selection bias.

**First Step: Probit Model** By applying the same variables from the OLS regression above as instruments in the probit model, we first determine the selection equation of the Heckman model. Table 6.5 provides the results on $\gamma_i s$ of the selection equation obtained from the probit model.

As expected, the private/public variable has a severe and significant impact on data availability as indicated by a relatively high (and significant) $\gamma$ coefficient in an amount of 0.3959 and a p-value of 0.00. Thus, we can conclude that data is more likely to be available for public firms (as the dummy variable for public firms = 1) and a selection bias is underlying in our sample. Besides the condition whether the target is private or public, time splits 1, 2 and 3, as well as the region Asia and the industry sectors Materials, Industrials and Consumer Staples, have a strong (and significant) influence on the selection equation which implies that multiple sample selection biases are underlying. Note that the regions Africa and Europe are significant on a 90 rather than 95 percent confidence level.

The p-values (which are $> 0.05$) and confidence intervals indicate that no transaction type has a significant influence on data availability on a 95 percent significance level. This indicates that PE firms do (not) report data independent on the transaction type of their investments. Next to transaction types, the industry sectors Energy and Telecommunication Services are insignificant in the selection.

Further, in each category, one variable has been omitted due to collinearity, namely, time split 5, secondary buyouts, Latin America, and the industry sector Utilities. Illustrative, Latin America may have been omitted in the selection model as we only obtained 82 transactions where the selection of data availability may have already been determined by the private/public variable.

Using the probit regression model, we estimate the $z_i^*$ values for each of the 35,325 transactions. Based on the $z_i^*$ values, we are able to calculate the inverse Mills ratio $\frac{\phi(w_i'\gamma)}{\Phi(w_i'\gamma)} = \lambda(w_i'\gamma)$ for each deal. The inverse Mills ratio needs to be incorporated as a further variable into the second step of the Heckman procedure and corrects for the underlying sample selection biases.

| Log (transaction size) | $\gamma$ Coef. | Std. Err. | z | $P > \|t\|$ | [95% Conf. | Internval] |
|---|---|---|---|---|---|---|
| private_public | 0.3959 | 0.0288 | 13.76 | 0.0000*** | 0.3394 | 0.4522 |
| time_1 | 0.7707 | 0.0326 | 23.67 | 0.0000*** | 0.7069 | 0.8346 |
| time_2 | 0.4717 | 0.0292 | 16.16 | 0.0000*** | 0.4145 | 0.5289 |
| time_3 | 0.3913 | 0.0346 | 11.32 | 0.0000*** | 0.3236 | 0.4591 |
| time_4 | 0.2194 | 0.0295 | 7.43 | 0.0000*** | 0.1615 | 0.2772 |
| time_5 | 0.0000 | (omitted) | | | | |
| t_lbo | -0.1663 | 0.1366 | -1.22 | 0.2240 | -0.4341 | 0.1015 |
| t_mbo | -0.1055 | 0.1414 | -0.75 | 0.4550 | -0.3826 | 0.1716 |
| t_jv | 0.1374 | 0.1414 | 0.97 | 0.3310 | -0.1396 | 0.4145 |
| t_minority | -0.1803 | 0.1371 | -1.31 | 0.1890 | -0.4491 | 0.0885 |
| t_majority | -0.1584 | 0.1365 | -1.16 | 0.2460 | -0.4260 | 0.1092 |
| t_secondary | 0.0000 | (omitted) | | | | |
| r_africa | 0.1177 | 0.0627 | 1.88 | 0.0600* | -0.0052 | 0.2405 |
| r_europe | -0.1011 | 0.0545 | -1.86 | 0.0640* | -0.2080 | 0.0057 |
| r_unitedstates | -0.2297 | 0.0551 | -4.17 | 0.0000*** | -0.3376 | -0.1218 |
| r_asia | 0.4667 | 0.0586 | 7.97 | 0.0000*** | 0.3519 | 0.5815 |
| r_latinamerica | 0.0000 | (omitted) | | | | |
| i_energy | -0.1085 | 0.0676 | -1.61 | 0.1080 | -0.2411 | 0.0240 |
| i_realestate | 0.1281 | 0.0759 | 1.69 | 0.0920* | -0.0207 | 0.2769 |
| i_materials | -0.3913 | 0.0557 | -7.03 | 0.0000*** | -0.5004 | -0.2821 |
| i_industrials | -0.4162 | 0.0519 | -8.02 | 0.0000*** | -0.5179 | -0.3145 |
| i_consumerdiscretionary | -0.2966 | 0.0519 | -5.72 | 0.0000*** | -0.3982 | -0.1949 |
| i_consumerstaples | -0.4606 | 0.0569 | -8.10 | 0.0000*** | -0.5721 | -0.3492 |
| i_healthcare | -0.3176 | 0.0556 | -5.72 | 0.0000*** | -0.4265 | -0.2087 |
| i_financials | -0.2880 | 0.0597 | -4.82 | 0.0000*** | -0.4050 | -0.1710 |
| i_informationtechnology | -0.3181 | 0.0533 | -5.97 | 0.0000*** | -0.4225 | -0.2137 |
| i_telecommunication | 0.0239 | 0.0771 | 0.31 | 0.7560 | -0.1272 | 0.1751 |
| i_utilities | 0.0000 | (omitted) | | | | |
| _cons | -0.1866 | 0.1558 | -1.20 | 0.2310 | -0.4920 | 0.1189 |

**Table 6.5:** Probit Model on the Heckman Selection Equation.

**Second step: Regression model** As noted in section *5.1.3.2 Missing Data Problem*, to avoid collinearity between the selection and the transaction size itself, it becomes important to exclude variables from the vector $w_i'$ to derive the vector of independent variables $x_i'$. Such a variable should have a strong influence on the selection but no direct effect on the transaction size itself. In the first step of the Heckman procedure, we could provide evidence that the variables private/public, time splits 1, 2 and 3, the region Asia and the industry sectors Materials, Industrials and Consumer Staples have a strong influence on the selection. The OLS model above (expressed in table 6.5) indicates that out of these variables only time split 1 has no significant effect on transaction sizes - at least on data that is provided to us and not yet corrected for sample selection bias. Thus, we exclude the variable time split 1 from the instrument vector $w_i'$ to derive the vector of independent variables $x_i'$ although we acknowledge that the effect on the transaction size may be different in samples that express the

| R-squared = 0.1400<br>Adj. R-squared = 0.1383<br><br>Log (transaction size) | $\beta$ Coef. | Std. Dev. | t | $P > \|t\|$ | [95% Conf. | Internval] |
|---|---|---|---|---|---|---|
| private_public | 1.1702 | 0.2937 | 3.98 | 0.0000*** | 0.5945 | 1.7458 |
| time_2 | 0.0205 | 0.2327 | 0.09 | 0.9300 | -0.4357 | 0.4766 |
| time_3 | -0.6853 | 0.2992 | -2.29 | 0.0220** | -1.2717 | -0.0988 |
| time_4 | -0.3997 | 0.4307 | -0.93 | 0.3530 | -1.2439 | 0.4445 |
| time_5 | -0.9525 | 0.6152 | -1.55 | 0.1220 | -2.1583 | 0.2534 |
| t_lbo | -1.3713 | 0.3815 | -3.59 | 0.0000*** | -2.1192 | -0.6234 |
| t_mbo | -1.4309 | 0.3784 | -3.78 | 0.0000*** | -2.1727 | -0.6891 |
| t_jv | -0.4333 | 0.3803 | -1.14 | 0.2540 | -1.1787 | 0.3120 |
| t_minority | -3.0940 | 0.3856 | -8.02 | 0.0000*** | -3.8498 | -2.3382 |
| t_majority | -1.4335 | 0.3791 | -3.78 | 0.0000*** | -2.1767 | -0.6904 |
| t_secondary | 0.0000 | (omitted) | | | | |
| r_africa | 0.0000 | (omitted) | | | | |
| r_europe | 0.0603 | 0.1889 | 0.32 | 0.7490 | -0.3100 | 0.4307 |
| r_unitedstates | 0.0514 | 0.2861 | 0.18 | 0.8570 | -0.5094 | 0.6121 |
| r_asia | 0.9743 | 0.2650 | 3.68 | 0.0000*** | 0.4548 | 1.4937 |
| r_latinamerica | 0.4485 | 0.1792 | 2.50 | 0.0120** | 0.0971 | 0.7998 |
| i_energy | -0.7136 | 0.1879 | -3.80 | 0.0000*** | -1.0820 | -0.3453 |
| i_realestate | -0.7598 | 0.1965 | -3.87 | 0.0000*** | -1.1449 | -0.3747 |
| i_materials | -1.6787 | 0.3328 | -5.04 | 0.0000*** | -2.3310 | -1.0264 |
| i_industrials | -1.7649 | 0.3477 | -5.08 | 0.0000*** | -2.4464 | -1.0833 |
| i_consumerdiscretionary | -1.4094 | 0.2625 | -5.37 | 0.0000*** | -1.9239 | -0.8949 |
| i_consumerstaples | -1.7108 | 0.3847 | -4.45 | 0.0000*** | -2.4650 | -0.9567 |
| i_healthcare | -1.3912 | 0.2821 | -4.93 | 0.0000*** | -1.9441 | -0.8383 |
| i_financials | -1.2696 | 0.2689 | -4.72 | 0.0000*** | -1.7967 | -0.7426 |
| i_informationtechnology | -1.9625 | 0.2800 | -7.01 | 0.0000*** | -2.5114 | -1.4137 |
| i_telecommunication | 0.0000 | (omitted) | | | | |
| i_utilities | -0.1662 | 0.1717 | -0.97 | 0.3330 | -0.5029 | 0.1704 |
| invmills | 2.4984 | 1.1504 | 2.17 | 0.0300* | 0.2435 | 4.7533 |
| _cons | 4.6038 | 0.5428 | 8.48 | 0.0000*** | 3.5398 | 5.6677 |

**Table 6.6:** Equation of Interest after the Second Step of the Heckman Procedure.

entire population better[1]. Yet, we do not test on over-identification by the SARGAN approach as we only have one instrument that is not included in $x_i'$ which itself lowers the degree of over-identification (Holly and Sargan, 1982). Table 6.6 provides the results on the equation of interest. Note again that the regression model is applicable to log-transformed transaction sizes which are not interpretable in $ million. In contrasts to the OLS regression model from above, it incorporates the explanatory variable

[1]Our analysis is supported by Capron and Shen (2007) on the variable private/public. They provide evidence that the deal size of private targets is smaller than those of public targets.

$\beta_\lambda$ which is calculated based on the Mills ratios for each observed transaction size and obtained from the probit model in the first step.

The $R^2$ value of the regression model amounts to 0.1400 (the adjusted $R^2$ amounts to 0.1383). As in the OLS model, the $\beta$ coefficients on transaction types are all negative; thus, we should compare them among all transaction types. The transaction type Acquisitions of Minority Stake indicates a strong negative effect on the transaction size as a smaller stake is acquired in this transaction type compared to other types. Further note that that the $\beta$ coefficients on Leveraged Buy Outs, Management Buyouts, and Acquisitions of Majority Stake are smaller than those of JV transactions (which is even insignificant). This may be due to the fact that CapitalIQ does not require a 100 percent stake takeover in these transaction types in contrast to JV transactions. Additionally, the coefficient on the inverse Mills ratio which amounts to 2.4984 indicates a strong need to correct for sample selection bias.

Besides JV transactions, time split 2, 4 and 5, the regions Europe and United States and Canada and the industry sector Utilities have no significant effect (p-values $< 0.05$) on the transaction size on a confidence level of 95 percent. The variables Secondary Buyouts, Africa and the Telecommunication Services industry sector have been omitted due to collinearity. This is in line with the observations from the OLS model above.

Based on the Heckman model, we estimate the missing 22,679 log-transformed transaction sizes. As we calculated the Mills ratio for all transactions - including those where transaction sizes are not given - we are able to correct for sample selection bias. Thereafter, we need to re-transform the estimations by ascending the power to $e^{log(y_i)}$ again. The Heckman two-step model leaves a total deal volume backed by PE/VC firms per year as shown in appendix 2. Appendix 3 provides mean transaction sizes for each variable. As we have seen that data is not missing at random, we are not able to apply other methods like expectation maximization or multiple imputations to impute missing values.

#### 6.1.1.3 Discussion of Missing Data Problem

As there is no comprehensive database about all types of transactions backed by PE firms for the period from January 1st 2000 until December 31st 2016 so far, it becomes difficult to cross-check our predictions. Yet, Bain & Company (2016) provide estimates about the global PE-backed buyout volume. Nevertheless, it should be noted that we use Bain & Company's (2016) estimates as a benchmark. Definitions for transactions that are classified as a *buyout* may differ which could lead to deviations and to differing implications in comparison with other benchmarks, respectively. In order to compare our results with the estimates from Bain & Company (2016), we need to look on all buyout deals in our sample. We consider the transaction types Leveraged Buy Out (LBO), Management Buyout, JV Strategic/Sponsor Acquisition and Secondary Buyout as buyout deals. Additionally, we add Acquisitions of Majority Stake to the buyout sample if it - next to an Acquisition of Majority Stake - is classified as one of the before-mentioned transaction types. Based on these types, we calculate

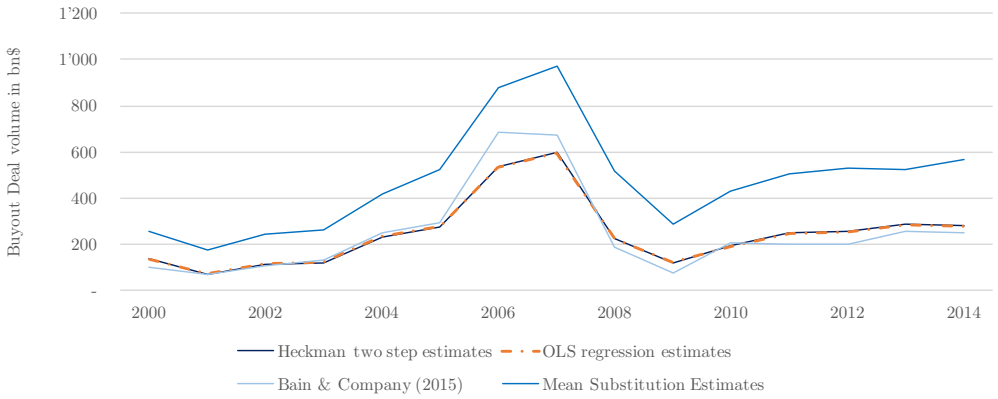


**Figure 6.3:** Buyout Deal Volume Estimations in Comparison.

the total deal volume per year per model. Figure 6.3 shows the buyout deal volume obtained from our estimation models in comparison with Bain & Company's (2016) estimates from 2000 until 2014. Table 6.7 indicates the derivation from each model to Bain & Company's (2016) results.

As can be obtained from figure 6.3, the mean substitution estimates exceed the estimated buyout deal volume estimated by Bain & Company (2016) in every year from 2000 until 2014. This is underlined by table 6.7: The sum of errors from the Mean substitution model compared to Bain & Company's (2016) results is extremely high in an amount of $ 3,359.95 billions.

| | Buyout Deal Volume in bn$ | | | | Error to Bain & Company in bn$ | | |
|---|---|---|---|---|---|---|---|
| Year | Bain & Company (2015) | Mean Substi-tution Est. | OLS Regression Est. | Heckman Model Est. | Mean Substi-tution | OLS Regression | Heckman Model Est. |
| 2000 | 98.00 | 215.84 | 134.34 | 134.14 | 117.84 | 36.34 | 36.14 |
| 2001 | 68.00 | 173.03 | 70.17 | 69.98 | 105.03 | 2.17 | 1.98 |
| 2002 | 109.00 | 241.88 | 114.29 | 114.13 | 132.88 | 5.29 | 5.13 |
| 2003 | 134.00 | 264.09 | 120.53 | 120.29 | 130.09 | -13.47 | -13.71 |
| 2004 | 247.00 | 417.54 | 231.06 | 230.99 | 170.54 | -15.94 | -16.01 |
| 2005 | 293.00 | 524.29 | 274.91 | 274.84 | 231.29 | -18.09 | -18.16 |
| 2006 | 687.00 | 878.43 | 533.85 | 533.56 | 191.43 | -153.15 | -153.44 |
| 2007 | 673.00 | 970.74 | 593.27 | 593.11 | 297.74 | -79.73 | -79.89 |
| 2008 | 189.00 | 520.35 | 222.68 | 222.63 | 331.35 | 33.68 | 33.63 |
| 2009 | 77.00 | 289.59 | 120.34 | 120.43 | 212.59 | 43.34 | 43.43 |
| 2010 | 204.00 | 433.35 | 190.66 | 191.22 | 229.35 | -13.34 | -12.78 |
| 2011 | 203.00 | 503.22 | 248.51 | 250.23 | 300.22 | 45.51 | 47.23 |
| 2012 | 199.00 | 527.42 | 253.74 | 255.81 | 328.42 | 54.74 | 56.81 |
| 2013 | 256.00 | 524.12 | 283.11 | 284.77 | 268.12 | 27.11 | 28.77 |
| 2014 | 252.00 | 565.06 | 278.64 | 280.50 | 313.06 | 26.64 | 28.50 |
| Sum | 3,689.00 | 7,048.95 | 3,670.10 | 3,676.63 | 3,359.95 | -18.90 | -12.37 |

**Table 6.7:** Buyout Deal Volume Estimations in Comparison.

The patterns of buyout deal volume estimates, obtained from the OLS regression as well as from the Heckman model however mirrors the pattern obtained from Bain & Company's (2016) results. Table 6.8 indicates that, over the entire period from 2000 to 2014, the sum of errors from the OLS model compared to Bain & Company's (2016) estimates amounts to $ -18.90 billion vs. a slightly smaller deviation of $ -12.37 billion from the Heckman model. Hence, we can conclude that both regression models' estimates are close to those of Bain & Company (2016). The deviation from both models to Bain & Company's (2016) estimates is highest with an amount of $ -153.15 billion obtained from the OLS regression and $ -153.44 billion obtained from the Heckman model in the year 2006. However, other reports, such as Preqin Ltd (2016), agree with us that 2007 instead of 2006 was the year with the highest global buyout deal volume ever. We believe that the OLS regression and the Heckman model deliver superior results compared to those obtained from the Mean substitution model. We do so because of the very high deviation of the mean substitution model compared to Bain & Company (2016). Although we believe the regression results are superior to the mean substitution method, it should be noted that the explanatory power of the regressions is relatively low: We obtained an $R^2$ value of 0.1396 for the OLS model vs. 0.1400 for the Heckman model. This could be due to a relatively low amount of explanatory variables. However, including more explanatory variables comes along with excluding transactions on which further information is not provided by CapitalIQ. This could, in turn, lead to non-generalizable conclusions. Although the estimated buyout deal sizes per year, as well as the $R^2$ values for both model, are very close, we make use of the results obtained from the Heckman model. We do so as we have seen in the first step of the Heckman procedure that multiple significant sample selection biases are underlying in our sample. In contrast to the Heckman model, the OLS regression model does not correct for sample selection. Table 6.8 provides yearly estimates of transaction sizes for the transaction type of interest, JV transactions. The peak difference between both models amounts to $ 1.70 billion in 2002. This could have severe implications on the share to total PE-backed transactions.

Following, we believe our analysis of JV transaction to be distorted in case we do not correct for sample selection bias by the Heckman method.

### 6.1.2 Time Series Modeling

Economic variables may exhibit non-stationarity over time. Hence, we need to account for them in our further statistical analysis. This part of the chapter deals with the modeling of our time serial variables, JV/T and E-HY rates. Note that the preceding part of this chapter concentrated on missing transaction sizes. However, our hypothesis leaves room on the question whether the share of joint venture deals between strategic and PE investors to total PE-backed deals is expressed by transaction sizes or activity. Here, we incorporate the shares determined in activity again into our analysis. As a next step, before analyzing whether our variables exhibit non-stationarity over time, we need to adjust our variables so that we are able to model the relationship between them properly.

| Year | Heckman results | OLS regression results | Difference between both models |
|---|---|---|---|
| 2001 | 78.63 | 78.05 | 0.58 |
| 2002 | 82.36 | 80.66 | 1.70 |
| 2003 | 121.19 | 120.46 | 0.73 |
| 2004 | 215.82 | 216.15 | -0.33 |
| 2005 | 211.83 | 211.01 | 0.82 |
| 2006 | 391.90 | 392.66 | -0.76 |
| 2007 | 580.35 | 580.79 | -0.44 |
| 2008 | 308.99 | 309.29 | -0.30 |
| 2009 | 219.32 | 219.30 | 0.02 |
| 2010 | 70.85 | 71.50 | -0.65 |
| 2011 | 271.42 | 272.91 | -1.49 |
| 2012 | 125.38 | 126.08 | -0.70 |
| 2013 | 170.42 | 171.47 | -1.05 |
| 2014 | 198.01 | 198.98 | -0.97 |
| 2015 | 311.71 | 312.72 | -1.00 |
| 2016 | 166.88 | 168.42 | -1.54 |

**Table 6.8:** Total Deal Volume per Year for Transactions typed as JV Acquisition in $bn.

#### 6.1.2.1 Log-Linear Regression Model on the Log-Odds of JV/Tts and JV/Ta

The variables of interest in our hypothesis, JV/Tts and JV/Ta, depict fractions that are bounded below by 0 and above by 1. As seen in the section *5.1.3.3 Linear Regression of the Log-Odds*, an OLS regression model can be used as a rule of thumb if the variable of interest lies in a range between $[0.2; 0.8]$. In case, the fraction lies outside of this range, we need to apply a linear function on the *logit*-transformed shares. In order to determine which model should be used, we have a look at the quarterly shares of joint venture transactions to total transactions in figure 6.4.

As can be obtained from figure 6.4, the share of JV/Total deals determined by activity (JV/Ta) does not exceed the lower bound of 20 percent for using the OLS model in any quarter quarter. The share of JV/Total determined by transaction sizes (JV/Tts) does so in one quarter, namely Q1 2000. This outlier in an amount of 57.71 percent can be explained by the mega-acquisition of the Honk Kong based telecommunication company Cable & Wireless HKT Ltd. by the integrated communication services company Pacific Century CyberWorks Ltd. on February 29th, 2000. The transaction size amounted to $ 38,100 million. The PE investor Hicks, Muse, Tate & Furst sponsored the acquisition by an amount of $ 500 million (S&P CapitalIQ, 2017). This deal accounts 95.48 percent of the total deal size of transactions typed as JV Strategic/Sponsor Acquisitions in Q1 2000 and 54.91 percent of total PE-backed transactions in Q1 2000 globally. To not distort our further analysis, we drop this transaction, leaving a JV/Tts of 5.77 percent in Q1 2000. As we are interested in certain shocks, we do not account for further outliers at this stage of the thesis. Despite this outlier, the share of JV/Total determined by transaction sizes, does not exceed the above-mentioned lower bound of 20

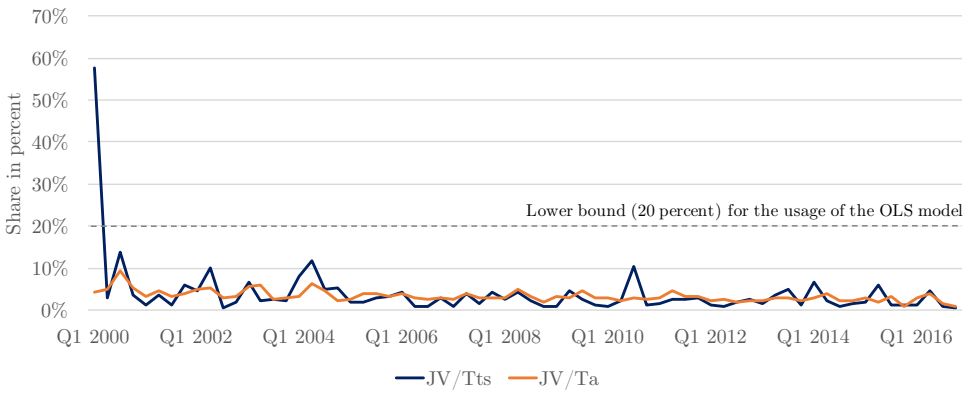


**Figure 6.4:** Quarterly Shares of JV Strategic/Sponsor Acquisitions to Total PE backed Transactions.

percent. Thus, we can conclude that we need to logit-transform the shares of JV/Total determined by both, activity and transaction sizes (JV/Ta and JV/Tts). A linear regression model on the logits of the shares of JV/Total has to be applied afterward. Although the shares of JV/Ta and JV/Tts amount closely to 0.00 percent in certain quarters, we never observe a value of exact 0.00 percent in any quarter. Hence, we do not adjust the *logit* ratios as proposed by Papke and Wooldridge (1996) although we acknowledge that no JV transaction might be executed with positive (but very small) probability.

