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MERGERS AND ACQUISITIONS

THE INFLUENCE OF CREDIT RATINGS ON THE PAYMENT FORM IN EUROPE

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1 Introduction

1.1 Background

The 2007 subprime crisis, followed by the euro zone recession in 2008, has shed light on the role of **credit rating agencies**, the institutions evaluating the creditworthiness of entities being corporations, states and even cities. Credit ratings can take different levels (from 1 to 22) depending on the quality of the issuer and are classified between two grades (investment or speculative). For instance, Standard and Poor's, the biggest rating agency, has rated the European Union soundness at the level "AA" in the investment grade meaning "very strong capacity to meet financial commitments" (Standard and Poor's, 2016).

According to Langohr and Langohr (2008) more than 745 000 securities from over 42 000 issuers have a credit rating and this represents more than 30 US \$ trillion across 100 countries. Even though 150 different credit rating agencies are currently operating the rating market is characterized by an oligopoly where the three biggest (the "big three") represent more than 90% of the market shares (Ben Hmiden et al., 2012). Even if these agencies argue that ratings are just opinions, they are seriously taken into account by investors. As an example, the downgrade of Enron led the firm to face a debt payment of 3,9 US \$ billion which accelerated its bankruptcy (Kisgen, 2007). Credit rating agencies argue that they play an important role on the capital market. They deliver valuable information to market participants and reduce the information asymmetry. Thanks to this, investors can reduce their risk of misevaluation of investments and are thus more likely to consider investing in firms holding a rating.

The increased role of credit rating is related to the expansion and globalization of the financial markets, the development of new financial instruments and the large number of debt securities issued by firms (Ben Hmiden et al., 2012). Nowadays, rating agencies face several criticisms relating to their independence and their lack of anticipation (as shown during past crises). Moreover, they often accelerate the bankruptcy of entities by

downgrading their grade (Uhr, 2012). In 1996, Thomas Friedman even pretended that two superpowers coexisted: The United-states and Moody's (Langhor & Langhor, 2008).

Mergers and acquisitions are a common way for companies to develop. These operations are often widely followed by economic media because they usually involve large amounts and tough power struggle (Fréry et al., 2011). If such operations can procure a quick strategic orientation, they may also provoke severe failures. For instance, the acquisition of the Royal Bank of Scotland by ABN AMRO was a financial disaster which led to the nationalisation of the bank by the British Government (Fréry et al., 2011). Mergers and acquisitions occur in cycles and are strongly correlated with the global state of economy.

The current post crisis situation in Europe, although affected by the recession, is characterized by an upsurge of mergers and acquisitions and a strong influence of credit rating agencies despite the criticisms.

1.2 Research motivation

The beginning of the 21st century is characterized by the increasing role of credit rating agencies. Despite the many criticisms they face, they still exert an important influence on the capital market. It is worth considering their implication on corporate finance decision, especially on the financing choice in mergers and acquisitions.

Corporate financing decisions are partially defined by the capital structure. In mergers and acquisitions, a deal can be financed by cash, equity or a combination of both. Authors like Faccio and Masulis (2005) prove that the use of cash in financing deals is for a big part funded by debt.

Several studies emphasize the role of credit ratings on the capital structure of companies. Faulkender and Petersen (2006) and Lemmon and Zender (2010) showed that the capital structure can be impacted by the access to public debt markets, implied by the existence – or the quality - of a rating (Denis & Mihov, 2003). Fazzari et al. (1988) explain that financial constraints in the credit market are partially created by the information asymmetry.

Following this, Almeida and Campello (2004) demonstrate that credit ratings reduce information asymmetry and thus the financial constraints of the firm. In this sense, rated firms have a better access to public debt markets and can issue more debt to finance their investments.

Karampatsas et al. (2014) study the relationship between the credit ratings of bidders as a measure of debt capacity and the payment method of US mergers and acquisitions. They show that bidders holding a high credit rating quality are inclined to finance their deals in cash funded by debt due to their better access to public debt markets. Thus high rated companies can more easily raise debt to finance deals with cash.

The point above reveals how important credit ratings are on corporate finance decisions, especially on the payment form in US mergers and acquisitions (Karampatsas et al., 2014). In Europe, Faccio and Masulis (2005) investigate extensively the payment form in mergers and acquisitions. They reveal that large firms are more prone to finance with cash due to their higher debt capacity. However, their analysis does not take into account credit ratings of bidders.

Considering the upsurge of mergers and acquisitions in Europe and the major role of credit rating agencies, it is worth considering deepening the analyses of factors influencing the financing choice in deals. Specifically, we are motivated by analysing the impact of credit ratings on the debt capacity linked to the payment form in European mergers and acquisitions.

1.3 Research questions

A bidder holding a credit rating faces an easier access to public debt markets and a firm with high quality rating enjoys relatively better opportunities to raise debt (debt capacity). This paper aims to examine if a relationship exists between the higher debt capacity due to credit ratings and the medium of exchange used in European mergers and acquisitions. We will thus investigate how the medium of exchange is impacted by the existence of a rating and by the quality of this one.

Precisely, the following questions are raised:

- *Is the financing choice in mergers and acquisitions impacted by the existence of a credit rating held by the acquirer?*
- *Among rated companies, does the quality of credit ratings influence the payment form?*

Sub question

As a credit rating belong to a grade in function of its quality (investment grade or speculative grade), we are interested to deepen the analysis of credit rating quality by exploring the following sub question:

- *Among rated companies, does the grade of credit ratings influence the payment form?*

1.4 Work plan

This study is organised in four main chapters followed by a conclusion.