#### 6.1.2.2 Stationarity of the Variables

After transforming the variable of interest, we need to investigate whether the *logit* transformed variables as well as the measure for boom and bust cycles, E-HY, exhibit stochastic or deterministic trends over time.

As applied in the skewness test on given transaction sizes, we have a look on the illustration in figure 6.5 on the variables before formally testing on time trends. Note that figure 6.5 provides the same information on the measure E-HY as figure 6.2. However, in figure 6.2 our interest was lying on the relationship between E-HY rates and splitting time frames. Here, our interest lies on potential time trends in the data.

Above, we have already noted that the variable E-HY mirrors the time splits of PE activity applied for the OLS model. The variable thus may have different mean and variance values that may lead to different PE activity levels over time as noted by Kaplan and Strömberg (2009). Additionally, the different mean and variance levels over time indicate non-stationarity. Indeed, the variable experienced an increase from -4.30 percent in Q1 2000 to 0.57 percent in Q4 2016. We also see bust cycles in Q1 2001 in line with the early 2000s recession and from Q4 2008 until Q1 2010 after the financial crisis 2007/2008. Figure 6.6 splits the EBITDA/EV-High Yield rates measure into its sub-measures.

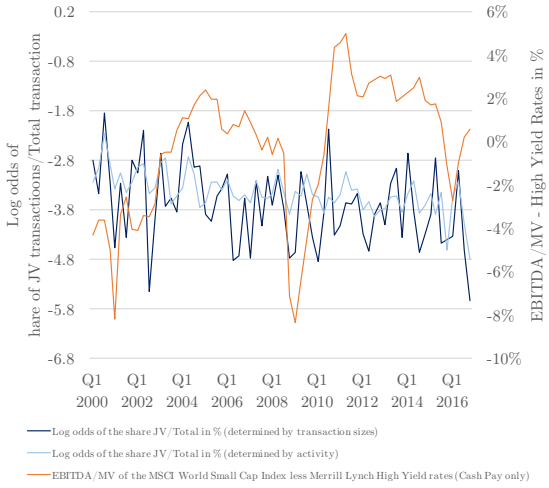


**Figure 6.5:** Time Trends in JV/Ta, JV/Tts and E-HY.

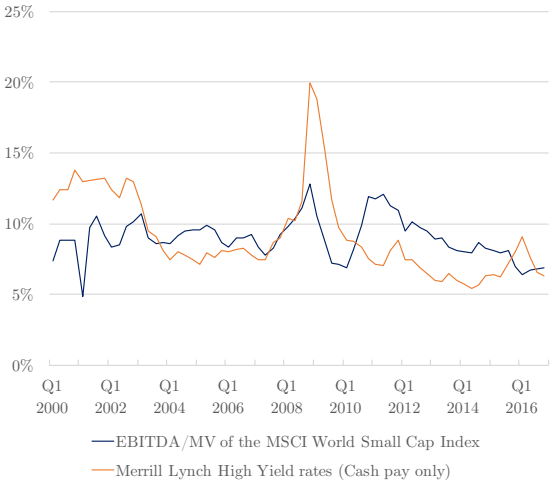


**Figure 6.6:** EBITDA/EV of the MSCI World Small Cap Index and Merrill Lynch High Yield Rates (Cash Pay Only) Averages over Quarters.

As can be obtained, the EBITDA/EV of the MSCI World Small Cap Index fluctuates around 9.00 percent over the time frame of interest. We believe that the peak of 12.82 percent in Q4 2008 - shortly before the consequences of the collapse of global credit markets became evident - is worth to mention. Moreover, we can see a break-in of 4.82 percent in Q1 2001 in accordance with the early 2000s recession. We also observe extremely fast recoveries of EBITDA/EV ratios after the break-in in Q1 2001 and low-level EBITDA/EV ratios from Q3 2009 until Q1 2010. Note that the time frame from Q3 2009 until Q1 2010 denotes the before-mentioned consequences of the financial crisis 2007/2008.

Despite a peak of 19.94 percent in Q4 2008 in line with the crash of the banking system, the Merrill Lynch High rates (Cash Pay only) exhibit a long-term decrease from 11.68 percent in Q1 2000 to 6.34 percent in Q4 2016. This can be explained by a long-term decrease of interest rates in general, specifically driven by FED's policy and ECB's quantitative easing as a reaction to the financial crisis. Hence, the long-term increase of the E-HY measure may be explained by the long-term decrease of high yield rates.

By having a look on figure 6.5 again, we can observe that there is some indication of non-stationarity both logit-transformed shares of JV/Ta and JV/Tts as they do not move equally around their means. It is interesting to note that there may be underlying a slight downward trend in both logit-transformed JV/Tts and JV/Ta over the entire time period of interest. More specifically, the downward slope of the logit-transformed JV/Ta seems to be equal over time, indicating a deterministic trend. In contrast, the downward slope of the logit-transformed JV/Ta mirrors a random walk, indicating a stochastic trend.

To confirm the expectations regarding non-stationarity, we test $H_0$ (variable contains unit-roots) against $H_1$ (variable is trend-stationary) on the variables on basis of the Augmented Dickey-Fuller

| Variable | Test statistic on max lag (4) | Critical value (95%) | p value | Comment | Test statistic on first-difference | Critical value on firstdiff. (95%) | p value | Order of int. |
|---|---|---|---|---|---|---|---|---|
| Log odds of JV/Total (Trans. size) | -3.14 | -3.49 | 0.10 | $H_0$ not rejected against $H_1$ | -5.30 | -3.49 | 0.00*** | I(1) |
| Log odds of JV/Total (Activity) | -4.22 | -3.49 | 0.00*** | $H_0$ rejected against $H_1$ | n/a | n/a | n/a | I(0) |
| EBITDA/MV less HY rates | -3.09 | -3.49 | 0.11 | $H_0$ not rejected against $H_1$ | -3.56 | -3.49 | 0.03** | I(1) |

**Table 6.9:** Augmented Dickey Fuller Test (Constant and Trend included).

| Variable | Test statistic on max lag (4) | Critical value (95%) | p value | Comment | Test statistic on first-difference | Critical value on firstdiff. (95%) | p value | Comment |
|---|---|---|---|---|---|---|---|---|
| Log odds of JV/Total (Trans. size) | 0.70 | 0.46 | n/a | $H_0$ rejected against $H_1$ | 0.02 | 0.46 | n/a | Stationary after first-diff. |
| Log odds of JV/Total (Activity) | 2.42 | 0.46 | n/a | $H_0$ rejected against $H_1$ | n/a | n/a | n/a | Determ. Trend |
| EBITDA/MV less HY rates | 1.74 | 0.46 | n/a | $H_0$ rejected against $H_1$ | 0.07 | 0.46 | n/a | Stationary after first-diff. |

**Table 6.10:** Kwiatkowski-Philips-Schmidt-Shin (KPSS) Test (Level-Stationarity Option).

(ADF) method and cross-check the results from the ADF results by the Kwiatkowski-Philips-Schmidt-Shin (KPSS) method (testing on $H_0$ (variable is trend-stationary) against $H_1$ (variable contains unit-roots)). Our sample consists of 68 observations/quarters within the time frame from Q1 2000 to Q4 2016. Thus, we believe that Schwert's (2002) equation for small samples seems to be appropriate in order to determine the optimal number of lags to minimize autocorrelation. This turns out to be 4 lags. The results are presented in tables 6.9 and 6.10.

As one can see, the test statistics on the logit-transformed JV/Tts and E-HY are higher than the critical values which imply that we cannot reject the null that they contain unit-roots. As the test-values of the KPSS are higher than their critical values, we can reject the null that the variables are stationary, which supports the implication of the ADF. However, after first-differencing the variables, both tests, ADF and the KPSS, provide evidence for stationarity. Hence, as both variables are integrated of order $I(1)$, we need to ascertain whether they form a long-run equilibrium, characterized by co-integration.

In contrast, we can reject that the logit-transformed JV/Ta contain unit-roots on basis of the ADF on a confidence level of 95 percent as the test statistic is lower than the critical value. However, the KPSS

does not support the implications of the ADF that the variable is stationary (the test statistic of the KPSS is higher than the critical value of 0.463). Thus, we can conclude that a deterministic trend is underlying: Running an OLS model over time, provides evidence that the variable is decreasing by the factor $-0,0124t$[2]. In the following, we account for the deterministic trend by removing it from the *logit*-transformed JV/Ta. We will be responsive on the observation of trends again in our discussion on the quantitative study.

#### 6.1.2.3 Co-Integration of the Variables

As shown by Engle and Granger (1987), two variables that exhibit stochastic trends on the same order of integration may exhibit a long-run relationship: From table 6.9, we have obtained that E-HY and JV/Tts are both integrated of order I(1). In figure 6.5, we further have seen that E-HY exhibit an upward trend whereas the logit-transformed JV/Tts are characterized by a slight downward trend; they are opposed to being co-integrated based on a negatively correlated relationship. As shown in section *5.1.3.4 Time Series Modeling*, the Engle and Granger (EG) method first tests by an ADF (again cross-checked by the KPSS) on non-stationarity of the residuals obtained from an OLS regression between the variables that could possibly co-integrated. In case the residuals are integrated of a lower order of integration (they are stationary, respectively), co-integration is underlying. The error correction model (ECM) could then account for co-integration.

To conduct the EG approach, we first run an OLS regression on E-HY and the logit-transformed JV/Tts[3]. We first examine the graph of residuals of the OLS model shown in figure 6.7. As can be observed, there is some indication for a slight downward move over time, implying non-stationarity of the residuals.

To formally ascertain the slight downward move, we conduct the ADF and KPSS on the residuals of the OLS model. The results of the tests can be obtained from table 6.11. On basis of the ADF, we find that the test value of -3.12 is higher than the critical value of -3.49 on a confidence level of 95 percent. Therefore, we cannot reject the null that the residuals contain unit roots. The KPSS supports the implication of the ADF as the test value of 0.68 is higher than the critical value of 0.46 on a confidence level of 95 percent: We can reject the null that the residuals are stationary. Hence, we can conclude that the two variables do not have a significant long-term co-integration relationship. Consequently, we do not include an *error correction model* (ECM) into our final model.

#### 6.1.2.4 Outlier Test

Based on the results of the Heckman regression and our analysis of time trends, we are able to estimate the final regression model to investigate the relationship between the share of joint venture transactions

[2]The OLS model can be obtained from appendix 4.
[3]The OLS model can be obtained from appendix 5.

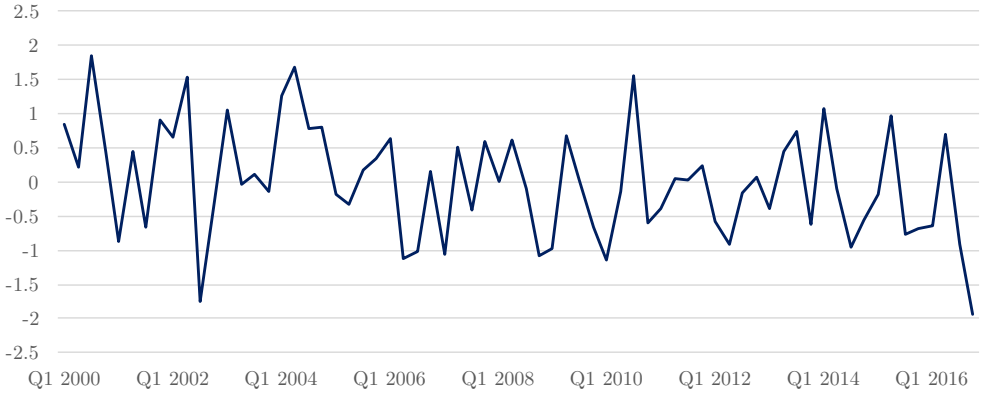


**Figure 6.7:** Residuals to test for Co-integration.

| Variable | Test statistic on max lag (4) | Critical value (95% Conf. Interval) | p value | Comments |
|---|---|---|---|---|
| Residuals (ADF) | -3.12 | -3.49 | 0.10 | $H_0$ not rejected against $H_1$ |
| Residuals (KPSS) | 0.68 | 0.46 | n/a | $H_0$ rejected against $H_1$ |

**Table 6.11:** ADF and KPSS on Residuals.

between PE and strategic investors to total PE-backed deals and boom and bust cycles expressed by E-HY. To do so, we need to take the difference of the variables that contain unit roots and need to take into account deterministic trends. As shown above, the variables E-HY and the logit-transformed JV/Tts need to be differenced once. JV/Ta contains a deterministic trend which we remove. Our regression equations thus become:

Based on transaction sizes:

$$D\left[log\left(\frac{y(ts)_t}{1-y(ts)_t}\right)\right] = \mu + \beta D[EHY_t] + u_t \tag{6.1}$$

*where D denotes first differencing and y(ts) share of JV/Total in transaction sizes*

Based on activity:

$$d\left[log\left(\frac{y(a)_t}{1-y(a)_t}\right)\right] = \mu + \beta D[EHY_t] + u_t \tag{6.2}$$

*where D denotes first differencing, d removed deterministic trends and y(a) share of JV/Total in activity*

Based on these models, we test on outliers as they may have a big impact on our analysis. Therefore we apply the DFBETA test (Belsley, Kuh, and Welsch, 2004). Based on the DFBETA-test provided

| Quarter | D.logodds | DFBETA value | Critical Value |
|---|---|---|---|
| Q2 2001 | 1.3023 | 0.2937 | 0.2443 |
| Q4 2010 | -2.1490 | 2.4272 | 0.2443 |

**Table 6.12:** DFBETA Test on Outliers

in table 6.12, we exclude the observations in Q2 2001 and Q4 2010 for equation 6.1 (the relationship between JV/Tts and E-HY). The DFBETA test implies that the above observations have a strong pull effect into its direction on the regression line. We exclude them as we could significantly improve R2 and p-values. We do not exclude any observations in equation 6.2 (the relationship between JV/Ta and E-HY) as the results on R2 and p-values are not significantly different. As applied previously in the observation of trends, we will be responsive on outliers in our discussion.

### 6.1.3 Final Regression Model

Running an OLS regression on the equations above leads to the results detailed in tables 6.13 and 6.14. Note that the results are on logit-transformed JV/Tts and JV/Ta. Thus, they are, again, not economically interpretable in $ million.

We find a positive correlation between boom and bust cycles, expressed by E-HY, and both JV/Tts and JV/Ta. Although the relationship between JV/Tts and boom and bust cycles is insignificant on the 95 percent confidence level, it is significant on the 90 percent confidence level as indicated by the p-value and confidence intervals. Controversy, the relationship is insignificant for the relationship between JV/Ta and boom and bust cycles. We acknowledge that our conclusions may be misleading by the relatively low significance level of 90 percent. However, we believe a 90 significance level to be appropriate in order to find relations that could be found in large samples but fail to be found in small samples as the one we obtained (65 observations after accounting for time-series and outliers).

Serial auto-correlation indicates that the error terms of a regression model are serially correlated over time. We test both models on serial auto-correlation by the Durbin-Watson test for first-order auto-correlation and the Breusch-Godfrey LM test for higher-order serial correlation[4]. The test statistic can also be obtained from tables 6.13 and 6.14. Both tests provide evidence that our models are robust.

Note that the $R^2$ values amount to 0.0513 (adj. $R^2$ value of 0.0363) for the JV/Tts model and 0.0280 (adj. $R^2$ value of 0.0130) for the JV/Ta, respectively. Generally, the explanatory power of our model is quite low. However, we see a higher explanatory power on JV/Tts than JV/Ta. This provides evidence for our earlier hypothesis that the deal activity does not fully reflect the commitment PE firms take into certain targets and in our case certain business models.

[4]Note that we did not focus on these models in chapter *5. Theoretical Methods* as they do not influence our results. For further information, we refer to Durbin and Watson (1951) and Breusch and Godfrey (1980).

Observations = 65
R-squared = 0.0513
Adj. R-squared = 0.0363
Durbin Watson = 2.6013
Breusch Godfrey LM Test = 0.0046***

| Variable | Coef. | Std. Dev. | t-value | p value | [95% Conf. | Interv.] | [95% Conf. | Interv.] |
|---|---|---|---|---|---|---|---|---|
| Constant | -0.2230 | 0.1283 | -0.17 | 0.8630 | -0.2787 | 0.2341 | -0.2365 | 0.1919 |
| E-HY | 18.0505 | 9.7788 | 1.85 | 0.0702* | -1.4909 | 37.5920 | 1.7257 | 34.3753 |

**Table 6.13:** Regression Models on the Logit-Transformed JV/Tts.

Observations = 67
R-squared = 0.0280
Adj. R-squared = 0.0130
Durbin Watson = 2.4673
Breusch Godfrey LM Test = 0.0310**

| Variable | Coef. | Std. Dev. | t-value | p value | [95% Conf. | Interv.] | [95% Conf. | Interv.] |
|---|---|---|---|---|---|---|---|---|
| Constant | -0.0283 | 0.0519 | -0.55 | 0.5870 | -0.1319 | 0.0753 | -0.1148 | 0.0582 |
| E-HY | 5.3308 | 3.5459 | 1.50 | 0.1380 | -1.7508 | 12.4124 | -0.5860 | 11.2476 |

**Table 6.14:** Regression Models on the Logit-Transformed JV/Ta.

## 6.2 Discussion and Limitations of the Quantitative Study

The aim of the quantitative study is, to provide explanations on external conditions that may influence the PE firms' decision to enter partnerships with strategic investors as expressed by our second sub-question. Therefore, we tested the hypothesis on the relationship between joint venture acquisition to total PE-backed deals in M&A boom and bust market environments. After highlighting the final model to test our hypothesis, we should now turn to the discussion of our results. In order to do so, we briefly summarize the main findings. Thus, we make use of existing theory to infer explanations for our observations. Finally, as "it is not clear which theories to select" (Bryman and Bell, 2015) in a quantitative study, we briefly perform a discussion on the limitations of our model.

### 6.2.1 Summary of Main Findings in the Quantitative Study

The above section highlights the applied statistical methods and tests as well as the results of our quantitative study. To find evidence for a relationship between joint venture transactions between PE and strategic investors and M&A boom and bust cycles, we started with documenting the evolution of global PE-backed deals in the $21^{st}$ century: Besides the activity of PE firms, the transaction size/volume is a natural measure to estimate the commitment of PE firms to certain targets (Strömberg, 2007). However, one of the most relevant obstacles we faced was however the missing data problem on transaction sizes/volume for targets. This issue is quite common while dealing with privately-held companies. We however, find that PE firms do not solely invest in private firms but also in public enterprises on which information on transaction sizes is more likely to be provided. We also find

differences in the extent of data availability on deal values across time, geographies, and industries. To account for these differences, we applied the Heckman procedure.

By time series modeling, we find support for underlying time trends in our variables. We observe an upward trend in the measure E-HY: Over time it has become more attractive to finance the purchase of an entire corporation with high-yield bonds due to decreasing high-yield rates. In contrast, we find downward trends in the shares of joint ventures to total transaction sizes (JV/Tts) and shares in joint ventures to total activity (JV/Ta) over the period from Q1 2000 to Q4 2016. After accounting for trends and outliers observed in Q2 2001 and Q4 2010, we find a significant correlation between JV/Tts and E-HY on a 90 percent confidence level and a non-significant relation between JV/Ta and E-HY. Our thesis now turns to the discussion to comment on possible rationales and implications of these patterns. We believe that insights from literature as well as methodological issues may influence our results.

### 6.2.2 Discussion of Main Findings in the Quantitative Study

**Significance of the Hypothesis** First, as the most important finding of the quantitative study, it should be discussed why our hypothesis of a higher share of JV transactions to total PE-backed transactions in booming M&A markets and a lower share in busting M&A markets is significant if determined by transaction sizes whereas it is inconclusive if determined by activity.

The non-significance on JV/Ta indicates that the decision to co-operate is not influenced by the external market environment. Nevertheless, external conditions may change the investors rationales to shake hands: It is evident that M&A bust cycles are accompanied with a low degree of economic output (Ding and Rahaman, 2010). PE firms however value poorly performing targets higher than strategic investors do due to their strong skills in restructuring as shown in section *3.3 Financial and Strategic Investors in Competition* (Gorbenko and Malenko, 2014). Thus, in M&A bust cycles PE firms may outbid their strategic counterparts more often than in M&A boom cycles due to their strong experience in dealing with financial distress. Although we find a decreasing JV/Tts and JV/Ta trend over time, PE firms may still purchase low-performing targets in a joint venture aiming to restructure with the help of complementary assets offered by strategic investors. Strategic acquirers may then profit from the high upside potential of purchased firms. Following our reasoning, the share of JV/Tts may be lower in M&A bust cycles since deal values of poorly performing firms are commonly lower than high performing ones. Nevertheless, in section *3.3 Financial and Strategic Investors in Competition*, we have also seen that on average strategic investors have higher price premiums than PE firms (Gorbenko and Malenko, 2014). Hence, in booming M&A market cycles characterized by strong performing firms, strategic acquirers are more likely to outbid their PE competitors. Strategic investors may then partner with PE investors to take advantage of the PE firms better access to capital markets, superior skills in identifying undervalued assets and more efficient negotiations in M&A deals (Demiroglu and James, 2010; Dittmar, Li, and Nain, 2017). Indeed, strategic investors could also

make use of these services from investment banks; however, the interests between partners may be more aligned than between a customer and a serving bank. PE firms, on the other hand, could then profit from reducing the pressure of their limited partners to invest in certain targets and reducing their level of dry powder. Further, as interests have to be shared, competition over these targets may often be less intense leaving room for lower price premiums (Schneider and Hendricks, 2015). As valuations of high-performing firms are generally higher than those of low-performing ones, the share of JV/Tts may be higher in M&A boom cycles than in boom cycles. In summary, our findings may indicate that the general activity of PE firms partnering with strategic investors compared to total activity may be quite independent of general market conditions; however, their rationales as indicated by transaction sizes to shake hands with their counterparts may not.

**Q1 2001 and Q4 2010 as Outliers** The significant relationship between boom and bust cycles and JV/Tts is based on the exclusion of the observations in Q2 2001 and Q4 2010. We noted that the early 2000s were characterized by a global recession involving a substantial decline in economic output. Especially in Q1 2001, we have seen a break-in of EBITDA/EV of global small cap enterprises. However, we also see a fast recovery of EBITDA/EV ratios from Q1 to Q2 2000, which underlines Kliesen (2003) who notes that the 2001 recession was relatively short compared with other postwar recessions. We can see the same pattern for Q4 2010 when global financial markets recovered after the economic downturn in line with the financial crisis 2007/2008: Due to a strong improvement of EBITDA/EV ratios and increased availability of leveraged financing, PE M&A activity showed a marked resurgence in late 2010 whereas the number of strategic M&A transactions increased with delay to the recovery of financial markets (Stephenson, 2011). As a consequence, we believe the level of competition could have been stayed moderate for these quarters implying moderate levels of joint venture transactions. This could be due to two reasons:

First, Kaplan and Strömberg (2009) provide evidence that strategic investors do not exploit financial market mispricing as much as PE firms do (Kaplan and Strömberg, 2009). Due to the strong and extremely fast recovery, PE firms could have detected opportunities to profit from arbitrage in market mispricing which in turn made them investing more than strategic investors did.

Second, in section *3.2.3.3 Operational Engineering and Synergies*, we have seen that the rationales of strategic investors to acquire firms have changed from the 1950s until today. In the past, diversification was a crucial argument to merge with a firm outside of the industry the acquirer operates in. However, conglomerates are no longer as prevalent as in the past. Investors believe in increasing agency problems in conglomerates as well as they believe in being able to diversify their stock portfolio on their own (Rumelt, 1982; Whittington, Mayer, and Curto, 1999). Thus, strategic investors need to invest much more effort to identify targets that suit their own business well in order to exploit synergy potentials. In contrast, PE investors are able to diversify their portfolios as they are not dependent on certain complementary assets. This, in turn, could lead to PE firms having superior skills in identifying

undervalued assets as well as in negotiating in M&A deals (Dittmar, Li, and Nain, 2017). In other words, these skills make PE firms more flexible if the market environment changes quickly.