First, all the **information** necessary to perform our study is presented. We develop our knowledge on mergers and acquisitions. We present a historical perspective and we define the process and our motivations. Thereafter we describe credit ratings and their influence on capital structure. Finally we investigate the payment methods used in deals as well as the factors influencing them. Our literature review is mainly based on studies and articles and on web based information. We gather information to acquire a deep understanding of our subject. The literature review offers a strong theoretical base and directions for the research and analyses in the second chapter.

Second, the **hypotheses** are developed based on the knowledge acquired during the literature review. Thereafter, the variables are cautiously selected to capture all the effects

impacting the payment form. Precisely, we define the variables representing the characteristics of credit ratings, firms, deals and market conditions.

Third, the **methodology** that will be used is presented. We explain how we elaborate the sample consisting of more than a dozen variables with the use of multiple databases (primary and secondary information). Each step is described from the initial sample (more than 8 000 observations) to the final sample (277 observations). Thereafter are presented the different descriptive statistics (F-tests and chi-squared tests) used in function of our variables (continuous or ordinal). Then comes the empirical analysis which includes a Tobit model for the quantitative analysis and a Probit model for the qualitative analysis. Each requirement for the models is described (fixed effects, homoscedasticity, residuals normality, multicollinearity, endogeneity) as well as the transformation performed to be statistically valid.

Fourth, the empirical **results** obtained from the methodology are debated. The results of descriptive statistics are examined to see how is defined our sample. Then, we perform a thorough analysis by comparing the results from the quantitative analysis (Tobit model) with the existing literature we gathered. Finally, we use the results of the qualitative analysis (Probit model) as a validation of the quantitative results and give an overview of the overall analysis. This section also includes the limitations of our study as well as suggestions for future researches.

Finally, a **conclusion** sums up the study. The main results and methodologies to answer our research questions are reported as well as the limitations and suggestions for further research.

2 Literature review

2.1 Mergers and acquisition

2.1.1 Definition

"**Mergers and Acquisitions**" (M&A) is a common financial term describing two different processes.

A merger is an agreement between two organizations to collaborate by joining their available assets, liabilities, and cultural values on a relatively equal basis. For Horwitz et al. (2002) it is the joining and integration of two previously discrete entities. Mergers can be viewed as the consolidation of two separate firms into a new entity and can occur across different businesses and industries, as well in the private as in the public sector (Schraeder & Self, 2003).

An acquisition occurs when one firm acquires sufficient shares to increase its ownership of another firm (Horwitz et al., 2002). It is defined as the takeover of one firm by another where the acquirer obtains the control over the new organization (Schraeder & Self, 2003). There are two main categories of acquisitions. The first one is **friendly**. It happens when both companies agree on the acquisitions terms. The target's management encourages its shareholders to sell their company (Fréry et al., 2011). Most acquisitions are friendly. The second type of acquisition is **hostile**. The bidder proposes a price to the target's shareholders against the target's management willingness. The final decision belongs to the shareholders, the management acting just as advisor.

There are several types of transactions following the relation between bidder and target, and the method of payment used in the transaction (Berk et al., 2014). A **horizontal merger** means that target and acquirer are operating in the same industry at the same level of production line. A **vertical merger** means that target and acquirer are in the same industry but at different level of production line. Finally, a **conglomerate merger** involves a target and an acquirer from different industries.

In reality, it is difficult to distinguish a merger from an acquisition. Most of the time, a merger ends up in the integration of one company into another, so the result is the same as an acquisition (Silhan, 1994). Generally, an operation of merger or acquisition leads to a change in the ownership of a company and a modification of the management or strategy (Della Faille, 2001). It is why the terms Mergers and Acquisitions are used interchangeably.

2.1.2 Historical perspective

Mergers and acquisitions take place in cycle with ups and downs (Fréry et al., 2011). It is difficult to isolate what triggers a cycle but three main timeless factors have been identified: industrial and technological shocks, regulatory changes and credit availability. An end cycle occurs with crisis and recessions like the subprime crisis in 2007. Martynova and Renneboog (2008) identify five major waves: the first one in the beginning of 1900s, following peaks in 1920s, 1960s, 1980s and 1990s.

The M&A activity started in the United-States in the 1920s and expanded later in Europe. The waves in Europe follow the timing of these in the United-states but have different characteristics, mainly due to different legislations. We will describe in our thesis only the European market since it is the core of our study.

The European M&A activity starts slightly in the 1960s mainly with horizontal integrations (Scherer & Ross, 1990; as cited in Briciu & Nivoix, 2009). Most of these transactions were nationals with objective of gaining economies of scales, market power and new resources (Hughes & Singh, 1980; as cited in Briciu & Nivoix, 2009).