The greater tendency to exploit market mispricing as well as the superior mobility to react to macroeconomic changes of PE firms indicates the appropriateness to exclude certain shocks as the level of competition does not flexibly follow the patterns of the E-HY measure. However, we do not claim completeness of factors coming into play for the observed outliers.

**Long-term Downward Moves of JV/Tts and JV/Ta** In our reasoning, the long-term downward move of JV/Tts, as well as JV/Ta, stands at odds with a long-term upward trend of E-HY. What could describe the long-term downward trend of both, JV/Tts and JV/Ta?

On the one hand, Gompers, Kaplan, and Mukharlyamov (2016) find that PE firms specialize more and more in certain industries. Further, they note that PE investors who specialize in an industry are more likely to find an opportunity in that industry. We believe that taking advantage of the industry and operational know-how of strategic investors are important factors that make PE firms partner with their counterparts. However, as PE investors are more and more specialized in certain industries, they may no longer be dependent on strategic investors to add value through operational engineering which in turn could provide evidence for a long-term downward trend of JV/Tts and JV/Ta.

On the other hand, we should also critically examine whether the downward move could be explained by the strategic investor's avoidance to shake hands with PE investors. Above, we have identified that strong skills in identifying undervalued assets, restructure poorly-performing firms, as well as the superior access to credit markets, may be rationales of strategic investors to partner with PE investors (Demiroglu and James, 2010; Dittmar, Li, and Nain, 2017). Nevertheless, as seen in section *3.2.3.1 Financial Engineering*, the strong growth of the PE industry could have led to a higher competition among PE firms which in turn could have weakened the PE firms ability to identify undervalued assets and assisting poorly-performing firms to recover. Further, the competition and a huge network of PE partnerships could have diluted the strong access to credit markets (Gompers, Kaplan, and Mukharlyamov, 2016). In case these superior skills are no longer as prevalent as in the extent seen in the past when the PE industry was still in its infancy, there may be little reason for strategic acquirers to cooperate with PE firms.

### 6.2.3 Limitations of Findings in the Quantitative Study

**Lack of Data** While determining the share of joint venture transactions to total PE-backed deals on transaction sizes, we face the disadvantage of lack of data. To overcome this problem, we estimated transaction sizes using the Heckman correction. As has been seen, the explanatory power is relatively low. We decided not to include further explanatory variables into the model as the loss of a number of transactions would have been too high. Therefore, we acknowledge that including further explanatory variables while accepting a smaller number of transactions could have yielded a higher explanatory

power of the model. A differently applied Heckman model to estimate missing transaction values could also lead to different conclusions about the shares of JV/Tts over time.

**Specificity of Variables** Moreover, we note that the internal and external competition is a very specific reason for PE firms expanding their investment universe such as investing jointly with strategic investors. As we hypothesized in section *4.2 Chosen Research Approach*, the empirical study only provides a minor part of the bigger and much more complex picture as shown by a relatively low explanatory power of our final models. Moreover, it underlines the appropriateness to base our research approach on a critical realistic epistemology and the need for an abductive research approach which is characterized by an interplay of quantitative and qualitative methods. To unlock further insights into the conditions making private equity expand their investment universe, we also conduct a case study of a PE/strategic partnerships in the next chapter.

# 7 Case Study: Joint Acquisition of Ubisoft Entertainment SA

The overall mean of the qualitative study is to find an answer on the third sub-question of our research process which rationales of the investor types may impact on joint acquisitions. We choose Ubisoft for our case study as the current situation of the firm perfectly fits into our research:

As we concluded in the end of the preceding chapter, strong performing companies, such as Ubisoft, tend to have higher valuations in booming M&A markets. Our indicator for booms and busts of M&A activity currently signals a boom which represents higher competition. (Gorbenko and Malenko, 2014) argue that strategic investors tend to outbid financial investors in such an environment to acquire an attractive target. The target in our case study, Ubisoft, is a leading company within the video gaming industry. According to many news outlets, e.g. Bloomberg's Boksenbaum-Granier (2016), CNBC's Morris (2016), etc.), Ubisoft is at risk of losing their independence due to an imminent hostile takeover attempt by Vivendi SA, a French media conglomerate which has already acquired another video gaming producer, namely Gameloft SA. Yet, the management of Ubisoft believes that a takeover by an entertainment conglomerate would harm the creative production capabilities of Ubisoft and consequently, damage the quality of Ubisoft's franchises[1]. Therefore, Ubisoft's management may be willing to merge with another gaming firm to avert a hostile takeover. The strategic investor in this case study is another independent gaming creator and publisher - Activision Blizzard Inc. (Activision Blizzard). Indeed, Activision Blizzard could acquire Ubisoft solely when considering Ubisoft's situation, however, the balance sheet of Activision Blizzard reveals their inability to finance such a transaction by cash. The rising two options are either financing it through additional debt or an interim joint venture with a financial investor before fully taking over Ubisoft after PE firm's investment horizon exceeds. Further, it should be noted that - due to its stable cash flows as well as its opportunities to grow - Ubisoft is a promising target for a PE firm.

In line with our research, this case study focuses on a partnership between both investors. As the case study is hypothetical, the outcome could, in reality, be very different compared to our case study resulting from an interplay between investors in negotiations. However, we make use of empirical work from our literature review in order to discuss a possible outcome for this specific transaction. Further, as shown in section *5.2 Methods in the Qualitative Study*, we rely on the information provided by Ubisoft's annual reports from FY13 until FY16 (Ubisoft, 2013, 2014, 2015, 2016), if not stated

[1] A media franchise is a collection of media derivatives, such as films, video games, literature or television programs (Johnson, 2013).

otherwise. To analyze the outcomes of a joint venture acquisition, we follow Rosenbaum and Pearl (2009) to conduct a commercial and financial due diligence which will serve as a basis for the operational value creation model as well as for our investement model in the end.

## 7.1 Due Diligence

To execute a joint venture acquisition of Ubisoft, Ubisoft's positioning within its commercial environment and its financial health in terms of profitability, cash flows and net assets should be assessed. In this regard, a due diligence helps to comprehend subsequent assumptions and considerations. This is in line with the approach of PE firms to assess the operational attractiveness of targets, as seen in section *3.2.3.3 Operational Engineering and Synergies*. Due to our main interests in the value creation of joint venture acquisitions, an in-depth analysis of current and future macroeconomic and legal factors, in all of the countries Ubisoft operates in, is out of the scope of our due diligence.

### 7.1.1 Commercial Due Diligence

The commercial due diligence focuses on the strategic framework and the external market conditions of the Ubisoft corporation, thereby seeking to provide a holistic overview of the company's current position and its future potential in the video gaming industry. On this account, we first present Ubisoft's corporate profile in a *Brief History and Company Profile of Ubisoft*. We continue with an outline of the company's *Business Model*, including details on Ubisoft's operations and products. The *Market Analysis* part focuses on the status quo of the gaming market, thereby presenting key areas and consumers. Thereafter, we continue to describe the industry's major *Growth Drivers*, including both today's most profitable segments as well as the business models and technologies that have the greatest potential for success in the near future. Finally, we conduct a brief *Consumer Analysis* as well as a short *Competitive Analysis*.

#### 7.1.1.1 Brief History and Company Profile of Ubisoft

In 1986, during a time where the video game industry was still in its infancy, the five brothers Claude, Michel, Yves, Grard and Christian Guillemot founded Ubisoft in Montreuil-Sous-Bois Cedey, France, where it is still headquartered today. Starting with publishing and distribution services for video game developers including Electronic Arts, they soon expanded their business into the development of their own video game material. In accordance with the brothers' ambitions to further advance their operations and in order to cope with increasing development costs, Ubisoft went public on the Paris Stock Exchange in 1996 and has a market capitalization worth around €4.5 billion today (Bloomberg). After going public, the company pushed forward organic growth with a growing number of games related intellectual property (IP) and franchise content (e.g. the *Assassin's Creed* series), which still today present the major source of Ubisoft's revenues. It has further been involved in various partnerships and acquisitions in order to increase its market share in the development and

publishing sector, to further their geographic expansion as well as to follow market trends of the video game industry. For instance, the partnership with *SpectreVision* has provided essential knowledge to develop video games in the virtual reality segment.

#### 7.1.1.2 Business Model

While Ubisoft is often classified as a software company, the business model of a video game developer and publisher is a very different one compared to a classical software developer (O'Donnell, 2012). This is partly due to the number of different stakeholders which Ubisoft and its peer companies deal with along the value chain of video games. Among others, participating parties include design and graphic specialists; traditional software programmers, publishing and marketing experts, hardware providers for video games, as well as a diverse set of customers and consumers that buy Ubisoft's products for their consoles, personal computers (PC), smartphones and tablets, in both physical and digital formats.

Ubisoft is directly and indirectly connected to a vast set of business activities along this value chain. In order to cope with the size and diversity of corporate activities, Ubisoft runs operations at several subsidiaries in Europe, the US, Canada, and the Asia-Pacific regions. Another reason why Ubisoft opts for such as disperse organization system is the possibility to cut costs in its HR-intensive development divisions. On this account, it employs two third of its 9,790 employees in cost-competitive countries. Moreover, the existence of multiple development studios around the world allows the company to develop several AAA products at a time as well as to create an internal knowledge base which makes it, compared to its competitors, extremely responsive to certain consumer trends and less dependable of mergers and acquisitions.

With 18 distribution companies worldwide, the global expansion of Ubisoft's facilities also helps to maintain fast access to its biggest customer groups. In some subsidiaries (e.g. *Future Games of London*), Ubisoft brings together the production, publishing and distribution function of their business, thereby seeking to optimize the efficiency of the process of bringing new products to the gaming markets. The most successful products stemming from Ubisoft's production process are the franchises *Assassin's Creed*, *Far Cry*, *Just Dance*, the *Rainbow Six Siege*, *Tom Clancy's* video game series and *Watch Dogs*.

#### 7.1.1.3 Market Analysis

Starting in the 1970s, the video game industry has experienced several ups and downs along its history. In the long run, however, it has been on a steady rise to a 100 billion-dollar business in 2016. With 47 percent of global revenues, the Asian-Pacific region (APAC) represents the biggest gaming market worldwide. The cumulative growth of all APAC countries is also the highest compared to the rest of the world, bringing about 58 percent of worldwide sales growth. As presented in figure 7.2, the other regions are North America ($25.5 billion), Europe, Middle-East and Africa ($23.5 billion), and Latin

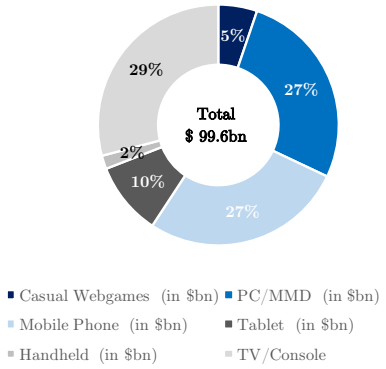


**Figure 7.1:** 2016 Global Games Market per Region (Newzoo, 2017).

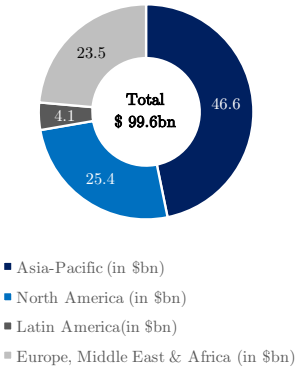


**Figure 7.2:** 2016 Global Games Market per Segment (Newzoo, 2017).

America ($4.1 billion), where the latter experienced the highest year-on-year (YoY) growth between 2015 and 2016 (+20.1 percent). The $100 billion global revenues can further be related to the different segments as well as devices in which users play their purchased video games on (Cf. figure 7.1). The majority of video game revenues (29 percent) are related to TV/Consoles software. This number is, however, exceeded by an integrated mobile segment adding up the revenues of smartphone and tablet software: The 2016 annual report considers the mobile group ahead of all other devices with a 37 percent ($36.9 billion) share of the global games market. The mobile and TV/Console group is then followed by the PCs with 27 percent, and other devices with the remaining 7 percent of revenues (Newzoo, 2017). The shift from a console and PC based to a mobile-driven industry has also led to changes in the gender distribution among video game customers, which we will discuss more into detail later in section *7.1.1.6 Consumer Analysis*.

Summarizing, the transformation from a niche market in the 1970s, serving only a few interested consumers, to a highly profitable industry with a worldwide growing customer base, is an ongoing process. In the following section, we introduce the segments and products, which currently drive the industry change and those which have a high potential to boost the future's growth.

#### 7.1.1.4 Growth Drivers and Future Trends

The segments that bring about the majority of gaming revenues include *Traditional PC and Console Games*, digital games and downloadable content as well as games for mobile devices. While having a huge impact on the profitability of the current video game industry, these segments are still expected to play a major role in the upcoming years. Additionally, several new trends challenge the developers and publishers in the video game industry, namely, *Digital Distribution Channels*, *Virtual and Augmented Reality*, and *eSports Tournaments*. This movement is primarily related to the ongoing process of digitalization and has a great potential to be new growth drivers for developing and publishing companies.

**Traditional PC and Console Games** Although the development of PC and console games revenues is moderate compared to the mobile sector, there is still a large market for video game publishers. As customers are still buying the most recent devices of leading producers, including Microsoft's *Xbox One* or Sony's *PlayStation 4*, they are also very likely to continue buying high-end video games (i.e. AAA material), either in order to use the available hardware to full capacity or simply to justify the purchase of their premium gaming device. There is also a high likelihood that revenues in this segment will remain on the same level or even rise, as announcements of hardware updates, including for instance Sony's virtual reality system for their PlayStation 4, will provide the game developing and publishing industry further sales (Newzoo, 2017).

**Digital Distribution Channels: Downloadable Content and Mobile Market** The ongoing digitalization of the video game industry is due to two major phenomena: the rise of the global mobile market as well as the increasing disc capacity and connectivity of consoles and PCs. As industry experts expect, this creates a shift from buying physical discs to downloading games and other content. The latter phenomenon may positively affect Ubisoft's industry, as consumers are expected to be more amenable to purchase online extra content for their video games. Such content usually comprises additional tools which can be used to succeed in a particular game or updates including new assignments, levels, and maps for existing IPs. In the background of an estimated 15 percent compound annual growth rate (CAGR) of revenues, which are related to PC and console downloads, producers can realize high profit potentials as such content is usually faster and cheaper to develop and publish. Increased connectivity is expected to boost the already established market for so-called *massively multiplayer online* (MMO) games. Enjoying the experience of playing against a *real* person rather than a computer, gamers have been increasingly playing MMO games over the past years, providing with both *free-to-play* (F2P) and subscription models. Such models depict another source of recurring revenues (Woodside Capital Partners, 2015). Interestingly enough, the F2P model is via in-game purchases providing the bigger amount of total revenues.

Mobile games for smartphones and tablets have become the fastest growing segment of the video gaming industry. This is due to advances in technology, the emergence of new game models and the establishment of mobile selling platforms attracting casual and core gamers likewise as well as providing easy access for consumers and publishers to buy and sell new video games (Newzoo, 2017). As revenues of mobile games are generated digitally, this trend also affects the digitalization of the industry. Most mobile gamers opt for F2P material. On this account, major revenue streams do not stem from paid app downloads but from in-app purchases and ad income (IBIS Capital, 2016) the F2P user is usually exposed to when choosing the free version of a mobile game. When comparing the estimated annual spending of a mobile games player ($20) with the revenues from a PC ($50) or console player ($145), the share of mobile revenue seems relatively small. However, this picture changes in favor of the mobile segment, when taking into account the total number of players for each

device, with around 600 million PC gamers, 200 million for consoles and 1.75 billion for smartphones and tablets (Deloitte, 2016).

**Virtual and Augmented Reality** Experts in the video gaming industry agree on the development of virtual and augmented reality products (Digi-Capital.com, 2015) to become a mass consumer phenomenon in the nearer future. While Sony already delivers its PlayStation VR (Virtual Reality) accessories in 2016, the technology is still considered in its infancy. Several players along the value chain of the video game industry, including Ubisoft, are therefore expanding their research into the area, seeing also the applicability in other business areas. The whole virtual reality market including games, hardware and movie sales is estimated to grow at a CAGR of up to 164 percent until 2020.

**ESports** In eSports, the audience watches a tournament between amateur or professional gamers, who compete in MMO type games within many different genres. The tournaments are usually broadcasted live on platforms such as Twitch but have also become part of the digital program of major TV channels (Superdataresearch.com, 2016). In a recent example, the BBC Three channel showed highlights of the quarter-finals of the 2015 League of Legends World Championships on its website. In contrast to individuals recording and streaming their games, the eSports segment is already a highly profitable business as viewers are ready to pay for subscriptions, higher streaming quality and merchandise (Newzoo, 2017). The level of profitability is also reflected in the prize money of such tournaments, which totaled an estimated $71 million in 2015 and which can amount up to several million dollars for an individual team. Besides consumer related income, eSports revenues also stem from advertising, brand partnerships and investments into the business model and are in total expected to grow with a CAGR of 40.7 percent to $1,072 million in 2019. Major game publishers as well as experts in the streaming of sports events, including Activision Blizzard, Valve, and ESPN, have discovered the financial potential underlying the eSports space, and have made substantial investments in this business via M&As (Superdataresearch.com, 2016). In an attempt to catch up with its competitors, Ubisoft has recently started with a Pro League tournament for its *Tom Clancy's Rainbow Six Siege*, a successful MMO.

#### 7.1.1.5 Consumer Analysis

The type, gender, age and preferences of video game consumers have been changing since the start of the industry in the 20th century. This trend is still in progress and will shape the future potential of video games. By 2030, the median age of a global citizen will have grown from 29.6 to 33.1 years, and in the industry's current biggest market China from 37.0 to 43.2 years (United Nations, 2015). The age group between 45-50, which contains the first video gamers from the very start of the industry, presents a fast growing market. Companies may, therefore, have a great interest in increasing their focus on the middle and retirement age segment, as many of related members are expected to carry on gaming or first discover video gaming in their later years.

As more and more female users are entering the gaming market, primarily with casual and social games, it is essential for developers to align the characteristics of these games with the interest of this customer group. Although it is still the male players providing the highest amount of revenues for the video game industry, the rise of the mobile segment has narrowed the gap between male and female customers, with female gamers representing 39 percent of revenue, 48 percent of players, and 50 percent of game buyers (Woodside Capital Partners, 2015).

#### 7.1.1.6 Competitive Analysis

Companies in this sector face constant challenges as they have to deal with quickly developing technologies and changing consumer preferences. This environment combined with high competition requires the players to be fast and creative in replying to recent trends and tastes, while also having the necessary resources to deal with costly development and technological expenses. On this account, the mobile sector has lower entry barriers compared to other segments, and many small developers are releasing their gaming applications on the different existing app stores (Deloitte, 2016). However, the ongoing penetration of mobile devices in developing and emerging markets as well as the consumers preferring free-to-play material on their smartphones and tablets, are expected to further spur the competition about related revenue streams. In such a competitive environment, publishers face high marketing expenses which are necessary to increase the popularity of their product among myriad mobile games (Deloitte, 2016). Considering the high technological expertise needed for the PC and console market, as well as the increasing marketing expenses in order to excel in the mobile sector, the video game industry currently presents a high entry barrier environment.

In 2015, Ubisoft was the $9^{th}$ largest computer and video game publisher worldwide (Statista, 2016). Its direct competitors differ in size, financial resources, type of games and business model. Sony, Microsoft, and Nintendo, for instance, are next to their publishing business also leading in producing and selling of video game devices. However, Activision Blizzard, Inc. and Electronic Arts, Inc. are companies which reflect Ubisoft's business model of an independent developer, focusing primarily on the development, production, publishing and distribution of video games. Both are active in the same segments as Ubisoft.

In order to cope with this competitive and costly environment, Ubisoft developed capabilities to create AAA franchises organically by securing their independence and thereby maintaining creative procedures. In other words, the ability to develop new top franchises on an ongoing basis is Ubisoft's key competitive advantage and their new focus on MMO franchises proves their endeavor in following current market trends and outrun the competition with their originality.

### 7.1.2 Financial Due Diligence

Besides Ubisoft's commercial position in the market, we emphasize on its financial health. Therefore, we analyze Ubisoft's income statements, cash flow statements as well as balance sheets for the time

frame from FY13 to FY16. Following items within the three analyses will be analyzed due to its direct impact on the purchase price of Ubisoft's joint takeover and Ubisoft's ability to borrow as well as to pay down (future) debt:

1. The major scope of the income statement analysis lies on Ubisoft's revenue development and its profitability in terms of its gross- and EBITDA-margin. Note that we analyze the profitability in terms of the EBITDA-margin instead of its EBIT-margin due to Ubisoft's business activities lying in the software industry which is considered as a less asset-heavy industry. As a drawback, we leave depreciation and amortization expenditures out of scope. We however analyze capital expenditures in the cash flow analysis.
2. In the cash flow statement analysis, we concentrate on the cash flow to pay down debt and capital expenditures.
3. In our balance sheet analysis, we focus on working capital requirements, tangible and intangible assets as well as net debt.

#### 7.1.2.1 Income Statement Analysis

**Sales Analysis** Figure 7.3 illustrates Ubisoft's sales development from FY13 until FY16. Within the time frame of interest, Ubisoft increased its revenues with a 4-year CAGR of 2.6 percent. The global entertainment and media market, in contrast, rose by a CAGR of 5.3 percent (Statista, 2017). The relatively small growth is marked by a decline in the retail business segment with a CAGR of -3.8 percent which was offset thanks to a strong increase of the digital business segment with a CAGR of 31.8 percent. From this development, it becomes evident that the group currently transforms from

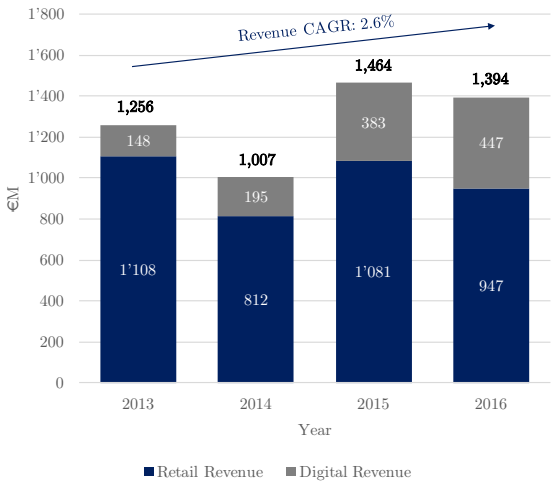


**Figure 7.3:** Sales Development of Ubisoft.

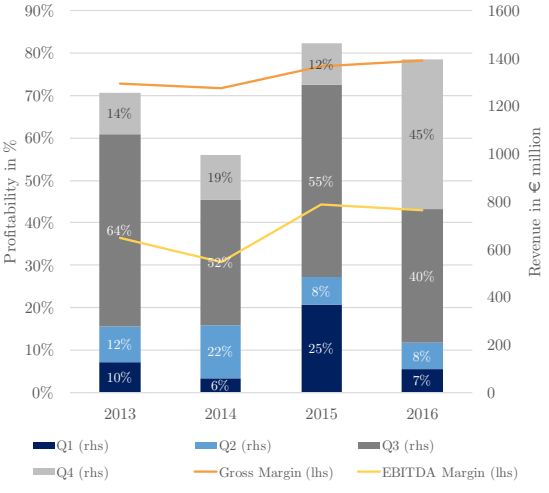


**Figure 7.4:** Quarterly Sales and Profitability Development of Ubisoft.

focusing on traditional PC and console games into the digital era of the entertainment and media market by expanding into online multi-player games, such as *Tom Clancy's Rainbow Six*.

In terms of sales by geographic region, Ubisoft is highly dependent on the US (47 percent of sales in FY16), UK (9 percent in FY16), France (8 percent in FY16) and Germany (8 percent in FY16). Despite a slight decline in total sales in every of these regions from FY15 to FY16 which was mainly driven by the decline of the retail business segment, Ubisoft could strengthen its market position in Asia/Pacific which increased from €122 million in FY15 to €199 million in FY16. Appendix 1 provides a more detailed overview of Ubisoft's sales by geographic region.

As can be obtained from figure 7.4, Ubisoft's business activities are of a highly seasonal nature: Yearly revenues are dependent on Q3 of Ubisoft's financial years which can be attributed to the Christmas sales period. One exclusion of this observation is the high share of Q4 in FY16 which is marked by the release of the games *Far Cry Primal* and *Tom Clancy's The Division*. The highly seasonal business activities of Ubisoft indicate that the group strongly bears the risk of a delay or poor start to the release of a flagship game. To mitigate this risk, Ubisoft continually strives to improve its development processes and its ability to create and launch new brands on a regular basis. As shown in the commercial due diligence, this is one of Ubisoft's competitive advantages: No other key competitor is able to market that many games with such a frequency.

**Profitability Analysis** Figure 7.4 also provides information on Ubisoft's profitability in terms of its gross- and EBITDA-margin from FY13 to FY16. The variations in Ubisoft's profitability are mainly driven by costs of goods sold (COGS) as well as operational expenses. As shown, Ubisoft increased its gross-margin from 72.72 percent in FY13 to 78.12 percent in FY16. This development underlines Ubisoft's transformation from traditional retail video gaming business to the digital business as sales in the digital business segment are usually more cost-efficient than retail sales[2]. The increase of Ubisoft's profitability in terms of its EBITDA-margin from 36.46 percent in FY13 to 43.01 percent in FY16 can mostly be explained by the increase of its gross-margin as operating expenses (total selling, general and administrative expenses) increased by a CAGR of 3.2 percent more than sales did by a CAGR of 2.6 percent. To analyze the development of operating expenses, we need to look at its different components shown in table 7.1.

It is notable that operating costs are mainly driven by R&D and marketing costs. Whereas marketing costs remained stable with a CAGR of 0.1 percent, R&D costs increased by a CAGR of 4.0 percent. R&D costs inclined especially from €433.9 million in FY14 to €580.6 million FY15 in order to successfully manage the technological changes within the gaming industry mentioned above. From FY15 to FY16, R&D expenses decreased again due to the launch of 4 top franchise titles in FY16 compared to 5 in FY15. The sharp increase in administrative and IT costs with a CAGR of 9.6 percent can be explained by higher structural costs in accordance with the integration of acquired studios, such

[2]The CAGR of COGS amounts to -2.9 percent.

| in €M | FY2013 | FY2014 | FY2015 | FY2016 | CAGR 4-Year |
|---|---|---|---|---|---|
| R&D Costs (Salaries, Payroll, Wage susidies and Rest) | 435.01 | 433.90 | 580.55 | 509.78 | 4.04% |
| Marketing Costs | 304.94 | 279.96 | 284.97 | 305.74 | 0.07% |
| Administrative and IT Costs | 81.36 | 83.27 | 100.05 | 117.30 | 9.58% |
| **Total selling, general and administrative expenses** | **821.31** | **797.13** | **965.57** | **932.81** | **3.23%** |

**Table 7.1:** Operating Expenses of Ubisoft.

as *Ivory Tower* studio concentrating on online games and certain assets of *Longtail Halifax* studios focusing on mobile games.

#### 7.1.2.2 Cash Flow Statement Analysis

Table 7.2 provides information on the cash flows from operating, investing and financing activities as well as the cash flow before debt paydown. The latter is of special interest for PE firms in order to analyze Ubisoft's ability to pay down its debt with its level of cash flows. Note that the reported cash flows are net of overdrafts. Thus, they differ to the YoY increase/decrease of cash levels. As can be obtained, the cash flow before debt paydown decreased from €389.6 million in FY15 to €-249.6 million in FY16 and is driven by a decline in all cash flow classifications.

The decline in cash flows from operating activities is strongly driven by higher working capital requirements in line with the launches of the games *Far Cry Primal* and *Tom Clancy's The Division* in Q4 FY16 in contrast to Q4 FY15 when no games were launched. These observations are thus aligned with our earlier observation of a higher importance of revenues in Q4 FY16 compared to previous years.

Whereas the decline of cash flow from investing activities is mainly driven by higher payments for internal and external developments in line with the digitalization Ubisoft's business, the decline of cash flows from financing activities can be explained by the fact that Ubisoft took on less debt in FY16. Both are driven by the acquisition of the Ivory Tower studios mentioned above (Ubisoft took on more debt in FY15 in order to fund the acquisition of Ivory Tower studios).

**Capital Expenditures Analysis** Table 7.3 provides information on Ubisoft's capital expenditures into property, plant and equipment and capitalized intangible assets. According to management information in annual reports, goodwill and brands are not capitalized. Thus, we adjusted intangible

| in €M | FY2013 | FY2014 | FY2015 | FY2016 |
|---|---|---|---|---|
| Total Cash Flow generated by operating activities | 402.85 | 290.86 | 654.08 | 340.71 |
| Net cash used in investing activities | -393.63 | -457.53 | -481.33 | -531.87 |
| Net cash generated from financing activities | 29.20 | 169.17 | 183.98 | -51.64 |
| **Net increase/(decrease) in cash and cash equivalents, net of overdrafts** | **38.42** | **2.50** | **356.72** | **-242.81** |
| **Net increase/(decrease) in cash and cash equivalents, before overdrafts** | **62.00** | **0.24** | **418.72** | **-195.29** |
| **Cashflow before debt paydown** | **43.20** | **-13.90** | **389.59** | **-249.59** |

**Table 7.2:** Cash Flow Statement of Ubisoft.

| in m | FY2013 | FY2014 | FY2015 | FY2016 |
|---|---|---|---|---|
| Revenue | 1,256.00 | 1,007.00 | 1,464.00 | 1,394.00 |
| Tangible Assets (PPE) | 46.49 | 56.74 | 80.98 | 83.95 |
| Capitalized intangible assets | 459.98 | 519.64 | 491.10 | 571.47 |
| Total Capitalized Assets | 506.46 | 576.38 | 572.08 | 655.41 |
| Delta Capitalized Assets | 33.77 | 69.92 | -4.30 | 83.33 |
| Depreciation and Amortization | 370.25 | 407.11 | 510.96 | 462.80 |
| **Capital Expenditures** | **404.02** | **477.03** | **506.67** | **546.13** |
| % of Sales | 32.17% | 47.37% | 34.61% | 39.18% |

**Table 7.3:** Capital Expenditures of Ubisoft.

assets for these items[3]. As there is no information given over the split of depreciation and amortization of tangible and intangible assets, we cannot analyze capital expenditures into these asset groups. However, bounded capital into capitalized intangible assets is much higher than into tangible assets. Thus, it is viable to assume that investments into intangible assets are higher than into tangible assets. This is typical for firms operating in the software entertainment and gaming industry as Ubisoft needs to invest heavily into its commercial software rather than items such as land, facilities or infrastructure in order to manufacture its products.

Further, it can be obtained that Ubisoft's capital expenditures exceeded depreciation and amortization. One exception to this observation was FY15 due to the high removals from assets of software for which the net book value was zero at the end of the year. Nevertheless, the overall exceedance in FY13, FY14, and FY16 shows Ubisoft's willingness to grow and expand its business.

#### 7.1.2.3 Balance Sheet Analysis

**Working Capital (WC) Analysis** In order to analyze Ubisoft's ability to cover short-term liabilities by its WC requirements, we adjust net working capital (NWC). Therefore, we exclude non-operating items, such as current financial assets and liabilities and cash and cash equivalents from NWC (New York Stern School, 2017)[4] from NWC to derive the net operating working capital (OWC). We do so as these items do not indicate Ubisoft's ability to convert its day-to-day operations into cash inflow. The OWC, in contrast, shows Ubisoft's capacity to convert trade receivables into cash and the allowance to pay suppliers a long time after receiving upstream products such as CD-ROMS. Figure 7.5 provides information on the OWC development of Ubisoft.

The OWC for FY13 until FY15 is negative whereas it is positive in FY16 again with 14.6 percent of sales. On the one hand, the negative OWC in the past could indicate that Ubisoft faces liquidity problems and is thus not able to pay its suppliers. On the other hand, it could be considered that Ubisoft is able to generate cash very quickly from its customers before it has to pay its suppliers.

[3] Appendix 6 provides more detailed information on the derivation of capitalized intangible assets.
[4] Appendix 8 indicates the high difference between NWC and OWC.

Due to the high cash and cash equivalents position in the past, we believe Ubisoft is not facing any liquidity problems and is managing its OWC requirements well. The exclusion of a positive OWC in FY16 can, as already shown in the sales and cash flow analysis above, be explained by the late release of the flagship games *Far Cry Primal* and *Tom Clancy's The Division* in Q4 FY16: Ubisoft accounted sales from these games but could not convert it into cash until the end of Q4 FY16 which led to a sharp increase in trade receivables.

These observations are linked to the cash conversion cycle (CCC), which indicate the average days it takes Ubisoft to convert bounded capital into cash: The CCC is defined as the days of sales in accounts receivables (DSO) plus days of COGS in inventory (DIO) minus days of COGS in accounts payables (DPO). Figure 7.6 illustrates the development of Ubisoft's CCC. As can be obtained, Ubisoft's CCC is negative for the entire time period of interest. From FY13 to FY15, the DSO were extremely low accompanying with a long period of DPO leading to the negative CCC. The observation that Ubisoft was not able to turn its sales into cash from the newly released games in Q4 FY16 is supported by a highly increased level of DSO in FY16. However, Ubisoft outbalanced the increase of DSO by keeping its relatively low level of DIO and extending the time to pay its suppliers even more than they already did in the past (measured by DPO). In other words, this indicates that Ubisoft sold a high amount of the above-mentioned flagship games to retail stores leading to a relatively low amount of stored games in inventory and a high amount of upstream products not having paid yet. This observation also shows that the games *Far Cry Primal* and *Tom Clancy's The Division* are rather sold through the retail channel (which is a B2B segment) than the digital channel (which is a B2C segment) in Q4 FY16: In contrast to B2C industries, customers in the B2B business do not have to pay their bills immediately by cash or credit card. Nevertheless, as Ubisoft is currently transforming its activities from retail to digital where less OCW may be required due to its B2C nature, it can be expected that the overall OCW requirements, as well as its CCC, will further shrink in the future. Although

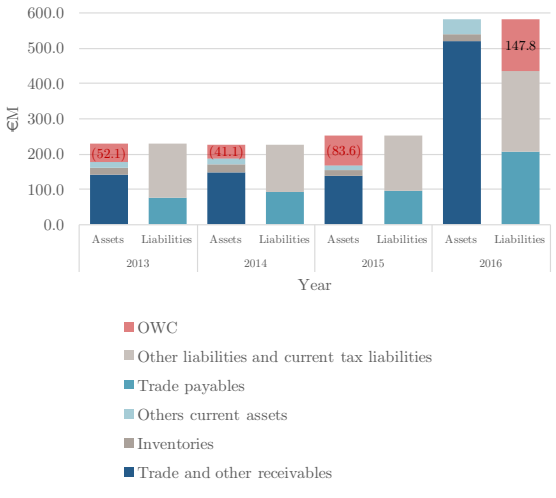


**Figure 7.5:** Net Operating Working Capital of Ubisoft.

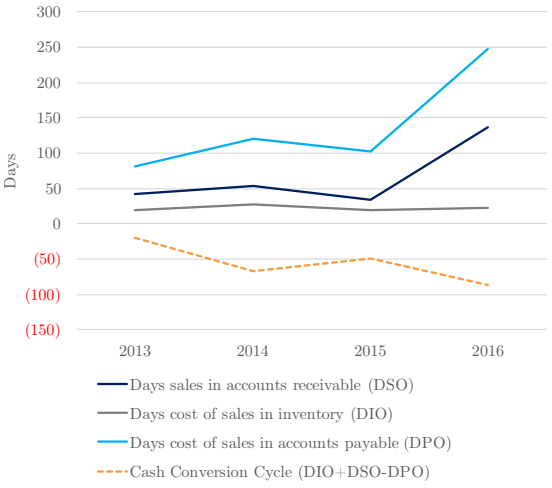


**Figure 7.6:** Cash Conversion Cycle of Ubisoft.

information about quarterly OCW requirements is not provided by Ubisoft, it is viable to assume that Ubisoft's OCW requirements are, as seen above, not only high prior to the launch of flagship games but also high in the busy Christmas season in the third quarter of the financial year.

Summarizing, the amount of cash on hands Ubisoft needs to finance its OCW requirements may highly differ within the year: Prior to releases of its flagship games as well as in the third quarter of each year, Ubisoft may have higher needs to finance its OCW requirements than in other seasons of the year. Nevertheless, Ubisoft does not face high costs of inventory finance as it is able to turn the sale of its games into cash before they pay the bills for upstream products delivered by its suppliers. Due to the transformation from retail to digital, it can be expected that the overall level of cash needed to finance its inventory may even decrease in the future.

**Asset Base Analysis** Table 7.4 provides information of tangible assets (property plant and equipment) and intangible assets to the total asset balance of Ubisoft. Ubisoft has a relatively strong asset base with slightly less than 60 percent tangible and intangible assets of the total asset balance in FY13 and FY14. The decrease in tangible and intangible assets to the total asset balance in FY15 and FY16 is driven by holding a high cash position in FY15 prior to the takeover of Ivory Tower studios in early FY16 and by high OCW requirements in Q4 FY16 due to the release of the flagship games *Far Cry Primal* and *Tom Clancy's The Division* mentioned above.

**Net Debt Analysis** In an LBO, the company's existing debt is usually paid off and refinanced. Therefore, we further analyze Ubisoft's net financial debt. Net financial debt is the sum of current financial liabilities and non-current liabilities less cash and cash equivalents and high-liquid current financial assets. Ubisoft's net debt fluctuates around zero and was €93.6 million with a Gearing Ratio (Net Debt/Equity Book Value) of 9.2 percent in FY16. To deeply analyze Ubisoft's financial health, we acknowledge that a thorough analysis of Ubisoft's gearing in comparison with its peer is needed. Due to the scope of this case study, we however prefer to analyze Ubisoft's net debt to EBITDA ratio which indicates how many years it takes Ubisoft to pay back its debt. A negative ratio indicates that Ubisoft could pay down its debt immediately. As can be obtained, Ubisoft's net debt to EBITDA

| in m | FY2013 | FY2014 | FY2015 | FY2016 |
|---|---|---|---|---|
| Property, plant and equipment | 46.49 | 56.74 | 80.98 | 83.95 |
| Intangible assets | 693.13 | 736.86 | 702.13 | 753.80 |
| Other non-current assets | 97.18 | 119.79 | 139.12 | 126.53 |
| **Total non-current assets** | **836.80** | **913.39** | **922.23** | **964.27** |
| **Total current assets** | **420.64** | **425.93** | **830.14** | **1,056.56** |
| **Total asset balance** | **1,257.44** | **1,339.32** | **1,752.37** | **2,020.83** |
| % Tang. and Intangible assets/Total asset balance | 58.82% | 59.25% | 44.69% | 41.46% |

**Table 7.4:** Tangible and Intangible Assets of Total Asset Balance of Ubisoft.

| in €M | FY2013 | FY2014 | FY2015 | FY2016 |
|---|---|---|---|---|
| **Assets:** | | | | |
| Cash and cash equivalents | 237.70 | 237.95 | 656.66 | 461.38 |
| Current financial assets | 6.85 | 1.53 | 4.92 | 13.78 |
| **Total current financial assets** | **244.55** | **239.48** | **661.58** | **475.16** |
| **Liabilities:** | | | | |
| Current financial liabilities | 108.76 | 189.32 | 183.23 | 228.22 |
| Total current liabilities | 108.76 | 189.32 | 183.23 | 228.22 |
| Provisions | 5.67 | 4.30 | 7.50 | 8.89 |
| Employee benefit liabilities | 3.00 | 3.72 | 5.43 | 6.62 |
| Non-current financial liabilities | 24.46 | 63.44 | 275.74 | 277.38 |
| Deferred tax liabilities | 49.18 | 40.96 | 48.94 | 47.65 |
| **Total non-current liabilities** | **82.31** | **112.41** | **337.61** | **340.54** |
| **Total Liabilities** | **191.06** | **301.74** | **520.84** | **568.76** |
| | | | | |
| Net Debt | -53.5 | 62.3 | -140.7 | 93.6 |
| Net Debt/EBITDA | -11.68% | 20.14% | -21.63% | 15.61% |
| Gearing Ratio (Net Debt/ Equity Book Value) | -6.38% | 7.69% | -14.37% | 9.19% |

**Table 7.5:** Net Debt of Ubisoft.

ratio fluctuates around zero and amounts to 15.6 percent in FY16. This signals Ubisoft's financial health and underlines that it is able to pay down its debt relatively quickly.

## 7.2 Operational Value Creation through Joint Acquisition

To create value out of the joint acquisition, we utilize almost all methods discussed in chapter *3 Literature Review of Financial and Strategic Investors* - namely financial, operational, and governance engineering or synergies. Here, in the operational model, we can develop Ubisoft's operational improvements which serve as a foundation of the assumption analysis of the investment model after completing the due diligence of the target by looking into both commercial and financial developments and trends. Since we are dealing with a joint acquisition and not a sole LBO, we also need to focus on potential operational synergies between the target and the strategic investor. We discuss the operational improvement (also potential results of synergies) in the following sections as they can affect the profitability of Ubisoft through revenue growth, cost reduction, or higher capital efficiency. Thus, we are planning four key business model improvements which we expect to affect future profits of Ubisoft:

- Expansion of customer base
- Diversification of product mix
- Increasing penetration with MMO game market
- Using economies of scale in production and administration

**Expansion of Customer Base** As the mid- and older- aged group of gamers represents not only a fast growing market but also 29 percent of all gamers, we aim to attract this group of customers directly in the future without losing any focus on the current and another aged group of gamers. An increased marketing activity is expected to be sufficient to attract mid- and older aged group of gamers. We do so as marketing activities have always proved to be the most efficient way in attracting new customers in the gaming industry. As the mid- and older aged gamers contain the first video gamers from the start of the industry, games do not need to be adjusted in content to make them more attractive for this kind of customer group. As no additional employees are needed to understand and satisfy the needs of this customer group, R&D costs are not significantly affected by these goals to increase customer base.

The current market trend of a rising interest of females in gaming is a solid basis to increase the female customer basis. Important to notice is that the female gaming population is mainly located in the mobile gaming sector with a focus on *social and casual* games. Thus, to leverage the current market trend, an extension of activities in the overall growing sector of mobile games is necessary. Despite the high amount of free-to-play mobile games that do not have an immediate and direct effect on the revenues of Ubisoft, indirect effects through an increased brand awareness and an increased potential for cross-selling activities for newly attracted female customers are expected to be observable. While Ubisoft is already successful with its AAA content on TV and console devices, a generally increased mobile presence may additionally match the preference of both female and male gamers to have their games available on different devices. Marketing activities may further make the female population aware of Ubisoft's increased focus in the sector of mobile games. Apart from marketing expenses, R&D costs for mobile games are not expected to be affected: First, Ubisoft already has experience in developing mobile games. Second, it invested in mobile infrastructure by acquisitions, i.e. Future Games of London. Finally, Activision Blizzard's other recent acquisition, King Digital Entertainment, is a specialist in that area. King Digital Entertainment has, for instance, developed the *Candy Crush Saga*, which is mostly favored by female gamers. Furthermore, development and sales cost within the mobile gaming sector is not as cost-intense as the development of other console games (MarketLine, 2016).

**Diversification of Product Mix** The current market observation of an increase in connectivity of consoles and PC yearn for a favorable outlook of downloading games and the digitalization in the video gaming industry. This trend boosts console and PC game downloads (and consequently, console and PC game sales) while further increasing the digital share of revenues. The mere expansion of full-game download offerings of Ubisoft in the future are expected to create further demand and thus may lead to a new significant revenue stream. As a drawback, however, it may thereby reduce retail sales. With further extra content for the downloaded games, the digital generated returns can be further levered. With $925 million revenues created through the sale of extra content. The stronger focus of downloading activities (digital sales) is more cost efficient than sales in the retails segment

as it requires less time in development. Furthermore, through more digital sales Ubisoft will be able to collect cash even quicker as digital B2C business requires immediate payment of online purchase increasing the capital efficiency of Ubisoft even further. More digital sales will also help to smooth the seasonality of Ubisoft's revenues since casual (mobile) games do not follow the typical seasonality with holidays. We are aware that there are still some gamers, who still perceive digital games as critical because they destroy the used game market and eliminate game sharing and game collection. However, we expect these doubts to be gone soon, as most of the digital downloads will allow the gamers to pre-load titles ahead of release and purchase extra-items and facelifted versions in between releases. Besides the increased offerings for video game downloads, Ubisoft already participates in recent activities in the field of virtual reality (VR). Following its CAGR of 164 percent until 2020, the speed in developing VR is of essence and Ubisoft needs to be able to keep up the growth momentum by continue developing VR games. Following, Ubisoft has published its first three VR games recently: *Werewolves Within*, *Eagle Flight*, and *Trackmania TM Turbo*. In order to continue riding the crest of the virtual reality wave and thereby creating a new significant revenue stream, it is essential to keep investments into activities of VR on a level comparable to the previous years. As Activision Blizzard is eager to increase its share in VR, Ubisoft's current products and capabilities are as of high interest of the strategic investor.

**Increasing Penetration of MMO Game Market** An increased focus on eSports - following another market trend - is expected to not only be a mean to catch up with the competitors but also boosts brand awareness and revenues. Ubisoft aims to achieve revenue growth as the sale and the online use of the game played in the tournament, e.g. *Tom Clancy's Rainbow Six Siege* on Ubisoft's current Pro League tournament, automatically increases along the course of the eSports tournament. As MMO franchises are a good fit for eSports and Activision Blizzard also has its own eSports leagues for the MMO hits like *Overwatch*, Ubisoft's recent focus on MMO games can be exploited even stronger. The two MMO games Ubisoft has published in FY16 proves its efforts in gaining shares of the MMO market. MMO games earned roughly 60 percent of all digital PC game revenues in 2016 (Superdataresearch.com, 2016). This is another indication of the strong trend towards digital returns and the increasing importance of MMO games in the future. Therefore, this focus is expected to generate as well as support the growth of digital revenues.

**Using Economies of Scale in Production and Administration** As common in a merger of two companies within an industry, when operations of Activision Blizzard and Ubisoft are combined, economies of scale arise as shown in section *3.2.3.3 Operational Engineering and Synergies*. This directly affects the COGS and operational (SG&A) expenses of both firms. COGS may be reduced when i.e. contracts with suppliers can be renegotiated due to increasing bargaining power. On the contrary, reduction of SG&A expenses can be realized by combining administrative departments as well as R&D departments. Nevertheless, as shown in section *3.2.3.3 Operational Engineering and Synergies*, synergies from integration cannot be realized immediately after the takeover: This process may depict

a lengthy and costly process. We however believe that synergies in COGS can be realized quicker than in operational expenses. We do so as negotiating with labor unions on pension plan strategies of the administrative staff may take much higher efforts than renegotiating supplier contracts (Mathys and Burack, 1993).

## 7.3 Assumption Analysis

The assumption analysis serves as the important basis for the investment model. This section first bundles information from the due diligence and the activities to boost profitability, and then, transforms this information into quantitative assumptions and impacts on the *pro-forma income statement*, *cash flow statement*, and *balance sheet* in three *operating scenarios*: The equity, base and stress case.

### 7.3.1 Operating Scenarios

We distinguish between three different operating scenarios: a base case, an equity case, and a stress case. The overall outlook in the base case is positive due to an overall growing gaming market. This scenario assumes that Ubisoft is able to get a moderate share of the positive market development. The equity scenario assumes a highly positive development of activities in virtual reality, as this field provides the highest CAGR until 2020 out of all business segments. The equity case is also driven by an extraordinarily positive development in the business with MMO games and downloadable content in general. The stress case assumes exactly the opposite and is further affected by both a general economic downturn, which leads to unfavorable changes in public, as well as unexpected internal difficulties in the management of Ubisoft. Note that we focus on the base case scenario in the following. For a detailed presentation of the operational model, see Table 7.6.