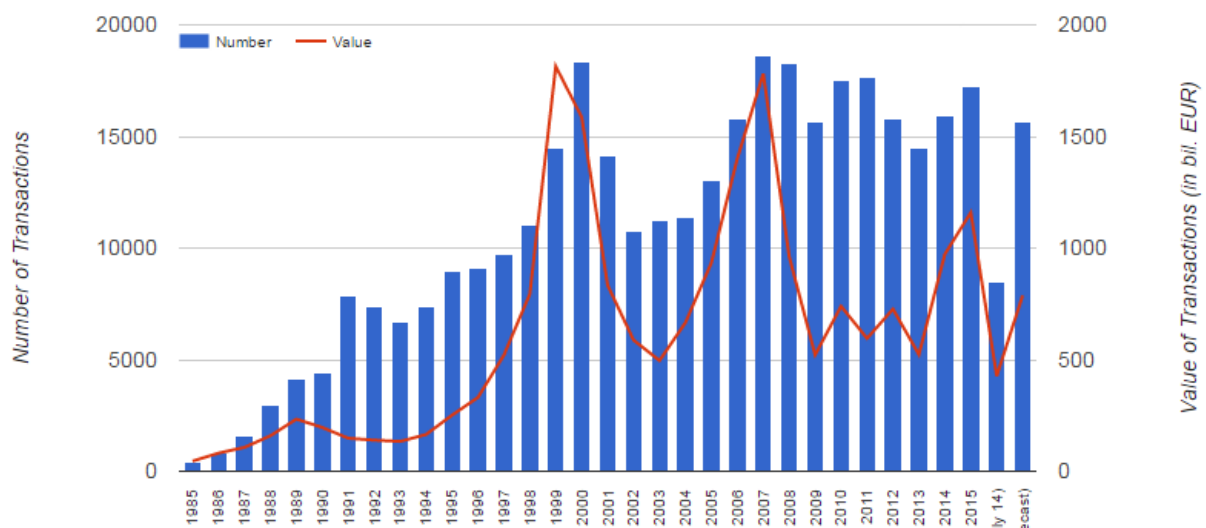
After 1980, trading is liberalized, investment is internationalized and economies become deregulated with a lot of private sectors (Coutinet & Sagot-Duvaurox, 2003; as cited in Briciu & Nivoix, 2009). The European international market is set up in 1986 (Single European Act¹) and Europe has its first real wave of M&A (1987-1991). Most transactions are friendly, hostile deals are only used for the biggest operations. Moreover, 44% of the transactions are entirely by cash and 80% through a mix of financing (Briciu & Nivoix, 2009).

¹ The single European Act established a single market among most European countries.

The second European wave occurs at the end of the nineties during a strong economic growth and a raise of deregulation and privatization. Services are more and more developed at the opposite of industries. Around 95% of operations are friendly (OCDE, 2001 as cited in Briciu & Nivoix, 2009). The use of shares becomes sensibly more important. The two main characteristics of this wave are international transactions and industry consolidation (European commission, 2000; as cited in Briciu & Nivoix, 2009). But it ends with the burst of the internet bubble in 2000.

The M&A activity recovers in 2003 with same trends as before: cross-border acquisitions and industry consolidations. Private equity firms play an important role in the activity encouraged by low-interest rates and credit availability. Investors are looking for diversification and higher yields. The global activity reaches its highest value (4 960 US \$ billion) and number of deals (47 823). This wave comes to an abrupt end following the subprime crisis of 2007. The figure 1 below from the Institute for Mergers, Acquisitions and Alliances (IMAA, 2016) illustrates the number and value of M&A in Europe since 1985 (figure 1: M&A activity in Europe)².

Figure 1: Historical M&A activity in Europe



² Retrieved from <https://imaa-institute.org/statistics-mergers-acquisitions> on 24/07/2016

Historical perspectives indicates a cyclical activity of M&A in line with cycles of the economy. According to Fréry et al. (2011), these ups and downs are accentuated by the attitude of managers: complacency during growing periods and mistrust during recessions. M&A follow a trend and managers are tempted to follow it without enough precaution. However, such operations are not always beneficial for companies as we will see.

2.1.3 Nowadays

According to the Institute for Mergers, Acquisitions and Alliances (IMMA, 2016), worldwide M&A amounted to 4 681 US \$ billion with 46 198 deals in 2015. Compared to 2014, the numbers of deals grew only marginally by 2,7% while their value rose 16%. The activity in Europe counts for 37% (17 244 deals) in term of number and for 25% in terms of value (1 159 US \$ billion). The number of deals is the most elevated in Europe whereas the total value is the highest in the United-Sates. In Europe, the level in 2015 is not as high as in 2007 but it is increasing compared to 2014 (+8,3% in number and +19% in value).

Most deals occur in Western Europe and in the United-sates. In other locations, the activity is still low due to economic conditions and legislation (i.e. Japan) (Fréry et al., 2011). However, the activity is developing in growing economies like India or China. The goal is to interact with western markets and gain access to new technologies. (PricewaterhouseCoopers, 2014).

The table in Appendix A shows the ten largest deals in Europe. Among the ten worldwide biggest transactions, seven include an European acquirer: Vodafone AirTouch PLC, Anheuser-Busch inbev, Spin-off, RFS Holdings BV, Glaxo Welcome PLC, Royal Dutch Petroleum Co (IMMA, 2016).

2.1.4 Motives

Several motives drive firms and managers to undertake M&A. The goal is to maximize the shareholder value by **creating value**. Theoretically, companies undertake transactions only if the combined value of acquirer and target is bigger if they operate together than if they operate as separate entities (Varaiya & Ferris, 1987). Fréry et al. (2011) classify motives in three main categories:

Strategic motives concern the improvement of business position regarding the extension, consolidation or ability. *Extension* is when merged business can expand in terms of geography, offers, market or even in management (acquisition of human capital). *Consolidation* is when companies consolidate their position in their respective industry. They can make pressure on competitors by gaining economies of scales and by reducing cost of running. *Ability* is when firms can access new technologies or knowledge from the acquired company.