### 7.3.2 Income Statement Assumptions

**Revenue Assumptions** The YoY growth in 2016 for the video gaming industry was 8.5 percent (Newzoo, 2017). As we see Ubisoft in combination with Activision Blizzard among the well-performing firms, expected sales growth is slightly higher than the industry average. The total revenue to growth forecasts is at a rate of 9.5 percent in the first and decline steadily to 7.3 percent until FY22 in the base case. The equity and stress cases differ each by $\pm$ 2.5 percent, respectively. The total revenue is a result of two revenue sources: retail and digital. The latter includes all revenues generated through digital channels, such as digital game sales for console players or in-game purchases. On the other hand, retail revenues are all revenues generated by the sale of physical products such as CD-ROMS or merchandising. As already mentioned, the video gaming industry is experiencing an intense stage of digitalization of distribution channels. Further, we believe that the combination of Ubisoft and Activision Blizzard is in a strong position to successfully expand its customer base by diversifying its product mix as well as transform its business activities into the digital era of the video gaming industry. Thus, when comparing our expectations for retail and digital revenues, a clear difference can

be observed. In the first year, retail revenues are expected to grow at a rate of 5.5 percent. Contrary, digital revenues are expected to grow at a rate of 18 percent. Both growth rates decline steadily, however, while retail revenues stagnate at 2.5 percent growth after FY20, digital revenues decline to 13 percent in FY22.

**Expenses Assumptions** Due to an overall increased focus on downloading and mobile games, we expect the contribution of digital sales to total revenues to increase along the course of our investment. As digital games and downloads come with a lower cost of sales and increase the overall cost-efficiency of the sales process, we expect the cost of sales not to grow as fast as revenues. Therefore, we assume that the COGS to sales ratio will be at a slightly lower level of 21 percent for the first two years before synergies enable a decline to 20 percent after FY19 in the base case.

Operational expenses are expected grow in absolute amount as the complexity of games and the need for technology increases. This requires continuing adjustments of the skills and capabilities of the development teams to recent technological trends. When looking at the operational improvements to

| **€M** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **CAGR 2016-2021** |
|---|---|---|---|---|---|---|---|---|---|---|
| Retail Revenue | 812.0 | 1081.0 | 947.0 | **999.1** | 1044.0 | 1080.6 | 1107.6 | 1135.3 | 1163.7 | |
| % Growth | -26.7% | 33.1% | -12.4% | **5.5%** | 4.5% | 3.5% | 2.5% | 2.5% | 2.5% | 3.7% |
| Digital Revenue | 195.0 | 383.0 | 447.0 | **527.5** | 617.1 | 715.9 | 823.2 | 938.5 | 1060.5 | |
| % Growth | 31.8% | 96.4% | 16.7% | **18.0%** | 17.0% | 16.0% | 15.0% | 14.0% | 13.0% | 16.0% |
| Total Revenue | 1007.0 | 1464.0 | 1394.0 | **1526.5** | 1661.2 | 1796.5 | 1930.8 | 2073.8 | 2224.2 | |
| % Growth | -19.8% | 45.4% | -4.8% | **9.5%** | 8.8% | 8.1% | 7.5% | 7.4% | 7.3% | 8.3% |
| Cost of Goods Sold | -285.3 | -337.1 | -305.1 | **-320.6** | -348.8 | -359.3 | -386.2 | -414.8 | -444.8 | |
| % Sales | 28.3% | 23.0% | 21.9% | **21.0%** | 21.0% | 20.0% | 20.0% | 20.0% | 20.0% | 6.3% |
| Operating Expenses | -412.6 | -476.3 | -489.3 | **-595.4** | -647.9 | -646.7 | -656.5 | -663.6 | -667.3 | |
| % Sales | 41.0% | 32.5% | 35.1% | **39.0%** | 39.0% | 36.0% | 34.0% | 32.0% | 30.0% | 6.3% |
| EBITDA | 309.1 | 650.6 | 599.6 | **610.6** | 664.5 | 790.4 | 888.2 | 995.4 | 1112.1 | |
| % Sales | 30.7% | 44.4% | 43.0% | **40.0%** | 40.0% | 44.0% | 46.0% | 48.0% | 50.0% | 10.7% |
| Depreciation & Ammortisation | -407.1 | -511.0 | -462.8 | **-503.8** | -548.2 | -592.8 | -637.2 | -684.4 | -734.0 | |
| % Sales | 40.4% | 34.9% | 33.2% | **33.0%** | 33.0% | 33.0% | 33.0% | 33.0% | 33.0% | 8.1% |
| Capex | -477.0 | -506.7 | -546.1 | **-549.6** | -598.0 | -646.7 | -695.1 | -746.6 | -800.7 | |
| % Sales | 47.4% | 34.6% | 39.2% | **36.0%** | 36.0% | 36.0% | 36.0% | 36.0% | 36.0% | 6.5% |
| Net Operating Working Capital | -41.1 | -83.6 | 147.8 | **-150.6** | -163.9 | -170.8 | -183.6 | -197.2 | -211.5 | |
| % Sales | -4.1% | -5.7% | 10.6% | **-9.9%** | -9.9% | -9.5% | -9.5% | -9.5% | -9.5% | |
| Change | N/A | -42.5 | 231.4 | **-298.4** | -13.3 | -6.9 | -12.8 | -13.6 | -14.3 | -197.8% |
| | | | | | | | | | | |
| ***Current operating assets*** | | | | | | | | | | |
| Trade and Other Receivables | 148.1 | 137.8 | 520.6 | **142.2** | 154.7 | 167.3 | 179.9 | 193.2 | 207.2 | |
| *Days Sales Outstanding* | *53.7* | *34.3* | *136.3* | ***34.0*** | *34.0* | *34.0* | *34.0* | *34.0* | *34.0* | |
| Inventories | 21.3 | 18.4 | 19.4 | **17.6** | 19.1 | 19.7 | 21.2 | 22.7 | 24.4 | |
| *Days Inventory Outstanding* | *27.3* | *20.0* | *23.2* | ***20.0*** | *20.0* | *20.0* | *20.0* | *20.0* | *20.0* | |
| Current tax assets | 17.0 | 12.4 | 41.5 | **27.5** | 29.9 | 32.3 | 34.8 | 37.3 | 40.0 | |
| *as % of sales* | *1.69%* | *0.85%* | *2.97%* | *1.80%* | *1.80%* | *1.80%* | *1.80%* | *1.80%* | *1.80%* | |
| **Total current assets** | **186.4** | **168.6** | **581.4** | **187.2** | **203.8** | **219.4** | **235.8** | **253.2** | **271.6** | |
| | | | | | | | | | | |
| **Current operating liabilities** | | | | | | | | | | |
| Trade payables | 93.6 | 94.9 | 206.2 | **131.7** | 143.4 | 147.7 | 158.7 | 170.4 | 182.8 | |
| *Days Payables Outstanding* | *119.8* | *102.8* | *246.8* | ***150.0*** | *150.0* | *150.0* | *150.0* | *150.0* | *150.0* | |
| Other liabilities and current tax liabilities | 133.9 | 157.2 | 227.3 | **206.1** | 224.3 | 242.5 | 260.7 | 280.0 | 300.3 | |
| *as % of sales* | *13.30%* | *10.74%* | *16.31%* | *13.50%* | *13.50%* | *13.50%* | *13.50%* | *13.50%* | *13.50%* | |
| **Total current liabilities** | **227.5** | **252.2** | **433.6** | **337.8** | **367.6** | **390.2** | **419.4** | **450.4** | **483.1** | |
| | | | | | | | | | | |
| **Total operating working capital** | **-41.1** | **-83.6** | **147.8** | **-150.6** | **-163.9** | **-170.8** | **-183.6** | **-197.2** | **-211.5** | |
| Change in total operating working capital | | -50.85% | -156.54% | **-201.86%** | 8.82% | 4.24% | 7.48% | 7.40% | 7.25% | |

**Table 7.6:** Operational Model of the Joint Acquisition of Ubisoft.

create value, we can expect the R&D costs to go up as approaching newer areas such as MMO games and female gamers are costly, which further may rise marketing costs. Furthermore, the operating expenses also include the post-merger integration costs in SG&A, which will merit in cost savings after a certain amount of time. The increase in the short-run is however mainly driven by higher pension expenses as outlined above.

Despite increases in expenses in the short-run, it is expected that they are outbalanced by rising effects of synergies, i.e. reduction of SG&A (such as administrative and IT costs), as well as effects of digitalization of the industry in the long-run.

Thus, the expected operating expenses to sales ratio will be at 39 percent for the first two years slightly higher than the average of the last three years which was at 36 percent. However, as we expect the synergy effects to strike, operating expenses' share in sales are expected to decrease steadily down to 30 percent in FY22.

**Profitability Assumptions** The above derivations lead to an EBITDA margin of 40 percent FY17 and FY18, which is lower compared to the previous two years as initial integration effects arise. As we expect synergy effects to strike after two years, we forecast an increasing EBITDA margin from 44 percent in FY19 to 50 percent in FY22.

### 7.3.3 Cash Flow Statement Assumptions

We assume investments in tangible assets, such as PP&E, and intangible assets, such as commercial software (games), to further grow in the future due to the overall increasing complexity in development processes. These two items will mainly contribute to our assumed overall increase in capital expenditures in the future. As we expect synergies (i.e. mutual usage of PP&E or complementary capabilities in development) in capital expenditures of the strategic investor and Ubisoft, we take a total capital expenditure to sales ratio of 36 percent - slightly less than the 3-year average (40 percent). With revenue growth and expanding games portfolio an increase of absolute depreciation and amortization will come along. However, the relative share of D&A to sales is expected to stay at a constant level of 33 percent, slightly less than the years before. Note that we assign 80 percent of CapEx invested in the item goodwill and intangible assets due to Ubisoft's asset base relying more on intangible assets than tangible assets.

Following, capital expenditures are still higher than the D&A to sales to ensure growth. By taking the average of the last 2 years, we also account for the fact that capital expenditure is driven to a certain degree by the nature of the industry, meaning that we cannot make significant changes in capital expenditures.

### 7.3.4 Balance Sheet Assumptions

In order to indicate the development of Ubisoft's trade receivables, inventory and trade payables, as part of the OWC, we base our assumptions on the days in accounts receivables (DSO), days inventory outstanding (DIO), and days payables outstanding (DPO). Due to a more thorough focus on digital distribution channels, which is typically a B2C business, we expect to turn sales more quickly into cash as customers pay directly after purchase. We see the DSO in FY16 of 136 as an exception because of the late release of the two flagship games as mentioned above. Thus, we expect the DSO on a slightly lower level than in FY15 amounting to 34 days. The same rationale applies to DIO, which is also at the level of FY16 amounting to 20 days. By the mutual position of Activision Blizzard and Ubisoft in the supplier market, they gain higher market power. Consequently, by utilizing their bargaining power towards supplier, Ubisoft should be able to increase the DPO to 150 days.

Current tax assets as well as other and current tax liabilities represent the average of the last 3 years and do not differ for the different operating scenarios, as we cannot influence these items by operative activities. The averages equal to 1.8 percent and 13.5 percent, respectively.

## 7.4 Joint Acquisition Model (PE-View)

As shown in section *5.2 Methods in the Qualitative Study*, we base the investment model on a leveraged buyout analysis due to our more thorough interest into PE investors highlighted in our research question. The analysis is conducted under consideration of a joint acquisition in order to investigate differing rationales of investors. Hence, we first calculate the funding needed to overtake the company; second, have a look at the sources available to come up with this amount; and finally, calculate the internal rate of return at which we arrive when combining our selected financing structure with the above-mentioned growth assumptions. The internal rate of return is further discussed based on different exit strategies of the PE investor we highlight.

### 7.4.1 Uses of Funds

With regard to the funding, we calculate the required amount by determining the uses of funds, the sum of equity purchase price, Ubisoft's current debt amount, and the fees that are related to the investment deal. Table 7.7 provides an overview of the uses of funds.

**Equity Purchase Price and Goodwill** To derive the enterprise value, we first use the trading comparables method to compute the EV/EBITDA multiple of comparable companies in three tiers categorized by size. As shown in section *5.2 Methods in the Qualitative Study*, the comparable companies are based on CapitalIQ's "Quick Comps" algorithm. Tier 1 includes the large-cap companies Activision Blizzard, Inc. and Electronic Arts, Inc., whereas Tier 2 and Tier 3 consists mid and small

| | €M |
|---|---|
| EBITDA ('16) | 610.62 |
| Multiple | 8.27 |
| Enterprise Value | 5,004.03 |
| Existing Debt | 568.76 |
| Equity Acquisition Cost | 4,435.27 |
| *Fees for Financing (2% of Ext. Debt)* | *46.74* |
| Fees | 46.74 |
| Total Uses | 5,050.77 |

**Table 7.7:** Uses of Funds.

cap companies, respectively. The median multiple derived from the comparables is 7.08x and a detailed table of the analysis can be found in appendix 7. Note that we use the median to account for outliers.

Secondly, as already discussed above, we need to identify the price premium of an acquisition of Ubisoft. On this account, we calculate an average price premium of comparable transactions in the information technology industry: The comparable transaction sizes are based on the transaction database we established in section *6.1.1 Estimating Missing Transaction Size Data* by the Heckman procedure and can be obtained from appendix 9. Note that we only consider public firms as comparable acquired firms as, first, Ubisoft is also a public traded firm and, second, we need to subtract traded market values (which are only available for public firms) from the transaction sizes in order to impute the price premiums of the deals. Dividing the price premium by the transaction size yields the price premium in percent of the paid transaction size. The average of comparable deals amounts to 21.85 percent. On this price premium, we consider a discount of 5 percent leading to a price premium of 16.85 percent. We incorporated a discount due to following two reasons:

1. In the introduction of this case study, we have seen that Ubisoft is exposed to a hostile takeover of Vivendi SA. The management, which still consists of the Guillemot brothers who founded Ubisoft, believes that an entertainment conglomerate would harm the business. Thus, they may prefer another video gaming publisher or a financial investor as an investor and provider of know-how that may be more beneficial to Ubisoft's business activities. This observation is, as shown in section *3.2.3.1 Financial Engineering and Synergies*, further in line with Tappeiner et al.'s (2012) observation of family firms be willing to raise capital in order to gain access to non-financial resources.

2. By mutually joining forces in a competitive auction process, Activision Blizzard and the PE investor decrease the overall competition to take over Ubisoft. A lower overall degree of competition could lead to a decreased price premium, as shown in section *3.3.2 Price Premia* (Gorbenko and Malenko, 2014).

Adding the above price premium on the trading multiple leads to a purchase EBITDA multiple of 8.27x. Note that the difference between Ubisoft's equity value and the calculated purchase price enters in the company's balance sheet. Due to simplicity, we model goodwill and intangible assets as one item although we acknowledge that it is more appropriate to differentiate between them. This is because intangible assets are amortized on a fixed schedule, tagging along potential tax deductions for the company (KPMG, 2010).

**Refinancing of Existing Debt** Another use we should consider is refinancing existing debt of Ubisoft. At the point of closing the deal, we pay back all debt related positions of Ubisoft's balance sheet in order to remove any financial covenant or other limitation, which may not fit Ubisoft's ex-post capital structure. These positions, amounting to €568.8 million and to a Debt/EBITDA multiple of 1.00x[5], respectively, comprise current and non-current financial liabilities. We further assume that no call or tender premiums have to be paid when repaying the existing debt.

**Financing Fees** In section *3.2.1.1 Structure of the Financial Investor (Private Equity Firm)*, we discussed different fee schemes of PE partnerships: We do not incorporate fees that Ubisoft has to pay to the fund as it is immaterial whether the proceeds originate from fees or exit returns. However, there are fees we should consider while taking over Ubisoft, namely financing fees. Financing fees refer to the costs of closing a debt contract and primarily depend on the principal amount and level of risk of a respective facility (Pignataro, 2014). For the sake of simplification, we assume total transaction fees of 2 percent of raised debt which amounts to €46.7 million. Note that we discuss raising external debt in the next part of this chapter.

### 7.4.2 Sources of Funds

In order to acquire Ubisoft and refinance its capital structure, we draw on internal as well as external sources. We allocate sources by the use of EBITDA-multiples. Thus, the allocation needs to sum up to the above-mentioned purchase multiple of 8.27x. Whereas internal sources mainly comprise high-liquid assets, external sources are drawn on equity and debt instruments. The following section investigates the financing scenario we consider for the joint acquisition of Ubisoft. The overall funding can be comprehended by table 7.8.

#### 7.4.2.1 Internal Financing

Before drawing on external funds in order to refinance Ubisoft's existing debt, we make use of high-liquid assets held by Ubisoft. These comprise cash and cash equivalents as well as current financial assets such as derivatives that can be liquidated immediately. However, we cannot make use of Ubisoft's

[5]Note that the multiple differs from the Net Debt/EBITDA multiple explained in the financial due diligence because it is not adjusted for cash and cash equivalents.

| Sources of Funds | €M | x EBITDA | Stake | % |
|---|---|---|---|---|
| Cash and cash equivalents | 161.38 | 0.26x | | |
| Current Financial Assets | 13.78 | 0.02x | | |
| **Total High Liquid Assets** | **175.16** | **0.29x** | | **3.47%** |
| **Senior Debt:** | | | | |
| Term Loan A | 305.31 | 0.50x | | |
| Term Loan B | 1,221.23 | 2.00x | | |
| **Subordinated Debt:** | | | | |
| Unsecured High Yield Bond | 610.62 | 1.00x | | |
| **Total Debt** | **2,137.16** | **3.50x** | | **42.31%** |
| **Equity Sources:** | | | | |
| Total Ordinary Equity | 2,464.61 | 4.04x | | |
| *thereof belonging to PE* | *1,109.07* | 1.82x | *45.0%* | |
| *thereof belonging to Blizzard* | *1,109.07* | 1.82x | *45.0%* | |
| *thereof Sweet Equity (rolled by the management)* | *246.46* | 0.40x | *10.0%* | |
| Shareholder Loan | 273.85 | 0.45x | | |
| *thereof belonging to PE* | *273.85* | 0.45x | | |
| **Total Equity** | **2,738.46** | **4.48x** | | **54.22%** |
| **Total Sources** | **5,050.77** | **8.27x** | | |

**Table 7.8:** Sources of Funds.

total cash balance due to its need to finance its working capital requirements. As we have seen in the financial due diligence, Ubisoft is facing high OCW requirements as it launched the games Far Cry Primal and Tom Clancy's The Division in Q4 FY16 shortly before the hypothetical acquisition. Therefore, we assume a relatively high minimum cash position of €300 million at the time of the acquisition needed to pay open trade payables. In the long run, we, however, assume a much lower minimum cash balance of €100 million due to a deeper focus on the digital business segment where less working capital is required. Thus, deducting the assumed minimum cash balance from Ubisoft's actual cash position plus current financial assets leads to funds in an amount of €175.2 million available to pay down Ubisoft's existing debt and an Internal Funds/EBITDA multiple of 0.3x, respectively. The remaining part is considered to be financed by external equity and debt sources.

#### 7.4.2.2 External Debt Financing

As a precondition to translate external debt sources into certain instruments, we need to set the target leverage for the acquisition of Ubisoft. As shown in section *3.2.3.1 Financial Engineering and Synergies* of this thesis, a typical leveraged buyout is highly leveraged with 60 to 80 percent of total financing coming in form of debt and an Debt/EBITDA multiple of 4.0x to 5.2x, respectively, which varies with general market conditions (Pignataro, 2014; Kaplan and Strömberg, 2009). However, the case of a joint acquisition of a PE firm and a strategic acquirer is very different compared to a typical buyout: First, the PE firm does not acquire the entire business of Ubisoft but rather a 45 percent

stake[6]. As shown by Chen et al. (2014) in section *3.2.3.1 Financial Engineering and Synergies*, PE firms that undertake minority investments leverage its targets less than they would in a typical buyout. Second, Activision Blizzard as a strategic partner in the acquisition may be more reluctant to take on high amounts of debt (Kaplan and Strömberg, 2009). Thus, it is viable to assume that a joint acquisition between a PE firm and a strategic acquirer is less leveraged. As a drawback, the positive impacts of leveraging, disciplining the management to cut costs in financial distress as well as tax benefits (which we also showed in section *3.2.3.1 Financial Engineering and Synergies*), are reduced.

Here, we make use of the Debt/EBITDA multiple in order to sum up the sources to the purchase multiple of 8.27x. Later, while analyzing the leverage over time in comparison with the ratios obtained from the financial due diligence, we make use of the Net Debt/EBITDA multiple again. Due to a lack of data on leverage ratios of joint venture transactions, we consider a Debt/EBITDA multiple of 3.5x Debt/EBITDA. This leverage is derived by taking the mean of Ubisoft's current leverage of 1.0x and the upper legal requirement considered by the European Central Bank to not exceed a multiple of 6.0x (Reuters, 2017). This strategy is in line with our assumption of joint venture transactions being less levered than typical buyouts by still incentivizing the management team to optimize Ubisoft's capital allocation and multiplying possible tax deductions (Strömberg, Hotchkiss, and Smith, 2011). We do not assume an even lower leverage due to the currently seen low credit spreads which fuel the willingness to take on debt of both investor types as seen in section *3.4 Current Developments and Trends*. In the following, we investigate the translation of the 3.5x Total Debt/EBITDA multiple into the optimal mix for debt instruments consisting of secured debt (Revolving credit facilities and term loan facilities) and unsecured high-yield bonds structured by their seniority. Indeed, shareholder loans are debt like forms; however, as it is provided by shareholders, we treat this instrument as equity and analyze this instrument later in the equity sourcing part of this chapter (Bongaerts and Charlier, 2009). Further, we do not focus on Mezzanine instruments since, as shown in section *3.2.3.1 Financial Engineering and Synergies*, its market has disappeared over the last couple of years (Afme/Finance for Europe, 2016). Also, note that we solely investigate the structure of debt here. The repayment schedule for these instruments can be obtained from section *7.4.3 Proceeds in Equity and Return Analysis*.

**Revolving Credit Facility (RCF)** RCFs are secured lines of credit that are used to protect the minimum cash balance to finance working capital requirements. They allow a firm to flexibly draw on cash to a pre-specified limit for a specified period of time and is thus usually not used to fund the purchase price of an acquisition (Rosenbaum and Pearl, 2009). Hence, it is not listed as a source to acquire Ubisoft in table 7.8. Nevertheless, we mention it at this point as it belongs to external debt financing of Ubisoft. To provide backup funding to finance operating expenses and protect a minimum

[6]We assume a 45 percent stake rather than a 50 percent stake as the current management will be incentivized in form of ordinary equity (so called rolled sweet equity). We refer to the section of equity financing therefore.

cash balance of €100 million in times of financial distress, we assume an RCF line of €200 million with a life of 7 years.

**Term Loan Facilities A and B** Term loans are secured lines with a specified maturity that require principal payments. They do not offer the flexibility like a revolver as they require the borrower to maintain a certain credit rating as well as a repayment of principals according to a defined schedule. Typically, they are classified by identifying letters, as "A", "B" or "C" in accordance with their lender base, amortization schedule, and its terms.

In our case, we assume two lines, one amortizing term loan (Term loan A) provided by banks and one institutional term loan (Term loan B). The term loan A will be amortized by substantial principal repayment throughout its life (known as a balloon loan) ending simultaneously with the revolver after 7 years. Term loan B, in contrast, is non-amortizing. Repayments occur by a bullet payment at maturity. The maturity of term loan B is typically longer than those of amortized term loans (Term loan A); thus, assuming a maturity of 8 years. Although debt markets registered almost the same amount of contracts signed for high-yield bonds as for term loan facilities in 2016, we believe in a higher leverage of term loans than high-yield bonds in our case study . We do so due to Ubisoft's healthy cash flows as well as due to our above derivation of a smaller leverage for the investment; thus, being a safer investment, leading to an overall cheaper financing. Therefore, we apply a Debt/EBITDA multiple of 2.5x, translated into a multiple of 0.5x for term loan A and 2.0x for term loan B. We focus on term loan B as institutional term loans are typically more prevalent in PE-backed deals than amortized term loans (Rosenbaum and Pearl, 2009).

**High-Yield Bonds** High-yield bonds are non-investment grade debt securities and are usually structured as an institutional term loan: They are typically non-amortizing with a principal repayment at the end of its maturity; however, high-yield bonds are subordinated to term loans and its maturity is usually longer (Rosenbaum and Pearl, 2009). Although high-yield bonds are major sources of debt financing in LBOs, we assume a lower leverage by high-yield bonds as outlined in the preceding section of term loan facilities. By following the overall leverage of 3.5x Debt/EBITDA, of which 2.5x are financed via term loan facilities, the remaining leverage of 1.0x is financed by high-yield bonds. We consider a maturity of 9 years as high-yield bonds have a longer maturity than Term Loans B (Rosenbaum and Pearl, 2009).