Financial motives describe the optimal use of resources through financial efficiency, fiscal optimisation and unit sales. These motivations are strictly regulated by law. *Financial efficiency* describes the efficiency to combine a company with excess of cash with an indebted one. The first one can make a good price deal while the second one can raise money. *Fiscal optimisation* implies tax benefits. Sometimes firms are looking to benefit from tax legislation by acquiring a company based in a low tax country, in order to transfer its own profits. Moreover, companies with big profit can buy companies with losses and reduce the tax level. A *unit sale* is a process where bidders buy a group in order to sell the activities separately. The total revenue of the sale of the different activities is bigger than the acquisition price.

Managerial motives lead M&A without any financial or strategic goals, but are based on personal ambitions and mode effects. These motives are often the reason of post-deal failures. *Personal ambitions* are the characteristic of management who tries to undertake M&A to reinforce his prestige, by (over) self-confidence or because his wage is linked to short term growth. *Mode effects* are the trend that M&A occur by wave, so in a growth phase management can be too optimistic and under pressure to perform an acquisition.

2.1.5 Process

The M&A process is a long operation requiring time. Fréry et al. (2011) summarize it in three main categories. First is the target selection, second the target evaluation and finally the target integration.

Target selection is the identification of the strategic compatibility to ensure the strategy of both groups is compatible and synergies are not overestimated. Moreover there is a check of organisational compatibility to ensure that cultures and practices of the companies match (Shaver, 2006). These two criteria are essential to evaluate the potential value of the merger. However since such matches occur so rarely, they are often not taken into account or minimized by managers (Melkonian et al., 2006).

Target evaluation aims to give a price to the target by using financial valuation methods such as discounted cash flow or dividend model (Varaiya & Ferris, 1987). The point here is to find a fair price, which has to be sufficient to get the deal but not excessive in order to preserve the merger profitability. The risk is the *winner's curse*: when the bidder pays such a price that the acquisition is never paid back (Haspeslagh & Jemison, (1991), as cited in by Fréry et al. (2011)). In general, bidders pay a *control premium* up to 30% of the stock exchange price to get the control. Once an offer is announced, the regulators have to approve the transaction to ensure that arbitrage laws are guaranteed (Ross et al., 2008).

Target integration is a key part of the process influencing the success of a merger. Integration is often problematic due to organizational incompatibility. Haspeslagh and Jemison (1991), as cited in by Fréry et al. (2011), give two criteria on which is based the success of integration. First, the *strategic independence* states that the degree of integration has to be correlated with the degree of dependence of the companies. Thus, companies with high interdependent strategies required a strong integration and vice versa. Secondly there is the need of *organisational autonomy*. When the nature of companies is so different, it is better first not to integrate and let the company operate alone.

2.1.6 Facts

Most M&A are post-deal failures, around 70% and 90% depending on studies (Christensen et al., 2011). Some researches show that 70% of operations end up in value reduction for shareholders (Fréry et al., 2006). There are several ways of failure: buyers incur a massive write-down afterward, talents from the seller leave after the deal, divestments or bankruptcies occur after the transaction. Whereas bigger companies have the necessary resources to fix up mismatches the consequences of bad deals are overall dangerous for mid-market companies (DeChesare, 2016).

As we said, motives of managers often lead to failures because they undertake irrational deals. The reasons of failures can also concern each part of the process, mainly the valuation and integration parts (Fréry et al., 2011). For instance, HP wrote-down 8,8 US \$ billion because of accounting irregularities that due diligence failed to detect. Another example is Google that acquired Nest for 3,2 US \$ billion. Google emphasizes an open internal communication while Nest (founded by ex-Apple employees) has a reserved culture, and this difference in culture led to cooperation problems. Cultural mismatch might work if the seller remains independent. Finally, the tendency to overpay and overestimate potential synergies is sometimes reinforced by bankers to make deals (Fréry et al., 2006).

Firms tend to multiply M&A operations during their development. However, some activities can lose interest with the change of strategic context and be sold. M&A are thus a common way of strategic development. However, it is a complex process which is sometimes led by bad motives.

2.2 Credit ratings

2.2.1 Understanding ratings

Sometimes, entities (corporations and governments) raise money directly from investors by issuing bonds or notes instead of taking bank loans. Investors purchase them expecting to receive interests in addition to the refund of principal. Credit ratings aim to facilitate the process of issuing and purchasing the bonds or notes by providing a measure of the credit risk. Issuers, debt securities and bank loans can hold a rating. Investors and market participants may use this rating to develop their portfolio according to their guidelines and risk tolerance (Standard and Poor's, 2016).

Credit ratings are opinions about credit risk. The ratings give a judgment about the ability of an entity (corporation, government) to respect its financial obligations in time and entirely. They also grant a quality on individual debt issue (such as corporate or municipal bond) and the probability that the issue may default. The rating attribution is not fixed and is continuously evaluated (Standard and Poor's, 2016).

The increased role of credit rating is due to the expansion and globalization of the financial markets, the development of new financial instruments and the large number of debt securities issued by firms (Ben Hmiden et al., 2012).

Ratings are usually classified in function of duration and currency. Short term rating evaluates the ability to meet its financial obligations within one year whereas long term rating evaluates this ability for more than one year. Foreign currency ratings take into account the probability of governments to impose restrictions on local currency conversion or on the transfer of foreign currency to residents and non-residents. Local currency ratings do not take into accounts these considerations (Capital Intelligence, 2016).

As explained by Lantin and Roy (2009), credit ratings take the form of letters and each one corresponds to a quality level. The banking sector has a specific measure table. In the figure 2³ below are reported the ratings of the biggest agencies:

Figure 2: Credit ratings ranking

Fitch	S&P	Moody's	Rating grade description (Moody's)	
AAA	AAA	Aaa	Investment grade	Minimal credit risk
AA+	AA+	Aa1		Very low credit risk
AA	AA	Aa2		
AA-	AA-	Aa3		
A+	A+	A1		Low credit risk
A	A	A2		
A-	A-	A3		
BBB+	BBB+	Baa1	Speculative grade	Moderate credit risk
BBB	BBB	Baa2		
BBB-	BBB-	Baa3		
BB+	BB+	Ba1		Substantial credit risk
BB	BB	Ba2		
BB-	BB-	Ba3		
B+	B+	B1		High credit risk
B	B	B2		
B-	B-	B3		
CCC+	CCC+	Caa1		Very high credit risk
CCC	CCC	Caa2		
CCC-	CCC-	Caa3		
CC	CC	Ca		In or near default, with possibility of recovery
C	C			
DDD	SD	C		In default, with little chance of recovery
DD	D			
D				

Concerning long term issuers, entities being rated above the threshold BB+ (Ba1 for Moody's) belong to the category "investment". Those being rated on or below this threshold belong to the category "speculative" (Lantin & Roy, 2009). This grade distinction is common among credit rating agencies and is important for investors. In fact, many threshold clauses specify that if the rating of a company moves into the speculative category, either interest rates increase or the company must pay back its obligations in advance (Frydman & Van Waeyenberge, 2014). Moreover, some financial institutions can not invest in companies rated in the speculative zone.

³ Retrieved from <http://www.globalresearch.ca/fitch-standard-poors-and-moodys-the-eu-and-brics-countries-forge-an-independent-rating-system/5440611>, (16.07.2016)

2.2.2 Credit rating agencies

Credit rating agencies are private companies whose activities are to produce credit ratings for issuers. It is an issuer-payer system in which the issuers request a rating and pay for it (Csikos, 2005). Before the seventies, it was an investor-payer system where the investors asked ratings on potential targets and paid for it.

Since the thirties in the United-states, the government has encouraged the use of credit ratings in order to avoid riskier investments. Some companies like banks are even prohibited from investing in speculative firms (Frydman & Van Waeyenberge, 2014). The government has thus delegated his role of regulator to the private sector.

In the United-States, credit rating firms need an agreement from the Security and Exchange Commission (SEC)⁴ in order to have an official status from the Nationally Recognized Statistical Rating Organization (NRSRO). They have to prove suitable financial resources as well as a competent and qualified staff in order to be trusted by public investors (Collard, 2012). This considerably limits access to the rating business.

Nowadays, three main agencies (the “big three”) form an oligopoly on the financial rating market: Standard & Poor’s, Moody’s and Fitch. The two first are American, the third one is located in the United-States but the French group Fimalac is the main shareholder (Bouguerra, 2013). Nine same shareholders hold 42% of Standard & Poor’s’ stock and 53% of Moody’s’ stock. Together, the big three have around 95% of market shares with 43% for Standard & Poor’s, 35% for Moody’s and 18% for Fitch⁵.

The scandals of Enron (2001), WorldCom (2002) and Parmalat (2003) as well as the financial crisis of subprimes and the European debts highlighted the role of credit rating agencies, more specifically of the big three (Collard, 2012). Several critics have been made regarding their lack of transparencies, their conflicts of interests and their (negative) influence. Thus, the legislation has been reinforced in order to restore the credibility of agencies (Colmant et al., 2013).

⁴ The Security and Exchange Commission is the federal authority of regulation and control of the financial markets.

⁵ From Roland Berger reported in <http://www.iev.be/getattachment/49ee0708-9a3b-4403-8ee4-a88d3b7766c4/Les-agences-de-notation---analyse-critique-et-enje.aspx>.

2.2.3 Credit rating process

The process follows a simple methodology. An issuer requests a rating to a credit rating agency which creates a team of analysts in charge of gathering all the public and private information and of interacting with the issuer. Then the team produces a report and proposes a rating. A rating committee reviews the report and approves the rating. This report is sent to the issuer before the publication and if the issuer disagrees, he can send additional information that will be revaluated by the committee. Finally, a press release is published announcing the public rating. The agency follows the issuer afterwards and revises its opinion based on future events if necessary. Generally a rating is revised each year (Gaillard, 2010; Standard and Poor's, 2016). The appendix B illustrates the rating process of Moody's (2016) which is similar to other agencies.

According to Raimbourg (2003), credit ratings are assigned following two main analyses. First is the *financial analysis* in order to estimate the repayment capacity for short term and long term. They investigate the financial structure and the cash flows forecasting. Second is the *strategic analysis* to evaluate the competitive positioning of the company as well as its future development.

If some events are likely to impact an issuer, agencies will put it on watch to evaluate the consequences on the rating. In such case, issuers adapt their decisions to maintain or improve their rating (Gaillard, 2010).