**Interest on Debt Instruments** Note that out of the above debt instruments, typically the rates of revolving credit facilities and term loans are floating (Rosenbaum and Pearl, 2009). In order to impute the interest Ubisoft has to pay on these debt instruments, we apply the *forward EURIBOR* base rate on March 31st FY17 until FY22 and add instrument specific spreads. The EURIBOR is based on interest rates at which a panel of European banks borrow funds from each other (Bodie, 2013). In contrast to e.g. the LIBOR which is a London based interbank rate, we believe the EURIBOR suits Ubisoft's interest expenses better due to its operations being located in the Eurozone. According to

Doherty (2016), the spreads on term loans A amount to 365 bps and on term loans B 425 bps. The spreads on RCFs are typically priced slightly below term loans (Rosenbaum and Pearl, 2009). We apply a spread of 350 bps for the RCF.

High yield bonds are typically non-floating. Therefore, we apply the average rate of Merrill Lynch High Yield Rates (Cash Pay Only) which we already applied in the quantitative study (see section *5.1.2 Data Collection in the Quantitative Study*). In Q1 2016 it amounts to 905 bps.

The total interest rates on debt securities can be obtained from the repayment schedule outlined in table 7.13.

**Covenants of Debt Instruments** While taking on debt, Ubisoft needs to consider related covenants. Usually, there are so-called affirmative, negative and financial maintenance covenants. Affirmative covenants require the borrower to perform certain actions. Negative covenants, in contrast, limit the borrower to take certain actions, such as limiting the amount of debt that may be outstanding. The latter form of covenants, financial maintenance, requires the borrower to maintain a certain credit profile, such as a setting a maximum leverage ratio. Usually, secured loans, such as term loans, are more restrictive than unsecured loans, such as high yield bonds. However, the exact list of covenants varies with the credit agreement (Rosenbaum and Pearl, 2009). Due to simplicity, we only model negative covenants for term loan lines, namely that 50 percent of excess cash (so-called *cash sweep*) needs to be used repay the principal amount quicker than stated by the maturity. The cash sweep is a negative covenant as it limits Ubisoft's management in the freedom of distributing free cash flows and thus reduces the possibility of *empire building*, as outlined in section *3.2.3.1 Financial Engineering and Synergies*. The repayment by excess cash is subject to the seniority of the instruments: Any excess cash is first to be used to repay Term Loan A, subsequently used to repay Term Loan B.

#### 7.4.2.3 External Equity Financing

As noted above, funding sources need to sum up to the purchase multiple of 8.27x. Thus, the remaining 4.47x need to be financed by equity, coming in form of ordinary shares and a shareholder loan. Although we above structured debt instruments by seniority, we first investigate the structure ordinary shares, as they provide the major part of equity financing in our case and provide the basis for the shareholder loan.

**Ordinary Shares** Ordinary shares represent the basic voting shares of a corporation and do not have any predetermined claims on dividends (Rosenbaum and Pearl, 2009). In the case of a joint acquisition of Ubisoft, we assume that each of both investors provides the same amount of ordinary equity. We, however, do not take the position that each inventor provides 50 percent of ordinary shares: Rather, we consider 45 percent voting rights assigned to each investor, Activision Blizzard and the PE firm. We do so as the management is typically incentivized by the so-called *sweet equity*, as outlined in section *3.2.3.1 Financial Engineering and Synergies*. Due to the successful past of Ubisoft, we believe into the

current management's industry and corporate expertise and do not consider governance engineering tools such as replacing members of the board of insiders at the time of the acquisition. This is in line with our observation in section *3.2.3.2 Governance Engineering*, where we found that PE try to appear friendly at the time of the takeover. Following, we assume 10 percent of total ordinary shares to be rolled by the existing management team.

The strategic investor Activision Blizzard typically provides its complementary assets next to the financing of the acquisition which is also beneficiary to the PE investor. In this case, they come in form of specialists in developing MMO games. Due to their proprietary, these assets are, however, hard to purchase on the free market and should thus be considered in the valuation of equity financing. There are two scenarios we consider to compensate Activision Blizzard for the providence of complementary assets: Either, we assign more voting rights to Blizzard than to the PE investor or we consider further capital providence by the PE firm; e.g. in form of preferred shares or shareholder loans. We acknowledge that a thorough valuation of synergy potentials of the assets is needed to come up with a fair compensation. However, the valuation is also opposed to the negotiations between both investors. Therefore, we consider that 90 percent of total equity financing (an EBITDA multiple of 4.04x) comes in form ordinary shares provided by both investors; the remaining 10 percent (EBITDA multiple of 0.45x) come in form of a shareholder loan solely provided by the PE firm.

**Shareholder Loan** Shareholder loans are debt-like instruments provided by shareholder and are the most junior loans in a corporation's loan portfolio. As it is provided by shareholders, it should be treated as equity. In contrast to ordinary shares, they have predetermined maturities and interest claims. Due to its seniority to ordinary shares, they are commonly applied in LBOs aiming to, first, reduce the risk and possible upside for the PE investor and, second, to increase the risk and possible upside to the management (Bongaerts and Charlier, 2009). In order to preserve cash flows in the early period of the investment, we consider a *payment-in-kind* (PIK) shareholder loan which usually does not pay out interest in cash but rather in form of additional notes (interests payments are thus accruing until the maturity of the loan) (Rosenbaum and Pearl, 2009). The rate on the PIK is very much dependent on the negotiations between the PE firm and other shareholders. We assume a fixed rate of 12 percent which is lower than the required IRR of 20 percent of PE firms as a lower risk is associated with shareholder loans due to their seniority to ordinary shares. Further, we assume a maturity in line with the life of a PE fund of 10 years. Note that, in France and contrary to typical debt instruments, the rate of a shareholder loan is tax deductible to the maximum of "a) the average annual interest rate applied by credit institutions to companies for medium-term variable rate loans or b) the interest that the borrowing company could have obtained from independent banks under similar circumstances" (which was 2.15 percent on 31 December 2015) (PWC, 2017). For a), we used the weighted average of 5-year forward interest rates of term loans A and B outlined above, resulting in a rate of 425bps. See table 7.9 for the calculation of the tax deductibility under a). Thus, we deduct tax expenses of shareholder loan rates on basis of option a), yielding to a tax deductibility of 35.38

| Senior Debt | €M | Medium-term 5y interest rate |
|---|---|---|
| Term Loan A | 305.31 | 3.65% |
| Term Loan B | 1221.23 | 4.40% |
| **Weighted average Interest rate** | | **4.25%** |
| **% of Shareholder loan tax-deductabible** | | **35.38%** |

**Table 7.9:** Tax Deductibility Shareholder Loan France.

percent on the shareholder loan (rate of a) divided by the interest rate on the shareholder loan of 12 percent).

### 7.4.3 Proceeds to Equity and Return Analysis

As we model the case out of the perspective of a PE firm, we evaluate the investments by its potential IRR rather than a DCF approach which is commonly applied by strategic investors (see section *3.2.2 Principles of the Investment Decision* for further information). The IRR is highly dependent on (1) Ubisoft's operational improvements measured by EBITDA, (2) the value gains from its financial engineering and the amount of debt and the principal of the shareholder loan paid down over the investment horizon as well as (3) the difference between the purchase and exit multiple. We apply an investment horizon of 5 years which is in line with our expectation of a 5 to 6 years lasting trend of digitalization in the gaming industry and the typical horizon of PE firms in developed markets such as France as outlined in section *3.2.3.5 Payoff Strategies (Exit vs Infinite Investment Horizon)*. After analyzing the value sources in the base case, we provide a brief sensitivity analysis for the equity-, base- and stress-case scenario over investment horizons of 4 to 6 years and different exit multiples. Tables 7.10, 7.11, 7.12 and 7.13 provide the pro-forma income statement, the pro-forma cash flow statement, the pro-forma balance sheet, and the debt repayment schedule in order to follow our judgments. With reference to the income statement, note that the tax rate in France amounts to 33 percent. From 2020 on it its expected that the French government decreases the tax rate to 28 percent for larger companies, such as Ubisoft (EY, 2016). We further assumes interest income in an amount of 1 percent of cash and cash equivalents.

**Operational Improvements** By changing Ubisoft's current business model and mutually integrating the competitive skills of Activision Blizzard and Ubisoft, we believe in an EBITDA growth from €599.6 million in FY16 to €974.7 million in FY21, implying a CAGR of 10.2 percent. The growth in EBITDA is driven by 1) a boost in sales by entering new market segments 2) lower COGS and a better capital efficiency resulting from a deeper focus on the digital channel, 3) long-term decreasing operational expenses due to scale effects by combining the administration departments of Blizzard and Ubisoft although they are opposed to short-term increasing expenses due to their mutual integration and by 4) a better capital efficiency in its OWC management. In this regards, sales boost results in a CAGR of 8.3 percent; COGS and Operating Expenses increase more slowly with a CAGR of 6.3

| €M | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| Revenue | 1526.54 | 1661.17 | 1796.45 | 1930.85 | 2073.79 | 2224.18 |
| **EBITDA** | **610.62** | **664.47** | **790.44** | **888.19** | **995.42** | **1112.09** |
| Depreciation & Amortisation | -503.76 | -548.19 | -592.83 | -637.18 | -684.35 | -733.98 |
| **EBIT** | **106.86** | **116.28** | **197.61** | **251.01** | **311.07** | **378.11** |
| Interest Income | 3.51 | 3.78 | 3.55 | 3.71 | 4.21 | 5.07 |
| Interest Expense | | | | | | |
| Senior Debt (TLA, TLB, TLC, Senior Secured Bond) | -58.96 | -53.04 | -52.23 | -51.07 | -52.44 | -52.25 |
| RCF Facility | -3.60 | -3.60 | -3.60 | -3.60 | -3.60 | -3.60 |
| Unsecured Bond | -54.96 | -54.96 | -54.96 | -54.96 | -54.96 | -54.96 |
| Shareholder Loan PIK | -32.86 | -36.80 | -41.22 | -46.17 | -51.71 | -57.91 |
| Total Cash Interest (Sen. Debt + RCF + Capex + Mezz. Cash) | -117.51 | -111.60 | -110.79 | -109.63 | -111.00 | -110.80 |
| Total Interest (Cash Interest + Mezz. PIK + SHL PIK) | -150.38 | -148.40 | -152.01 | -155.80 | -162.70 | -168.72 |
| **Net Interest** | **-146.86** | **-144.63** | **-148.46** | **-152.09** | **-158.49** | **-163.64** |
| **EBT** | **-40.00** | **-28.35** | **49.15** | **98.92** | **152.58** | **214.47** |
| Taxable Income | -18.77 | -4.56 | 75.79 | 128.76 | 186.00 | 251.89 |
| Tax | 0.00 | 0.00 | -16.38 | -27.70 | -42.72 | -60.05 |
| **Net Income** | **-18.77** | **-4.56** | **59.41** | **101.06** | **143.27** | **191.84** |

**Table 7.10:** Pro-Forma Income Statement (P&L).

| €M | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| **EBITDA** | **610.62** | **664.47** | **790.44** | **888.19** | **995.42** | **1112.09** |
| Adjustments: | | | | | | |
| Change in Net Working Capital | 298.42 | 13.28 | 6.95 | 12.78 | 13.59 | 14.30 |
| Tax | 0.00 | 0.00 | -16.38 | -27.70 | -42.72 | -60.05 |
| Non tax-deductible part of Shareholder Loan Interest (PIK) | 21.24 | 23.79 | 26.64 | 29.84 | 33.42 | 37.43 |
| CapEx | -549.56 | -598.02 | -646.72 | -695.10 | -746.56 | -800.70 |
| **Cash flow before financing (CFBF)** | **380.72** | **103.51** | **160.92** | **208.00** | **253.14** | **303.06** |
| **FCF (% EBITDA)** | **62.35%** | **15.58%** | **20.36%** | **23.42%** | **25.43%** | **27.25%** |
| Total Cash Interest | -117.51 | -111.60 | -110.79 | -109.63 | -111.00 | -110.80 |
| Interest Income | 3.51 | 3.78 | 3.55 | 3.71 | 4.21 | 5.07 |
| **Cash flow available for debt repayment (FCF)** | **266.72** | **-4.31** | **53.68** | **102.08** | **146.36** | **197.33** |
| Debt Repayments | -61.06 | -45.80 | -45.80 | -45.80 | 0.00 | 0.00 |
| Excess Cash | 205.66 | -50.11 | 7.88 | 56.28 | 146.36 | 197.33 |
| **Cash Sweep** | **-102.83** | **0.00** | **-3.94** | **-28.14** | **-73.18** | **-98.66** |
| **Opening Cash Balance** | **300.00** | **402.83** | **352.72** | **356.66** | **384.81** | **457.99** |
| Cash Increase/(Decrease) | 102.83 | -50.11 | 3.94 | 28.14 | 73.18 | 98.66 |
| RCF Drawdown/(Repayment) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Closing Cash Balance** | **402.83** | **352.72** | **356.66** | **384.81** | **457.99** | **556.65** |

**Table 7.11:** Pro-Forma Cash Flow Statement.

percent and 6.3 percent, respectively, over the time frame from FY16 until FY21. This leads to a boost of EBITDA margins from 40 percent in FY16 to 48 percent in FY21 in the base case scenario.

**Leverage and Repayment Schedule** In order to benefit from the advantages of debt - tax shields and a better capital allocation by reducing the risk of empire building in accordance with the free cash flow problem - we increase the debt level from €568.8 million in FY16 pre-acquisition to €2,137.8

| €M | 2016 post | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| **Current Working Capital:** | | | | | | | |
| Cash & Equivalents | 300.00 | 402.83 | 352.72 | 356.66 | 384.81 | 457.99 | 556.65 |
| Net Operating Working Capital | 147.84 | -150.58 | -163.86 | -170.81 | -183.59 | -197.18 | -211.48 |
| **Total Current Assets** | **447.84** | **252.24** | **188.86** | **185.85** | **201.22** | **260.80** | **345.17** |
| **Non-Current Assets:** | | | | | | | |
| Net Property, Plant & Equipment | 83.95 | 93.11 | 103.07 | 113.85 | 125.44 | 137.88 | 151.22 |
| Other Assets | 173.28 | 173.28 | 173.28 | 173.28 | 173.28 | 173.28 | 173.28 |
| Total Fixed Assets | 257.22 | 266.38 | 276.35 | 287.13 | 298.71 | 311.15 | 324.50 |
| Goodwill & Intangible Assets | 4,170.56 | 4,207.19 | 4,247.06 | 4,290.18 | 4,336.52 | 4,386.29 | 4,439.67 |
| **Total non-current Assets** | **4,685.00** | **4,739.96** | **4,799.76** | **4,864.43** | **4,933.94** | **5,008.60** | **5,088.67** |
| **Total Assets** | **4,875.61** | **4,725.82** | **4,712.27** | **4,763.16** | **4,836.45** | **4,958.25** | **5,109.34** |
| | | | | | | | |
| **Long Term Debt:** | | | | | | | |
| RCF | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Term Loan A | 305.31 | 141.42 | 95.62 | 45.88 | 0.00 | 0.00 | 0.00 |
| Term Loan B | 1,221.23 | 1,221.23 | 1,221.23 | 1,221.23 | 1,193.18 | 1,120.00 | 1,021.33 |
| Unsecured High Yield Bond | 610.62 | 610.62 | 610.62 | 610.62 | 610.62 | 610.62 | 610.62 |
| **Total Liabilities** | **2,137.16** | **1,973.27** | **1,927.47** | **1,877.73** | **1,803.80** | **1,730.62** | **1,631.95** |
| **Equity:** | | | | | | | |
| Shareholder Loan | 273.85 | 306.71 | 343.51 | 384.73 | 430.90 | 482.61 | 540.52 |
| Common Stock | 2,464.61 | 2,464.61 | 2,464.61 | 2,464.61 | 2,464.61 | 2,464.61 | 2,464.61 |
| Retained Earnings | 0.00 | -18.77 | -23.33 | 36.08 | 137.14 | 280.41 | 472.25 |
| **Total Stockholders' Equity** | **2,738.46** | **2,752.55** | **2,784.80** | **2,885.42** | **3,032.65** | **3,227.63** | **3,477.39** |
| **Total Liabilities & Equity** | **4,875.61** | **4,725.82** | **4,712.27** | **4,763.16** | **4,836.45** | **4,958.25** | **5,109.34** |

**Table 7.12:** Pro-Forma Balance Sheet.

million post-acquisition. Compared to the analysis of sources for the acquisition, we make use of the Net Debt/EBITDA multiple again in order investigate Ubisoft's ability to pay down debt rather than coming up how to finance the entire acquisition. The above debt levels imply an increase of the Net Debt/EBITDA multiple of 0.16x pre-acquisition to 3.06x post-acquisition. The leverage effects are further increased by the shareholder loan in an amount of 273.8 million, which is partly tax-deductible in our case. By paying down existing debt and refinancing Ubisoft, future cash flows are used to repay the debt that was taken on in course of the acquisition. Following, over time, the Net Debt/EBITDA multiple decreases from 3.06x in FY16 post acquisition to 1.28x in FY21. By taking on a revolving credit facility, we secure a minimum cash level of €100 million in the long run which is needed to finance Ubisoft's inventory. Indeed, the minimum cash level reduces Ubisoft's ability to pay down debt. However, it brings Ubisoft in the beneficiary position to flexibly react to any unforeseen events which require higher financing outflows. Further, we consider, as outlined above, that 50 percent of excess cash needs to be used to repay terms loans as a covenant of term loans. This increases the security for banks and institutional investors. In the following, we briefly comment on the repayment schedule for each debt instrument as well as for the shareholder loan. The repayment schedule can be obtained from table 7.13.

- RCF: The threshold for drawing on the revolver is the minimum cash balance of €100 million.

€M

| **Base Rates** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
|---|---|---|---|---|---|---|
| 3m EURIBOR (synth.) forward curve | -0.27% | -0.30% | -0.24% | -0.08% | 0.15% | 0.42% |
| **Senior Debt Repayment Schedule m** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***RCF*** | | | | | | |
| Base Interest Rate | -0.27% | -0.30% | -0.24% | -0.08% | 0.15% | 0.42% |
| Interest Rate | 3.23% | 3.21% | 3.26% | 3.43% | 3.65% | 3.92% |
| Commitment Fee | 1.80% | 1.80% | 1.80% | 1.80% | 1.80% | 1.80% |
| Commitment | 200 | | | | | |
| Undrawn | 200 | 200 | 200 | 200 | 200 | 200 |
| Drawdown/(Repayment) | 0 | 0 | 0 | 0 | 0 | 0 |
| Opening Balance | 0 | 0 | 0 | 0 | 0 | 0 |
| Drawdown/(Repayment) | 0 | 0 | 0 | 0 | 0 | 0 |
| Closing Balance | 0 | 0 | 0 | 0 | 0 | 0 |
| **Interest Expense** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Commitment Fee on Unused Revolver** | **-3.6** | **-3.6** | **-3.6** | **-3.6** | **-3.6** | **-3.6** |
| ***Term Loan A*** | | | | | | |
| Base Rate | -0.27% | -0.30% | -0.24% | -0.08% | 0.15% | 0.42% |
| Interest Rate | 3.38% | 3.36% | 3.41% | 3.58% | 3.80% | 4.07% |
| Fixed Charges Cover | | | | | | |
| Amortisation Schedule (% of total facility) | 20.00% | 15.00% | 15.00% | 15.00% | 15.00% | 10.00% |
| Opening Balance | 305.31 | 141.42 | 95.62 | 45.88 | 0.00 | 0.00 |
| Principal Repayments | -61.06 | -45.80 | -45.80 | -45.80 | 0.00 | 0.00 |
| Cash Sweep | -102.83 | 0.00 | -3.94 | -0.09 | 0.00 | 0.00 |
| **Interest Expense** | **-10.33** | **-4.74** | **-3.26** | **-0.09** | **0.00** | **0.00** |
| **Closing Balance** | **141.42** | **95.62** | **45.88** | **0.00** | **0.00** | **0.00** |
| ***Term Loan B*** | | | | | | |
| Base Rate | -0.27% | -0.30% | -0.24% | -0.08% | 0.15% | 0.42% |
| Interest Rate | 3.98% | 3.96% | 4.01% | 4.18% | 4.40% | 4.67% |
| Amortisation Schedule (% of total facility) | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Opening Balance | 1,221.23 | 1,221.23 | 1,221.23 | 1,221.23 | 1,193.18 | 1,120.00 |
| Principal Repayments | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cash Sweep | 0.00 | 0.00 | 0.00 | -28.05 | -73.18 | -98.66 |
| **Interest Expense** | **-48.63** | **-48.30** | **-48.97** | **-50.99** | **-52.44** | **-52.25** |
| **Closing Balance** | **1,221.23** | **1,221.23** | **1,221.23** | **1,193.18** | **1,120.00** | **1,021.33** |
| **Subordinated Debt Repayment Schedule m** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***Unsecured High-Yield Bond*** | | | | | | |
| Coupon Rate | 9.05% | 9.05% | 9.05% | 9.05% | 9.05% | 9.05% |
| Amortisation Schedule (% of Op. balance+PIK) | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Opening Balance | 610.62 | 610.62 | 610.62 | 610.62 | 610.62 | 610.62 |
| Principal Repayments | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Cash Interest Expense** | **-54.96** | **-54.96** | **-54.96** | **-54.96** | **-54.96** | **-54.96** |
| **Closing Balance** | **610.62** | **610.62** | **610.62** | **610.62** | **610.62** | **610.62** |
| ***Shareholder Loan*** | | | | | | |
| PIK Element | 12.00% | 12.00% | 12.00% | 12.00% | 12.00% | 12.00% |
| Amortisation Schedule (% of Op. Balance+PIK) | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Opening Balance | 273.85 | 306.71 | 343.51 | 384.73 | 430.90 | 482.61 |
| Principal Repayments | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PIK Interest Expense** | **-32.86** | **-36.80** | **-41.22** | **-46.17** | **-51.71** | **-57.91** |
| **Closing Balance** | **306.71** | **343.51** | **384.73** | **430.90** | **482.61** | **540.52** |

**Table 7.13:** Debt Repayment Schedule.

As cash on hand does not fall below the threshold, we do not make use of the RCF. However, the commitment fee, which we assume to amount to 1.8 percent, on unused revolver needs to be paid over the time frame of 7 years.

- Term Loan A: The amortization schedule of term loan A decreases from 20 percent in FY17 to 10 percent in FY23. However, in the base case, Term Loan A will already be paid down in FY20 due to relatively high amounts of cash sweeps in FY17.
- Term Loan B: The principal repayment occurs in its maturity in FY24. However, the full amount of the face value does not have to be paid back as cash sweep is used from FY20 to FY23 to repay the loan.
- High-Yield Bond: Interest payments and repayment of the high-yield bonds occurs according to its predetermined schedule after a maturity of 9 years.
- Shareholder Loan: Due to its PIK nature, interests are accruing until its maturity of 10 years. An amount of €759.4 million is to be repaid then. Until FY21 principal plus accrued interests amount to €482.62 million. As its interests are not fully tax-deductible, taxes are considered in the pro-forma income statement (table 7.10).

One disadvantage of leveraging is the increased risk of default (Kaplan and Strömberg, 2009). Yet, the higher risk of default does not have any consequences on the internal rate of return. However, banks and institutional investors may rise costs of debt in case of financial distress. In order to assess Ubisoft's risk; we apply Altman's (2000) Z"-score as outlined in section *5.2 Methods in the Qualitative Study* for the pre- and post-acquisition scenario of the acquisition. Table 7.14 provides the derivation

| **Altmans Z" Score FY16 pre-acquisition** | **2016 Pre** |
|---|---|
| X1: Working Capital/Total Assets | 0.09 |
| X2: Retained Earnings/Total Assets | 0.06 |
| X3: EBIT/Total Assets | 0.09 |
| X4: BV of Equity/BV of Liabilities | 1.79 |
| **Altman's Z" Score: 6.56X1+3.26X2+6.72X3+1.05X4** | **3.26** |

| **Altmans Z" Score FY16 post-acquisition** | **2016 Post** |
|---|---|
| X1: Working Capital/Total Assets | 0.09 |
| X2: Retained Earnings/Total Assets | 0.00 |
| X3: EBIT/Total Assets | 0.03 |
| X4: BV of Equity/BV of Liabilities | 1.28 |
| **Altman's Z" Score: 6.56X1+3.26X2+6.72X3+1.05X4** | **2.14** |

**Table 7.14:** Altman's Z"-scores Pre- and Post-Acquisition.

of the values. Ubisoft's Z"-score as of FY16 pre-acquisition amounts to 3.26 compared to 2.14 post-acquisition. Hence, it is expected that Ubisoft's credit worthiness is being downgraded from *having an adequate capacity* (Z"-score $> 2.99$) to *having a capacity "on alert"* ($1.81 <$ Z"-score $< 2.99$) to meet its financial commitments. As a consequence, it is likely that credit institutions will increase costs of debt in the future. However, as shown in *3.2.4.1 Financial Engineering and Synergies*, PE firms tend to have a good reputation to deal with financial distress which mitigates the risk of default. Further, as Ubisoft is less leveraged in a joint transaction compared to a typical LBO, we expect that the risk of default would have been higher if the PE firms acquired Ubisoft solely without Activision Blizzard.

**Purchase and Exit Multiple Difference** We derived the purchase multiple by analyzing trading and price premium comparables, including a discount factor of 5 percent due to less bidding competition and the management's willingness not to sell to Vivendi SA. In the exit scenario, we assume that the comparable trading and price premium multiples do not change due to their industry-wide nature. However, note that the enterprise value increases, as EBITDA increases according to the base case plan. Further, we exclude the discount factor in the exit multiple as a PE investor is interested in making profits on its investment (Gompers, Kaplan, and Mukharlyamov, 2016) although we acknowledge that the PE firm also sets strategic objectives in order to establish a good reputation (Folta and Janney, 2004) as outlined in sections *3.2.3.2 Governance Engineering and Synergies*, *3.2.3.3 Operational Engineering and Synergies* and *3.2.3.5 Payoff Strategies (Exit vs Infinite Investment Horizon)*. Yet, the PE may argue for a put option to force its stake in Activision Blizzard in order to set a minimum return for their LPs. Contrary, Activision Blizzard as a strategic investor, with a long-term objective on Ubisoft, could be interested in securing a call option in the event of an exit of the PE investor. However, the strike multiple of either a put or call option is very dependent on the negotiations between the PE investor and Activision Blizzard. Therefore, we need to analyze different exit multiples in a sensitivity analysis. The following table 7.15 provides an IRR sensitivity analysis on the proceeds to the PE fund (on ordinary shares as well as on the shareholder loan). In order to compare the value gains to both investors, we also provide an IRR sensitivity analysis on the proceeds to Activision Blizzard (solely coming in form of value increases of ordinary shares) although strategic investors do not evaluate their performance by the IRR. Note, however, that these proceeds do not incorporate expenses of the post-merger integration on behalf of Activision Blizzard as well as the costs of allocating complementary assets as we do not model the merger of both firms.

By adjusting the exit multiple for the discount factor and keeping it otherwise constant as well as by expecting an exit after 5 years, the IRR on proceeds to the PE fund amounts to 18.6 percent whereas the one of Activision Blizzard amounts to 21.9 percent. It should be noted that the IRR on proceeds to the PE fund is lower than the usually among PE firms targeted 20 percent IRR. This observation is especially driven by the shareholder loan: Whereas it decreases upside potential on the proceeds to the PE investor, it increases upside on proceeds to the strategic investor and the management's sweet equity (Bongaerts and Charlier, 2009). Further, the PE funds' IRR is strongly dependent on the exit

| | Equity Case | | | Base Case | | | Stress Case | | |
|---|---|---|---|---|---|---|---|---|---|
| | **IRR on Proceeds to PE Fund** | | | **IRR on Proceeds to PE Fund** | | | **IRR on Proceeds to PE Fund** | | |
| | 2020 | 2021 | 2022 | 2020 | 2021 | 2022 | 2020 | 2021 | 2022 |
| 7.3x | 19.59% | 19.73% | 19.59% | 14.35% | 15.15% | 15.43% | 12.52% | 13.07% | 12.11% |
| 8.3x | 24.19% | 23.23% | 22.39% | 18.90% | 18.62% | 18.20% | 16.95% | 16.44% | 14.79% |
| 9.3x | 28.34% | 26.38% | 24.90% | 22.98% | 21.72% | 20.68% | 20.91% | 19.46% | 17.19% |
| | **IRR on Proceeds to Activision Blizzard** | | | **IRR on Proceeds to Activition Blizzard** | | | **IRR on Proceeds to Activision Blizzard** | | |
| | 2020 | 2021 | 2022 | 2020 | 2021 | 2022 | 2020 | 2021 | 2022 |
| 7.3x | 23.64% | 23.11% | 22.50% | 17.68% | 17.97% | 17.87% | 15.18% | 15.28% | 13.83% |
| 8.3x | 28.81% | 27.01% | 25.58% | 22.86% | 21.87% | 20.96% | 20.28% | 19.14% | 16.91% |
| 9.3x | 33.42% | 30.47% | 28.33% | 27.45% | 25.33% | 23.71% | 24.80% | 22.56% | 19.62% |

**Table 7.15:** IRR Sensitivity Analysis.

multiple: Increasing the exit multiple to 9.3x by keeping the investment horizon constant, we obtain an IRR of 21.7 which is 2.1 percent higher compared to the scenario of an exit multiple of 8.3x. Thus, it becomes crucial for the PE firm to enforce a high strike multiple in accordance with a put option and vice versa a low one in course of a call option of Activision Blizzard. As we assume a slowdown of revenue growth in both business segments, retail and digital, over time, the IRR is higher on a shorter investment horizon of 4 years. Further, as expected, the IRR is generally higher in the equity case and lower in the stress case and is thus highly dependent on the operational assumptions about synergies between Activision Blizzard and Ubisoft we make through our case study.

## 7.5 Theory Development and Discussion of the Case Study

As shown section *4.2 Chosen Research Approach*, the aim of our case study is to get novel insights in an emerging field of research in order to develop new theories. Specifically, it aims to answer the third sub-question what the relationship between differing rationales of the investors and the PE firm's decision to enter a partnership is. We believe, the above investment model provides insights into potential challenges and benefits, and thereby conditions, PE firms face while entering a partnership in a joint acquisition. Based on that, we should now turn to the discussion of our results. To do so, we briefly summarize our findings and remark on the viability of such a case. Then, we turn into discussing these insights in order to develop new theories. As qualitative studies are highly subject to the values of the researcher itself (see section *4.2 Chosen Research Approach*), we should also highlight the limitations of our case study.

### 7.5.1 Main Findings of the Case Study and Viability of the Joint Acquisition

The above section highlights a hypothetical investment model about the acquisition of the video game publisher Ubisoft which is jointly acquired by a PE firm and the strategic investor Activision Blizzard.

In the following, we emphasize the main challenges and benefits, both investors face in this acquisition.

We find a strong improvement in the top and bottom line of Ubisoft's operations, especially driven by following two reasons: First, the digitalization trend brings Ubisoft into the position to enter new market segments by thereby boosting revenue growth. We additionally boost capital efficiency through a better inventory management and through the smoothing of revenues by the means of extra-offerings and downloading possibilities during the year. Second, synergies between Ubisoft and Activision Blizzard bring an interplay between strong capabilities in developing AAA franchises on behalf of Ubisoft and competencies in developing MMO games as well as long-term cost efficiencies in COGS through an increased market power and operational expenses by sharing R&D and administrative resources.

We further find a discount on the purchase price premium. The discount is firstly driven by the current management's (which consists out of the Guillemot brothers who founded Ubisoft) willingness to avoid a takeover by the entertainment conglomerate Vivendi SA, thereby confirming the findings of Tappeiner et al. (2012) who found that family firms may raise capital by PE in order to access non-financial resources. Secondly, and even more relevant to the purpose of our study, the discount is driven by a lower degree of competition as both investors join forces in the bidding process to acquire Ubisoft.

Next, we observe a lower overall leverage compared to the classical LBO model. The joint acquisition of Ubisoft depicts a special form of a minority investment for both investors where PE investors typically take on less debt compared to an LBO as shown by Battistin et al. (2013) and Chen et al. (2014). This may further be driven by Activision Blizzard's reluctance to take on high amounts of debt (Kaplan and Strömberg, 2009; Demiroglu and James, 2007). As a drawback, the lower leverage yields in a lower degree of the management being incentivized to cut costs as well as to a smaller amount of tax shields (Jensen, 1989). As a benefit, we observe a lower risk of the investment compared to an LBO, as expressed by Altman's (2000) Z"-score. Also note that the risk on behalf of the PE investor is further reduced by providing a shareholder loan.

As another point, we do not see any governance issues accompanying with the investment. As the base case scenario has a positive outlook and the current management has proved to bring the right expertise to transform Ubisoft's activities into the digital era of video gaming in the past, we do not believe in a replacement of the management. This may also be driven by the fact that no investor takes the majority stake of Ubisoft and thus cedes the full control of the firm. Hence, we are unable to investigate potential differences on the investor's behavior in such situations of a joint acquisition.

Last but not least, we find a high negotiation need on the partnership agreement of both investors: We observe the negotiating need on a) the valuation of complementary assets provided by the strategic investors which in our case lead to a further contribution of equity in form of a shareholder loan by

the PE firm and b) on the exit strategy of the PE firm in form of a put option for the PE firm and a call options for the strategic investor.

### 7.5.2 Discussion of Main Findings in the Qualitative Study

**Operational Value Creation** The above observation of operational value creation should be split into its two sources. We believe that there is no question to discuss the first, following market trends, between both investor types. The strategic investor, Activision Blizzard, operates in the same industry as the target and may thus, bring the industry-specific know-how as well as the strategic oversight in order to boost the growth of its business activities (Damodaran, 2006). As we noted in section *3.2.3.3 Operational Engineering and Synergies*, PE firms have enhanced their operational know-how by specializing in certain industries over the past. This brings them into the favorable role to identify promising market segments and advise portfolio companies successfully in order to follow these trends. In contrast, we see certain obstacles to overcome in the second driver of operational value creation: Indeed, partnering with a strategic investor brings synergies by strengthening and boosting core competencies as well as cost synergies by sharing certain resources. However, exploiting synergies comes along with a greater need to integrate the activities. Such a lengthy and costly process may be beneficial if an investor is more long-term orientated, such as a strategic investor, but very harmful for rather short- or mid-term oriented investors, such as PE firms, who may be pressurized by their LPs in order to generate a financial return after a pre-specified of time; especially when their capital is bounded and thus, illiquid, such as private equity (Vild and Zeisberger, 2014; Gompers, Kaplan, and Mukharlyamov, 2016). The existence of a trade-off between benefits of synergies and costs of integration may further provide an explanation next to a trend of PE firms to specialize in certain industries why we observe a downward trend of the shares of joint venture deals to total PE-backed deals as shown in the quantitative study.

**Risk Considerations of PE Funds** As mentioned in section *3.2.3 Principles of the Investment Decision*, limited partners may set risk-return targets influence the total leverage ratio of a fund (Gompers, Kaplan, and Mukharlyamov, 2016). On this account, we also discussed that PE firms have a lower leverage ratio when entering minority and joint deals which also signals lower risk compared to a classical LBO. PE firms conduct a valuation driven by IRR neglecting risk considerations. Nevertheless, they apply adjustments in the hurdle-rate to adapt different risk levels. The limited partners, on the contrary, use a different approach in their own portfolios as they take the risk-return-tradeoff into account and may want to control risk in their PE exposure as well (Gompers, Kaplan, and Mukharlyamov, 2016). Therefore, the risk allocation of the PE fund can be driven by risk-averse limited partners as well as by the PE firm itself as a need to decrease fund risk arises due to another risky investment. Additional to the literature insight of lower leverage ratios in minority investments, we, in our case study, could also observe lower risk levels in joint acquisitions. Therefore, we see joint acquisitions as a tool for PE firms to implement their risk allocation decisions depending on the needs

of their fund or the limited partners. However, as PE LPs are facing an aging society as well as stricter regulations, their risk appetite may have been increased since the financial crisis 2007/2008 (Khort, 2015). This in turn, could further provide an explanation for the downward trends of the share of joint deals to total PE-backed deals we have seen in the quantitative study. Further note, that the effect of mitigating risk can, as seen above, also be achieved by taking on shareholder loans (Bongaerts and Charlier, 2009).

**Negotiation Need on the Valuation of Complementary Assets and Funding** While entering a joint acquisition, potential frictions arise when it comes to the commitment of assets and valuing these assets. Besides funding commitments, both investors bring their set of skills and additional assets. Activision Blizzard, in our case study, has not only the industrial knowledge in developing and marketing games but also brings complementary assets to generate synergies assuming all these additional assets are completely available to the target (it can be limited as well depending on agreement). The PE firm, on the other hand, may bring financial know-how in dealing with distressed firms and a better access to capital markets as well as industrial know-how assuming a specialized focus of the PE firm (Demiroglu and James, 2010; Dittmar, Li, and Nain, 2017). The valuation of these additional assets available for the target can be inconsistent as each investor may value these additional assets differently. Therefore, we see a great negotiation need the commitment as one of the major obstacles to overcome while entering a joint acquisition. These needs could have severe impacts on the PEs and strategic investors decision to enter a partnership.

**Negotiation Need of Exit Strategies and Securing Minimum Returns** Besides potential frictions in entering a joint deal, there is also an exiting phase which requires intense negotiations before the acquisition: When looking at the investment horizons of both investors, we can observe a clear difference. As seen in section *3.2.3.5 Payoff Strategies (Exit vs Infinite Investment Horizon)*, the PE firm plans to hold the target companys shares for 4-6 years before exiting. As the PE expects to exit the investment after a certain amount of years, it may have defined a return which is promised to the LPs of the fund (Gompers, Kaplan, and Mukharlyamov, 2016). On the contrary, the strategic investors horizon can be indefinite and thus, it may plan to integrate the target completely into its operations (Vild and Zeisberger, 2014). In other words, we see a high potential of a merger of Ubisoft and Activision Blizzard after the PEs exit. It is, therefore, essential to align interests of both parties before entering the joint deal such as securing minimum returns for the PE firm or safeguarding the full integration option for the strategic investor. We mention potential put or call options for each investor to secure interests in the sections before. In that way, the PE firm and Activision Blizzard can set the parameter of exiting the deal beforehand. However, it raises the question how to define the strike price (exit multiples) of these options? Can the PE force its share on Activision Blizzard or can Activision Blizzard force the PE to sell? These scenarios have to be discussed and negotiated when entering a joint deal and could, again, influence the decision on entering partnerships.

### 7.5.3 Limitations of Findings in the Qualitative Study

**Impact of our own Values on Assumptions** As shown in section *4.2 Chosen Research Approach*, a case study is usually exposed to the values of the research itself. Although we widely make use of empirical work in existing theory, our values come highly into play while making certain assumptions on the case. In the case study, our values may impact our results in section *7.4 Assumption Analysis* where we make certain growth assumptions on the revenue growth and the decrease of expenses. Moreover, determining the financing structure of the acquisition is strongly dependent on the negotiations with banks and credit institutes. Before negotiating on these points with stakeholders, we need to rely on observations we currently see on the market. Summarizing, the outcome of the case may, in reality, be very different to the one we hypothetically conducted.

**Discount on the Price Premium** The observation of a price premium in joint ventures may underline the conclusion made in the quantitative study (see section *6.2.1 Discussion of Main Findings in the Quantitative Study*), that one rationale of a PE firm to enter a partnership with a strategic investor could be the avoidance of a fierce competition in the bidding process in M&A booms. Nevertheless, we should limit our findings on this point as it is not clear whether the benefit of a discounted price premium is a) rather driven by the decreased level of competition in the bidding process or b) by the fact that our case studies the acquisition of a family-controlled firm whose management may be selling stakes in order to avoid the hostile takeover of an investor that may not provide the resources the management sees most beneficial.

# 8 Conclusion

The aim of this study was to provide an investigation of whether private equity firms see partnerships with strategic investors as a viable option to expand their investment universe. Our ambition to conduct research on this topic was to motivate other researchers to step into the field of unconventional business models of private equity investors as well as to assist private equity and M&A practitioners in their future decision making. The leading research question we sought out to answer thus became:

*Which conditions lead private equity firms to enter partnerships with strategic investors?*

In order to guide our research, we split the question into the following three sub-questions:

1. *Which existing theories can be used to investigate external and internal conditions that make private equity firms partner with strategic investors?*
2. *Which external market environment conditions lead to a higher share of partnerships between PE firms and strategic investors to total PE-backed deals?*
3. *What is the relationship between rationales of both investor types and the decision to enter partnerships?*

In order to understand the general ways on how to design an investigation on these questions, we first provided a short overview of different philosophies and approaches of research in chapter 2.

Based on that, we aim to answer the first sub-question in chapter 3. We provided a theoretical literature review in order to understand the main differences and commonalities of both investor types. Overall, we not only found differences in their structure and applied tools to align interests between stakeholders and tools to base their investment decision on, we also found differing strategies in order to create value and their behavior in bidding processes based on external as well as internal conditions. We further elaborated on the current external market environment of PE firms and strategic investors.

The boundaries of research, as well as the theoretical literature review, helped us to design and strategize our research in chapter 4. We found a critical realistic principle combined with an abductive approach to research most suitable to answer our overall research questions. Building on that, we aimed to conduct a quantitative as well as qualitative study. We developed a quantitative study to answer the second sub-question whereas the qualitative study targeted the third sub-question of our research.

In chapter 5, we then turned into looking at previous studies and their applied methods we investigated in chapter 3 to set our toolbox. Due to our mixed methods research approach, we split this section accordingly into the presentation of methods for the quantitative study and qualitative study. To design the quantitative study, we first developed a hypothesis on the external market environment that can be tested on activity as well as transaction sizes of joint venture acquisitions. The hypothesis was:

*In times of high competition between private equity and strategic investors within the M&A market, the share of joint venture deals between both types of investors to total PE-backed transactions is higher than in times characterized by low competition.*

We saw that we need to overcome the missing data problem of transaction sizes and need to apply statistical models to deal with time series and outliers. In order to conduct the qualitative study, we found an investment model out of the perspective of a PE firm most suitable for our research.

In chapter 6, we commenced by conducting the quantitative study. Here, we started to overcome the missing data problem of transaction sizes. As our data sample was exposed to a sample selection bias not only due to the condition of whether firms are privately or publicly listed but also due to differences in availability of data in time as well as among regions and industries, we found the Heckman procedure to estimate the missing data as most suitable. Then, we turned into time-serial modeling. We found upward trends in our M&A boom and bust measure E-HY and downward trends on the share of joint venture deals to total PE-backed deals, measured by both, activity and transaction sizes. Further, we accounted for outliers seen in Q1 2001 and Q4 2010 in the model testing on the shares measured by transaction sizes. Overall we found a significance on the model of shares measured by transaction sizes whereas the model measured by activity was insignificant. Based on these results, we turned into a discussion with the aim of finding explanations for our observations by making use of existing theories. Most notable, the downward trend of joint venture deals to total PE deals could be explained by a deeper specialization of PE firms into certain industries. The non-significance of M&A boom and bust cycles on the joint venture deal activity indicates that the decision to partner itself is driven rather by their internal rationales than the overall external market environment. However, the significant influence of M&A boom and bust cycles on the share measured by transaction sizes showed us that the external market environment may change the rationales to enter partnerships: In a boom cycle PE firms may co-operate to avoid a fierce price competition; in a bust cycle they may partner in order to access complementary assets fueling the restructuring of poor-performing firms.

Chapter 7 conveyed the qualitative case study about a hypothetical joint acquisition of the video game publisher Ubisoft. In order to analyze the rationales of both investors, we provided an investment model out of the perspective of a PE firm. We found following points that may impact the decision to partner most relevant: First, we identified that the differing investment horizons of both investors may impact the operational value creation strategy. Second, we obtained a lower risk associated with joint venture

acquisition. Hence, this business model could be used in order to adjust the risk-return requirements of PE LPs. Third, we found a great negotiation need on the valuation of certain skills and assets that are provided next to the funding of the acquisition. Besides the valuation of skills and assets, we also found a negotiation need on the exit strategy of the PE investor where we considered put and call options for both investors. Fourth, the case study confirms our reasoning in the quantitative study: PE firms may avoid fierce competition with strategic investors about targets in a booming M&A cycle which was shown by a discount on the purchase price premium in our case. We further found that the need to trade-off of synergies and costs of integration, as well as a higher risk appetite of PE LPs could provide further explanation why we see the the downward trend of partnerships to total PE backed deals in our quantitative study.

In conclusion, we identified that the external market environment does not significantly influence the investors decision to co-operate. However, external conditions may impact their rationales. As shown by the case study, internal differences strongly impact the decision to co-operate. By providing these comprehensive analyses and insights on an unconventional business model of PE firms, we hope that our thesis has served to enlighten the nature of relationships between external and internal conditions and PE investors decisions to partner.

# 9 Outlook and Future Research

PE investors make their investment decision into certain targets and business models based on a number of factors. The positive outlook of the current market environment expressed by low interest rates and high market valuation leads to a strongly changing landscape of the M&A market. Limited partners, such as pension funds, push capital into private equity in order to secure pensions of an aging society. As strategic investors also sit on a bunch of capital due to the positive macroeconomic outlook, the competition about promising targets increases. This may pressurize general partners of private equity. How can they satisfy the needs of their limited partners? We tap a step into the field of an unconventional business model for private equity firms, namely the joint venture with strategic investors.

Future research could deepen into the field of joint venture acquisitions. Our research focuses on the decision to co-operate. Although we conducted a brief analysis of the performance as well as on organizational topics of such an investment, a case study is not sufficient to infer generalizable conclusions on the extent of these topics. Therefore, we motivate future researchers to conduct empirical work on a broad sample of joint venture deals. Further, as our research was motivated by the currently seen dry powder problem and by the question on how private equity investors could unlock value again, future research could conduct this kind of research on other unconventional business models, such as minority deals, co-investments with limited partners as well as investments in infrastructure and real estate.