2.2.4 Credit ratings and capital structure

Healy and Palepu (2001) state that enterprises lower their cost of capital by reducing the information asymmetry. By assessing creditworthiness, credit ratings mitigate this information asymmetry through communication of valuable information. Investors can evaluate more accurately the rated company and reduce the risk of misevaluation and overpayment. Thus, credit ratings reduce the borrowing cost of companies (investors take less risk) and enhance the demand for their issues (Tang, 2009). The cost of debt is positively correlated with the rating quality. The better the rating is, the lower the cost of debt is. Rated companies, even with a speculative grade, face lower costs than those unrated. Rated firms face a higher demand for their debt, allowing them to diversify their financing sources and reduce their dependence to restricted markets (Gaillard, 2010). Almeida et al. (2004) define credit rating as a measure of financial constraints. By reducing the information asymmetry, ratings also reduce these financial constraints. Lowered financial constraints grant a better access to public debt markets.

Several studies link credit ratings with debt capacity (Faulkender & Petersen, 2006; Lemmond & Zender, 2010). The relation between debt capacity and credit rating is explained by the Pecking Order Theory. This theory, as described by Myers (1984), is what determines the financing policies among managers. There is thus a hierarchy in the financing methods. First, firms prefer to use their own liquidity, then to raise debt and finally to issue new shares. This order is caused by the information asymmetry, which increases with debt and even more with the issue of new equity. This theory is opposite to the trade-off theory assuming that the market value of a firm is independent of its capital structure in perfect capital markets (Miller & Modigliani, 1958). Kraus and Litzenberger (1973) complete the trade-off theory with corporate taxes and bankruptcy costs. Firms can increase their profitability by using debt thanks to tax benefits. Thus, debt is the first financing choice and there is a positive relationship between the amount of debt and the market value of the firm, until the benefits of the tax shield are offset by financial constraints.

Lemmon and Zender (2010) support the Pecking Order Theory among rated companies. If firms need external funds, debt is preferred over equity but only in the case they do not consider their debt capacity. Hence, stock issuance is mainly determined by debt concerns.

Faulkender and Petersen(2006) show that capital availability does not depend only on company's characteristics. They find that companies with better access to public debt markets, measured by the existence of a rating, have significantly more leverage. Even if rated and unrated companies are fundamentally different, they prove that in general, rated firms have 35% more debt.

Denis and Mihov (2003) examine the credit quality and explain that it is the primary factor of debt financing. Public sources tend to lend money rather to highest credit quality, banks to medium quality and private lenders to the lowest credit quality. Regarding credit quality, Liu and Malatesta (2005) demonstrate that the information asymmetry and the adverse selection problem are reduced with the quality of ratings. Chen et al. (2007) investigate the grade of ratings. Firms belonging to the investment grade generate lower bond yield spreads compared to those belonging to the speculative grade. Moreover, investment grade companies enjoy a larger panel of investors and a higher demand for their debt securities due to the lowest regulation restrictions concerning allowed allocations (Kisgen, 2007).

As ratings are not fixed, firms are willing to maintain (or improve) their rating level. A downgrade has serious consequences on financial constraints and debt capacity (Kisgen, 2007). Kisgen (2009) explains that managers target a specific minimum level of rating and that an entire model of capital structure is set up accordingly. They manage their capital structure by issuing shares, by selling assets or even by reducing dividends. The management maintains the debt level under certain limits imposed by credit rating agencies. The credit rating has become the second factor influencing the debt management - among international companies - after the financial flexibility (Lantin, 2012).

When firms think their rating will be downgraded, they tend to reduce their debt level relative to their equity in order to maintain the rating level (Kisgen, 2009). Even if the firm is effectively downgraded, it tries to reduce its debt level. By doing this, the firm hopes to be reevaluated and upgraded. However, when a firm is upgraded, this has few impacts on its debt level.

If a rating is effectively modified, it also has an impact on the capital structure. Kisgen (2006) describes three possible rating changes (reported in the table). First, a change of grade (speculative or investment). Second a change of level defined as "Broad Rating". Third, a

change of sign in the letter described as “Micro Rating”. According to the author, a change affecting the first category (grade) has the largest impact on the capital decisions whereas a change in the third category (Micro Rating) has few effects.

Lantin and Roy (2009) explain that when a company is downgraded, it has to pay higher interests rate, therefore increasing the financial constraints. As a consequence, its shares are sold on the market and the share price falls. As we said, a change of grade (speculative or investment) has the largest impact (Kisgen, 2009). However, an upgrade or constant rating does not imply systematically market reactions (Gaillard, 2010).

It is difficult to establish the causal effect between the announcement of a rating change and the market reactions. In fact, it is not well established if market participants react to changes from rating agencies or if it is rating agencies which react to market changes. Lantin (2012) states that share price modifications are due to the integration by investors of the signal send by rating changes. However, he fails to prove it because of the difficulty to isolate factors releasing market modifications.

2.3 Methods of payment

The method of payment used to finance a deal plays an important role in the process. There are several mediums of exchange and each has its own internal and external consequences. Boards and shareholders have to take into account many factors influencing the financing choice.

2.3.1 Preview of the different methods of payment

According to Tesolin (2010), companies can finance a deal by using cash, stock or a combination of the two. The goal is to buy the ownership of the target by exchanging one of these two exchange money with the target shares. Rahman et al (2013) assert that about thirty percent of M&A include an exchange of equity. As we saw in the historical perspective, this trend varies in function of periods but we see a lowering of stock exchange these past ten years. Small companies tend to use cash meanwhile the use of equity is more popular among large deals (Moeller et al., 2004). For instance, Yoox buys Net-a-porter in an all share deal in 2016. Richemont, the owner of Net-a-porter, received 65.5 millions of shares valued around Euro 1.5 billion. He has 50% of ownership with voting rights limited to 25% and the obligation to keep at least half of its shares for three years.

The principal difference between cash and stock transactions is the split of risk (Rappapport & Sirower, 1999). In stock transactions, the risk that the expected synergy value embedded in the acquisition premium will not occur is shared. In fact, the target received a part of the risk which is proportional to the amount of received shares. In cash transactions, the acquiring shareholders take on all the risk. At the opposite, the value of an equity offer depends on cash flows generated by the combined company. These future cash flows depend on the true value of the bidder, the target and gains generated by the merger. However, in most takeovers the bidder is so much bigger than the target that target's shareholders end up with a small part of the combined company. Cash provides the advantages that you get the entire ownership after the acquisition, and the process is generally simpler than using stock (Tailard, 2010).

There are two ways to provide cash (Berk et al. (2014)). Companies provide cash by self financing if they have enough reserves or by issuing debt when they can raise it. The use of its own liquidity is the easier and cheaper way to process (Tailard, 2010). However, companies are limited if deals become larger. Often companies use debt financing because their liquidity reserves are not sufficient. Debt is expensive and increases financial constraints because of interest payment. However, this process allows a repayment plan instead of a large cash outflow at one point of time.

An equity exchange can be structured in two ways determining the risks allocation between acquirers and bidders. Enterprises can either issue a fixed number of shares or a fixed value of shares (Rappaport & Sirower, 1999). When the number of shares is fixed the deal value may fluctuate between the announcement and the closing date as the acquirer share price changes. However, the proportional ownership will remain the same in the combined company. In a fixed value shares deal, the price is fixed but not the number of shares. This time the ownership of the combined company is uncertain until the closing date. When the number of shares is fixed, the target's shareholders take the risk of a fall of the bidder price. At the opposite, when the price is fixed, bidder's shareholders bear the risk to issue more shares if their shares price falls. The use of shares complicates the process because the bidder shares have to be evaluated (Rappaport & Sirower, 1999). Schlingemann (2004) explains that using stock is the most expensive method for an acquisition. However, it avoids an output of liquidity which can be tricky for some firms. Moreover when shares are on the stock exchange market, they become quite liquid like cash (Berk et al., 2014).

Given that most bidders have not enough cash and liquid assets, the use of cash often requires debt financing. The consequence is an explicit choice between debt and equity financing. This brings a trade-off between corporate control by issuing equity and rising financial constraints by issuing debt (Faccio & Masulis, 2004).

Tesolin (2010) states that the bidder's shareholders lose money when the deal is financed with equity (negative abnormal returns at the time of announcement). At the opposite, they make normal return when the deal is financed with cash (absence of abnormal returns). Huang and Walking (1987) have the same results, deals financed with cash have higher returns than those with equity or a combination.

2.3.2 Factors influencing the method of payment

Deal value

According to Rhodes-Kropf et al. (2005), overvalued companies are keener to finance deals with shares. When a company is overvalued, the stock payment becomes cheaper than cash for the same amount. In such case managers are tempted to finance deals with stock in order to gain market shares and create value for shareholders (Gratton, 2003). At the opposite, undervalued firms become potential targets because they are cheaper than their true value. According to Myers and Majluf (1984) the value creation comes from a merger of overvalued companies acquiring undervalued ones.

Harford et al. (2009) explain that companies are more likely to introduce shares in the deal financing as the deal value becomes large. If the deal value is small, it is quite easy to perform the transaction in cash. However, when deal value becomes larger, companies are limited and use stocks to reach the value. If the target size is important, the bidder prefers to finance the deal with its shares instead of raising funds from banks or financial markets (costly operation increasing financial constraints) (Tesolin, 2010).

Berk et al. (2014) state that target's shareholders are more prone to accept an exchange of shares if the transaction price is high. They establish an exchange rate as the ratio between the amount of new issued shares (S_{new}) and the number of target shares (S_{target}). If this exchange rate is lower to the ratio of target share price (P_{target}) on bidder share price (P_{bidder}) multiplied by the ratio of future synergies ($V_{synergies}$) on target value (V_{target}), the seller will accept the deal with a stock exchange.

$$Exchange\ rate = \frac{S_{new}}{S_{target}} < \frac{P_{target}}{P_{bidder}} * \left(1 + \frac{V_{synergies}}{V_{target}} \right)$$

If we look at the model of Berck et al. (2014), we see that target's shareholders have more interest in an exchange of equity if their shares price is high compared to the bidder shares price because they benefit from a favourable exchange rate. In fact, we can see in the equation that a rise in the target share price increases the member $\left(\frac{P_{target}}{P_{bidder}} \right)$ at the right of

the equation. But you also have to convince the target's shareholders of the interest of the deal by promoting future synergies $\left(1 + \frac{V_{synergies}}{V_{target}}\right)$.