# Abbreviations

| | |
|---|---|
| **ADF** | **A**ugmented **D**ickey-**F**uller |
| **APAC** | **A**sia **PAC**ific |
| **AR** | **A**uto**R**egressive |
| **B2B** | **B**usiness-To-**B**usiness |
| **B2C** | **B**usiness-To-**C**ustomer |
| **CAGR** | **C**oumpounded **A**nnual **G**rowth **R**ate |
| **CapEx** | **Cap**ital **Ex**penditures |
| **CAPM** | **C**apital **A**sset **P**ricing **M**odel |
| **CCC** | **C**ash **C**urrency **C**ycle |
| **COGS** | **C**ost **O**f **G**oods **S**old |
| **D&A** | **D**epreciation and **A**mortization |
| **DAP** | **D**'**A**gostino-**P**earson |
| **DCF** | **D**iscounted **C**ash **F**low |
| **DIO** | **D**ays **I**nventory **O**utstanding |
| **DPO** | **D**ays **P**ayable **O**utstanding |
| **DSO** | **D**ays **S**ales **O**utstanding |
| **E-HY** | **E**BITDA/EV Minus **H**igh **Y**ield |
| **EBIT** | **E**arning **B**efore **I**nterest and **T**axes |
| **EBITDA** | **E**arnings **B**efore **I**nterest, **T**axes, **D**epreciation and **A**mortization |
| **ECM** | **E**rror **C**orrelation **M**odel |
| **EG** | **E**ngle-**G**ranger |
| **EURIBOR** | **Eur**o **I**nter**b**ank **O**ffered **R**ate |
| **EV** | **E**nterprise **V**alue |
| **F2P** | **F**ree-To-**P**lay |
| **FCF** | **F**ree **C**ash **F**low |
| **FY** | **F**inancial **Y**ear |
| **GP** | **G**eneral **Partner** |
| **HY** | **H**igh **Y**ield |
| **IG** | **I**nvestment **G**rade |
| **IP** | **I**ntellectual **P**roperty |
| **IPO** | **I**nitial **P**ublic **O**ffering |
| **IRR** | **I**nternal **R**ate of **R**eturn |
| **JV** | **J**oint **V**enture |

| | |
|---|---|
| **JV/T** | **J**oint **V**entures to PE-Backed **T**ransactions |
| **JV/Ta** | **J**oint **V**entures to PE-Backed **T**ransactions measured by **A**ctivity |
| **JV/Tts** | **J**oint **V**entures to PE-Backed **T**ransactions measured by **T**ransaction **S**ize |
| **KPSS** | **K**wiatkowski-**P**hilips-**S**chmidt-**S**hin |
| **LBO** | **L**everaged **B**uy**o**ut |
| **LP** | **L**imited **Partner** |
| **M&A** | **M**ergers and **A**cquisitions |
| **MMO** | **M**assively **M**ultiplayer **O**nline |
| **MOIC** | **M**ultiples **o**f **I**nvested **C**apital |
| **NWC** | **N**et **W**orking **C**apital |
| **OLS** | **O**rdinary **L**east **S**quares |
| **OWC** | **O**perating **W**orking **C**capital |
| **P/E** | **P**rice-to-**E**arnings |
| **PE** | **P**rivate **E**quity |
| **PIK** | **P**ayment-**I**n-**K**ind |
| **R&D** | **R**esearch and **D**evelopment |
| **RCF** | **R**evolving **C**redit **F**acility |
| **SG&A** | **S**elling, **G**eneral and **A**dministrative |
| **VC** | **V**enture **C**apital |
| **WACC** | **W**eighted **A**verage **C**ost of **C**apital |
| **WC** | **W**orking **C**apital |
| **YoY** | **Y**ear-**O**ver-**Y**ear |

# Appendix: Tables

| Year | Mean Substitution | OLS Regression | Heckman Model |
|---|---|---|---|
| 2000 | 280.41 | 160.26 | 160.10 |
| 2001 | 230.96 | 86.28 | 86.20 |
| 2002 | 326.97 | 160.71 | 160.66 |
| 2003 | 351.85 | 157.07 | 156.92 |
| 2004 | 543.97 | 300.90 | 300.80 |
| 2005 | 736.41 | 389.81 | 389.74 |
| 2006 | 1,210.37 | 733.04 | 732.71 |
| 2007 | 1,317.62 | 782.73 | 782.60 |
| 2008 | 710.49 | 296.00 | 295.93 |
| 2009 | 441.49 | 173.17 | 173.18 |
| 2010 | 621.46 | 257.01 | 257.46 |
| 2011 | 713.94 | 336.60 | 338.33 |
| 2012 | 707.90 | 320.38 | 322.48 |
| 2013 | 703.42 | 340.62 | 342.27 |
| 2014 | 793.49 | 373.90 | 375.81 |
| 2015 | 848.32 | 384.77 | 387.45 |
| 2016 | 684.32 | 254.14 | 257.81 |

**Table 2:** Yearly Volume of Private Equity-Based Deals in $ billion.

| | Mean Substitution | OLS Regression | Heckman Model |
|---|---|---|---|
| private | 312.33 | 146.88 | 147.29 |
| public | 402.85 | 284.56 | 284.32 |
| time_1 | 247.85 | 117.52 | 117.43 |
| time_2 | 347.10 | 195.32 | 195.26 |
| time_3 | 282.41 | 105.24 | 105.25 |
| time_4 | 327.65 | 154.26 | 155.09 |
| time_5 | 318.75 | 118.68 | 120.38 |
| t_lbo | 340.71 | 180.31 | 180.88 |
| t_mbo | 260.95 | 105.12 | 105.30 |
| t_jv | 432.08 | 360.49 | 360.12 |
| t_minority | 231.47 | 52.49 | 52.51 |
| t_majority | 345.68 | 183.14 | 183.61 |
| t_secondary | 405.13 | 343.26 | 344.28 |
| r_africa | 219.52 | 61.05 | 61.03 |
| r_europe | 304.58 | 134.75 | 134.91 |
| r_unitedstates | 361.26 | 194.19 | 195.00 |
| r_asia | 268.08 | 169.32 | 169.29 |
| r_latinamerica | 297.99 | 145.19 | 145.14 |
| i_energy | 380.88 | 256.58 | 256.10 |
| i_realestate | 315.39 | 197.38 | 196.81 |
| i_materials | 291.44 | 122.87 | 123.50 |
| i_industrials | 299.36 | 124.59 | 125.29 |
| i_consumerdiscretionary | 319.27 | 162.68 | 162.91 |
| i_consumerstaples | 321.99 | 148.40 | 149.40 |
| i_healthcare | 328.58 | 167.93 | 168.45 |
| i_financials | 324.63 | 177.76 | 177.74 |
| i_informationtechnology | 305.34 | 126.69 | 126.90 |
| i_telecommunication | 510.40 | 508.79 | 506.88 |
| i_utilities | 517.73 | 414.70 | 413.67 |

**Table 3:** Average Deal Size per Variable in $ million.

| | |
|---|---|
| R-Squared | 0.3753 |
| Adj. R-Squared | 0.3658 |

| | **Coefficient** | **Std. Err.** | **t** | $P > \|t\|$ | **[95% Conf.** | **Interval]** |
|---|---|---|---|---|---|---|
| time | -0.0124 | 0.0020 | -6.3000 | 0.0000*** | -0.0164 | -0.0085 |
| constant | -3.0144 | 0.7831 | -38.4900 | 0.0000*** | -3.1708 | -2.8581 |

**Table 4:** Regression Model JV/Ta over Time

| | | | | | | |
|---|---|---|---|---|---|---|
| R-Squared | 0.0001 | | | | | |
| Adj. R-Squared | -0.0151 | | | | | |
| | **Coefficient** | **Std. Err.** | **t** | $P > \|t\|$ | **[95% Conf.** | **Interval]** |
| E-HY | 0.2345 | 3.3059 | 0.0700 | 0.9440 | -6.3659 | 6.8349 |
| constant | -3.7092 | 0.0995 | -37.2800 | 0.0000*** | -3.9079 | -3.5106 |

**Table 5:** Regression Model JV/Ta over E-HY

| **Intangible assets** | **2013** | **2014** | **2015** | **2016** |
|---|---|---|---|---|
| Goodwill | 145.92 | 138.34 | 129.91 | 106.19 |
| Released commercial software | 94.61 | 61.81 | 63.99 | 113.47 |
| Released external software developments | 2.92 | 2.53 | 11.00 | 8.29 |
| Commercial software in production | 340.06 | 385.83 | 351.56 | 367.33 |
| External software developments in progress | 0.00 | 40.02 | 28.49 | 22.96 |
| Office software | 12.49 | 10.41 | 19.67 | 18.23 |
| Other intangible assets in progress | 3.39 | 9.08 | 5.67 | 5.12 |
| Brands | 87.24 | 78.88 | 81.12 | 76.14 |
| Released movies | 0.00 | 0.00 | 1.20 | 2.00 |
| Movies in production | 6.47 | 9.67 | 9.35 | 34.01 |
| Other | 0.03 | 0.29 | 0.18 | 0.05 |
| **Total Intangible Assets** | **693.13** | **736.86** | **702.13** | **753.80** |
| | | | | |
| Not Capitalized Int. Assets | | | | |
| Goodwill | 145.92 | 138.34 | 129.91 | 106.19 |
| Brands | 87.24 | 78.88 | 81.12 | 76.14 |
| **Adjustments for not capitalized Int. Assets** | **233.16** | **217.22** | **211.03** | **182.33** |
| **Capitalized intangible assets** | **459.98** | **519.64** | **491.10** | **571.47** |

**Table 6:** Capitilized Intagible Assets Development of Ubisoft.

| **Company** | **Symbol** | **Sales NTM ( million)** | **EBITDA NTM ( million)** | **EBITDA Margin** | **Market Cap ( million)** | **Ent. Val (EV) ( million)** | **P/Sales** | **P/EBITDA** | **EV/EBITDA** |
|---|---|---|---|---|---|---|---|---|---|
| Ubisoft Entertainment SA | ENXTPA-UBI | 1,394.00 | 599.59 | 0.43 | 3,839.60 | 3,883.80 | 2.75 | 6.40 | 6.48 |
| **Tier 1: Large Cap** | | | | | | | | | |
| Activision Blizzard, Inc. | NasdaqGS:ATVI | 5,910.32 | 2,034.31 | 0.34 | 23,735.35 | 25,844.44 | 4.02 | 11.67 | 12.70 |
| Electronic Arts, Inc. | NasdaqGS:EA | 4,124.36 | 1,406.98 | 0.34 | 19,129.78 | 16,419.30 | 4.64 | 13.60 | 11.67 |
| **Tier 1 Mean/Median** | **Mean** | **5,017.34** | **1,720.65** | **0.34** | **21,432.57** | **21,131.87** | **4.33** | **12.63** | **12.19** |
| | **Median** | **5,017.34** | **1,720.65** | **0.34** | **21,432.57** | **21,131.87** | **4.33** | **12.63** | **12.19** |
| **Tier 2: Mid Cap** | | | | | | | | | |
| Konami Holdings Corp. | TSE:9766 | 2,160.51 | 464.79 | 0.22 | 3,899.38 | 3,290.11 | 1.80 | 8.39 | 7.08 |
| Take-Two Interactive Software, Inc. | NasdaqGS:TTWO | 1,961.52 | 412.77 | 0.21 | 5,473.60 | 4,361.82 | 2.79 | 13.26 | 10.57 |
| Nexon Co., Ltd. | TSE:3659 | 1,784.14 | 730.40 | 0.41 | 6,444.08 | 3,690.16 | 3.61 | 8.82 | 5.05 |
| Square Enix Holdings Co., Ltd. | TSE:9684 | 2,226.56 | 368.12 | 0.17 | 3,062.69 | 2,264.83 | 1.38 | 8.32 | 6.15 |
| **Tier 2 Mean/Median** | **Mean** | **2,033.18** | **494.02** | **0.25** | **4,719.94** | **3,401.73** | **2.40** | **9.70** | **7.21** |
| | **Median** | **2,061.01** | **438.78** | **0.21** | **4,686.49** | **3,490.13** | **2.30** | **8.61** | **6.62** |
| **Tier 3: Small Cap** | | | | | | | | | |
| Zynga, Inc. | NasdaqGS:ZNGA | 749.35 | 85.62 | 0.11 | 2,256.30 | 1,456.47 | 3.01 | 26.35 | 17.01 |
| Capcom Co., Ltd. | TSE:9697 | 756.02 | 181.66 | 0.24 | 1,020.02 | 1,015.05 | 1.35 | 5.62 | 5.59 |
| Atari SA | ENXTPA:ATA | 14.35 | 10.60 | 0.74 | 45.22 | 48.88 | 3.15 | 4.27 | 4.61 |
| **Tier 3 Mean/Median** | **Mean** | **506.57** | **92.63** | **0.36** | **1,107.18** | **840.13** | **2.50** | **12.08** | **9.07** |
| | **Median** | **749.35** | **85.62** | **0.24** | **1,020.02** | **1,015.05** | **3.01** | **5.62** | **5.59** |
| **Overall Mean/Median** | **Mean** | **2,187.46** | **632.80** | **0.31** | **7,229.60** | **6,487.90** | **2.86** | **11.14** | **8.94** |
| | **Median** | **1,961.52** | **412.77** | **0.24** | **3,899.38** | **3,290.11** | **3.01** | **8.82** | **7.08** |
| **Ubisoft Valuation** | | | | | | | **3,987.99** | **6,681.37** | **5,358.58** |

**Table 7:** Comparable Companies Valuation of Ubisoft.

| **Working Capital** | **2013** | **2014** | **2015** | **2016** |
|---|---|---|---|---|
| Cash and cash equivalents | 237.70 | 237.95 | 656.66 | 461.38 |
| Trade and other receivables | 142.36 | 148.13 | 137.76 | 520.56 |
| Inventories | 17.73 | 21.34 | 18.43 | 19.37 |
| Current tax assets | 15.99 | 16.97 | 12.38 | 41.46 |
| Current financial assets | 6.85 | 1.53 | 4.92 | 13.78 |
| *Foreign exchange derivates* | *1.24* | *0.74* | *3.87* | *13.78* |
| *Stock futures* | *0.51* | *0.79* | *1.05* | *0.00* |
| *Gameloft shares* | *5.10* | *0.00* | *0.00* | *0.00* |
| **Total current assets** | **420.64** | **425.93** | **830.14** | **1056.56** |
| Current financial liabilities | 108.76 | 189.32 | 183.23 | 228.22 |
| Trade payables | 75.96 | 93.64 | 94.92 | 206.25 |
| Other liabilities and current tax liabilities | 152.18 | 133.89 | 157.24 | 227.32 |
| *Advances and prepayments received* | *0.00* | *0.00* | *0.00* | *0.19* |
| *Employee related liabilities* | *87.42* | *74.12* | *95.04* | *99.82* |
| *Other tax liabilities* | *22.95* | *18.35* | *15.85* | *47.68* |
| *Other liabilities (Acquisitions; Rental debt & Incentive rental income)* | *31.88* | *27.36* | *21.56* | *24.13* |
| *Deferred income* | *6.08* | *9.06* | *17.17* | *41.99* |
| *Current tax liabilities* | 3.85 | 5.00 | 7.62 | 13.51 |
| **Total current liabilities** | **336.91** | **416.85** | **435.38** | **661.78** |
| **Net Working Cap** | **-153.97** | **-228.88** | **-261.90** | **-66.60** |
| **Adjustments** | | | | |
| Cash and cash equivalents | -237.70 | -237.95 | -656.66 | -461.38 |
| Current financial assets | -6.85 | -1.53 | -4.92 | -13.78 |
| Current financial liabilities | 108.76 | 189.32 | 183.23 | 228.22 |
| **Total Adjustments** | **-135.80** | **-50.15** | **-478.35** | **-246.94** |
| **Operating Net Working Capital** | **-52.06** | **-41.08** | **-83.59** | **147.84** |

**Table 8:** Net Working Capital versus Operating Net Working Capital of Ubisoft.

| All Transactions Announced Date | Target/Issuer | Exchange:Ticker | Total Transaction Value ($USDmm, Historical rate) | Buyers/Investors | Industry Classifications (Target/Issuer) | Implied Equity Value ($USDmm, Historical rate) | Premium Analysis |
|---|---|---|---|---|---|---|---|
| 17/04/2003 | NCC Group plc (LSE:NCC) | LSE:NCC | 49.69 | Equistone Partners Europe | Information Technology (Primary) | 47.99 | 3.54% |
| 12/01/2005 | Amadeus IT Group, S.A. (BME:AMS) | BME:AMS | 5465.63 | BC Partners; Cinven Limited | Information Technology (Primary) | 5296.77 | 3.19% |
| 28/07/2005 | SS&C Technologies Holdings, Inc. (NasdaqGS:SSNC) | NasdaqGS:SSNC | 1012.69 | The Carlyle Group LP (NasdaqGS:CG) | Information Technology (Primary) | 875.00 | 15.74% |
| 02/04/2007 | First Data Corporation (NYSE:FDC) | NYSE:FDC | 28677.85 | KKR & Co. L.P. (NYSE:KKR) | Information Technology (Primary) | 25666.49 | 11.73% |
| 30/05/2007 | CDW Corporation (NasdaqGS:CDW) | NasdaqGS:CDW | 7332.61 | Madison Dearborn Partners, LLC; Providence Equity Partners LLC | Information Technology (Primary) | 6968.98 | 5.22% |
| 16/12/2008 | Sodifrance SA (ENXTPA:SOA) | ENXTPA:SOA | 20.3 | Arka Capital Gestion, SCR; Unexo; Grand Sud Ouest Capital, S.C.R. SA.; Sodero Gestion | Information Technology (Primary) | 17.01 | 19.34% |
| 27/03/2009 | Vantiv, Inc. (NYSE:VNTV) | NYSE:VNTV | 1811 | Advent International Corporation | Information Technology (Primary) | 1100.00 | 64.64% |
| 22/07/2009 | Bankrate, Inc. (NYSE:RATE) | NYSE:RATE | 571.59 | Apax Partners LLP | Information Technology (Primary) | 545.72 | 4.74% |
| 27/10/2010 | CommScope Holding Company, Inc. (NasdaqGS:COMM) | NasdaqGS:COMM | 4459.79 | The Carlyle Group LP (NasdaqGS:CG) | Information Technology (Primary) | 3053.12 | 46.07% |
| 11/12/2013 | Macromill, Inc. (TSE:3978) | TSE:3978 | 507.53 | Bain Capital Private Equity, LP | Information Technology (Primary) | 485.37 | 4.57% |
| 21/01/2014 | Auto Trader Group plc (LSE:AUTO) | LSE:AUTO | 3280.86 | Apax Partners LLP | Information Technology (Primary) | 2034.63 | 61.25% |
| 01/06/2016 | Tessi SA (ENXTPA:TES) | ENXTPA:TES | 505.14 | HLD Associs | Information Technology (Primary) | 413.40 | 22.19% |
| | | | | | | **Mean** | **21.85%** |

**Table 9:** Price Premia of Comparable Deals.

# Appendix: Figures

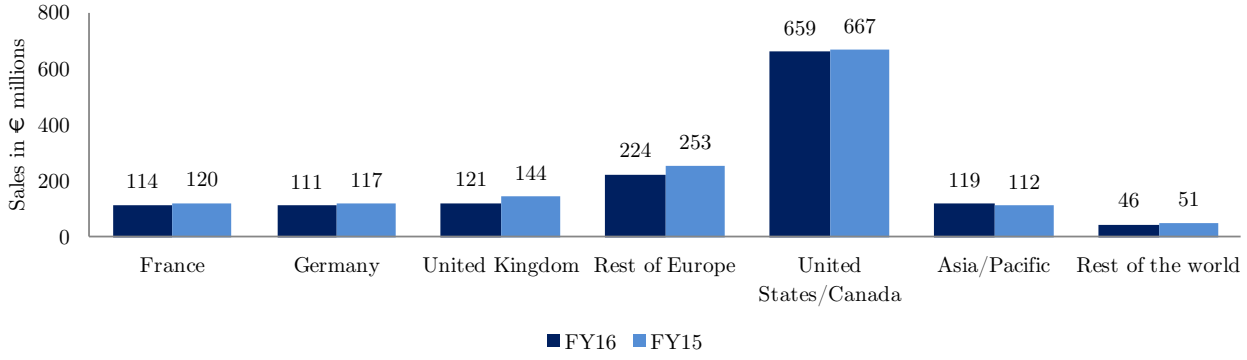


**Figure 1:** Regional Sales Development of Ubisoft.

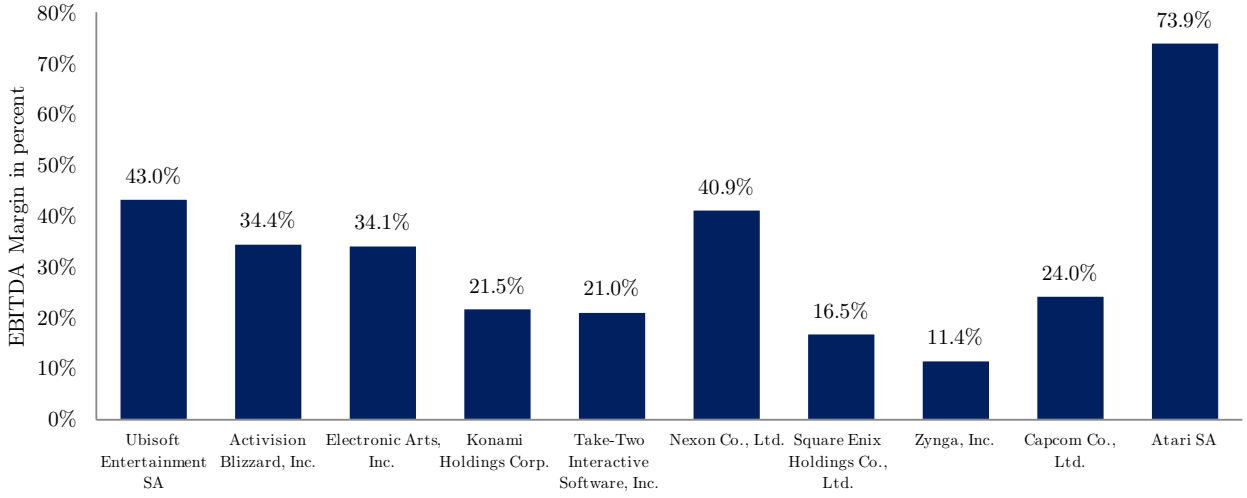


**Figure 2:** EBITDA Margins of the Peer Group.

# Appendix: Codes

## Heckman Stata STATA Code

```
clear all
set more off

* Change directory to folder with data files
cd S:\DataGeneration2803
*dir

* Importing csv file
insheet using Input_Stata_Heckmanlog.csv, clear

* Set x and y data for variables
global ylist logts
global xlist private_public time_1 time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities

sktest transaction_size

sum transaction_size, detail

summarize transaction_size

histogram transaction_size

describe $ylist $xlist
summarize $ylist $xlist

*Regression
reg $ylist private_public time_1 time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities
predict regy, xb

summarize regy

putexcel set mydata

* Heckman model
heckman $ylist private_public time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities,
select($xlist) twostep mills(lambda)

reg $ylist private_public time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
```

```
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities lambda

predict heckts, xb

summarize heckts

generate s=logts^=.

tab s

probit s private_public time_1 time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities

predict p1,xb

generate phi=normalden(p1)

generate capphi=normal(p1)

generate invmills=phi/capphi

regress logts private_public time_2 time_3 time_4 time_5 t_lbo t_mbo t_jv t_minority
t_majority t_secondary r_africa r_europe r_unitedstates r_asia r_latinamerica i_energy
i_realestate i_materials i_industrials i_consumerdiscretionary i_consumerstaples
i_healthcare i_financials i_informationtechnology i_telecommunication i_utilities
invmills

predict transaction_size2, xb
summarize transaction_size2

putexcel set mydata

export excel mydata
```

## Time-Series Model STATA Code

```
clear all
set more off

*Change directory to folder with data files
cd S:\DataGeneration2803

*Importing csv file
insheet using Input_Stata_Timeseries.csv, clear

*Set x and y data for variables
global ylist logodds
global xlist D.kpi

*Descriptive Analysis
describe $ts_jv $tstotal $jvshare $logodds $kpi $alogodds $dkpi1 $dlogodds1 $dkpi2
$dalogodds
summarize $ts_jv $tstotal $jvshare $logodds $kpi $alogodds $dkpi1 $dlogodds1 $dkpi2
$dalogodds

tsset, clear

tsset number

*ADF for Log-Odds TS
dfuller logodds, lags(4) trend regress
dfuller D.logodds, lags(4) trend regress

*ADF for Log-Odds Activity
dfuller alogodds, lags(4) trend regress
dfuller D.alogodds, lags(4) trend regress


*Install KPSS use "net sj 6-3" and install "stationarity" tool
*ssc install kpss

*net describe kpss

*KPSS for Log-Odds TS
kpss logodds, maxlag (4) notrend
kpss D.logodds, maxlag (4) notrend

*KPSS for Log-Odds Activity
kpss alogodds, maxlag (4) notrend
kpss D.alogodds, maxlag (4) notrend

*ADF for KPI
dfuller kpi, lags(4) trend regress
dfuller D.kpi, lags(4) trend regress

*KPSS for KPI
kpss kpi, maxlag (4) notrend
kpss D.kpi,maxlag (4) notrend
```

```
*Regression

describe $ylist $kpi
summarize $ylist $kpi
reg logodds kpi
reg alogodds kpi

*Englegranger TS
dfuller error, lags(4) trend regress
kpss error, maxlag (4) notrend

*Englegranger Activity
dfuller aerror, lags(4) trend regress
kpss aerror, maxlag (4) notrend


reg D.logodds D.kpi
estat dwatson
estat bgodfrey

predict logoddss
predict residual2, resid
predict rstandard2, rstandard
list logodds residual2 rstandard2 if abs(rstandard2)>2.78215 & rstandard2<.
dfbeta
list logodds residual2 rstandard2 _dfbeta_1 if abs(_dfbeta_1)>2/sqrt(67) & _dfbeta_1<.

reg dlogodds1 dkpi1
estat dwatson
estat bgodfrey
reg dlogodds1 dkpi1, level(90)


reg D.alogodds D.kpi
estat dwatson
estat bgodfrey

predict alogoddss
predict residual, resid
predict rstandard1, rstandard
list alogodds residual rstandard1 if abs(rstandard1)>2.78215 & rstandard1<.
dfbeta
list alogodds residual rstandard1 _dfbeta_2 if abs(_dfbeta_2)>2/sqrt(67) & _dfbeta_2<.

reg dalogodds dkpi2
estat dwatson
estat bgodfrey
```

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