Information asymmetry

The information asymmetry means that same information is not shared by everyone. Even if it was the case, interpretations can differ depending upon the receptors. In M&A, the information asymmetry occurs mostly during the target valuation process.

Myers and Majluf (1984) point out that information asymmetry is present between companies and market participants. Thus, when managers choose a medium of exchange, market participants see it as a signal of valuable information (signalling effect). More precisely, the offer discloses information about the asset valuation of the acquirer. Equity offer reveals that acquirer assets are overvalued whereas cash offer reveals that acquirer assets are undervalued. Thus, cash offers are well seen by market investors while equity offers are not (Travlos, 1987). Hansen (1987) explains that bidders are more tempted to finance deals with equity if the information asymmetry regarding the target value is high. The information asymmetry increases the risk of overpayment and bidders dwindle these risks by exchanging equity and sharing a part of the mispricing with targets. The author says that the information asymmetry rises with the target size relative to the acquirer. Zhang (2001) confirms in his study the negative impact of the relative size on the use of cash.

Conversely, the choice of the medium of exchange will influence the stock valuation. As we said, choices act as a signalling effect (Tesolin, 2010). In fact, when a company makes an offer, it tells the perception of managers about its own valuation. Market participants are aware of this. Thus, when a bidder makes a stock offer, investors will consider bidder stock as overvalued and vice versa with cash (Myers and Majluf (1984)). The managers of the bidder anticipate these consequences for their financing decision.

As we said, abnormal returns are positively correlated with the use of cash to finance an acquisition. Petmezas (2009), Berkovitch and Narayanan (1990) confirm this observation in

their analysis of competition and payment forms. They conclude that the higher the part of cash used is, the higher abnormal returns because of the information asymmetry are.

Cornett and De (1991) validate the theory of information asymmetry in their research comparing inter-state bank mergers and non-bank mergers. They find that returns to shareholders of acquiring firms are positive and significant for cash, stocks and combination. According to the authors, banks are less exposed to misleading valuation and information asymmetry than non banking companies because they follow more strict regulations.

The initial public offering reduces the information asymmetry relative to the firm value (Berk et al., 2014). Public companies have to reveal precious information allowing more accurate valuations. Moreover, target's shareholders are more reluctant to accept equity from a non traded or foreign company as it is difficult to exchange such shares on their own markets.

Taxation

The taxation theory states that taxes influence the medium of exchange. In general, acquisitions by exchanging stock are tax-free meanwhile paying cash results in taxable transactions (Jordan et al., 2008). Taxes affect directly the amount of cash received by the target's shareholders. In an equity offer, they can postpone these taxes until they sell their shares (Travlos & Papaioannou, 1991). As a consequence, cash offers bring higher premiums compared to an exchange of shares to compensate the tax burden. These higher premiums create more financial constraints for the acquirer (Brown and Ryngaert, 1991). Thus, even if the information asymmetry is very low, an equity offer could be used because of the tax benefits.

Harris et al. (1987) do not find a relationship between tax implications of capital gains and the medium of exchange. In their study on US and UK acquisitions over thirty years, all cash offers and all equity offers are the most widely used compared to mix offers. Shareholders who pay attention to paying capital gain taxes will more easily accept equity offers. Shareholders who refuse to combine their portfolio with the one of the bidders will prefer cash offers. The authors name this as the tax and transaction cost efficiency. Their empirical studies do not reveal tax consideration as a principal factor influencing the decision of using

cash. However, they find that cash offers generate better post-acquisition performance than equity offers which is consistent with the proposition of asymmetric information and overvaluation.

Corporate control

According to Stulz (1988) the medium of exchange is principally influenced by the desire of the bidder's managers to maintain a corporate control. Managerial ownership refers to managers having stocks of the company they manage. Managers wish to maintain or increase their voting power. A transfer of control means a decrease of their fractional voting power. The author describes it as the management wealth constraints to the shareholding structure. Companies can rely on debt financing to ensure the ownership level and voting power to their managers. However raising debt increases the portfolio risk and by the same token, the management stock risk which is problematic among risk-averse managers. There is a trade-off between the optimum debt level for the company and the optimum investment in shares for managers. The response to this trade-off is generally the preservation of the management control through continued debt financing. Amihud et al. (1990) also empirically demonstrate that shareholding has a negative influence on the use of equity for a bid because of the corporate control effect.

Rahman et al. (2013) specify that the willingness of the acquirer's shareholders to maintain power depends on how is structured the equity exchange. If the power is going to few target's shareholders who will receive an important part in the new entity, bidder's shareholders will be reluctant to use equity. If the power is diluted among the target, target's shareholders will just become other small shareholders.

Martin (1996) explains that the corporate control effect depends on the acquirer's shareholders importance. Large stock owners are willing to use equity financing meanwhile the intermediate range of shareholders (managers belong to this category) tends to reduce equity financing. Large owners can easily transfer a small part of their equity while keeping a satisfying level of power, which is not the case with intermediate owners. Song and Walkling (1993) demonstrate that firms with a low level of managerial ownership have more

probability to become a target. In the case of contested offers, the managerial ownership is significantly lower. This indicates that a target with a low level of managerial ownership is more likely to be contested by the bidders.

Ghosh and Ruland (1998) confirm the link between the level of the managerial ownership of the bidder and the use of cash. Moreover, their analyses reveal two important facts. First, among equity exchange deals, the level of managerial ownership of the targets is significantly higher. Second, among cash exchange deals, the level of managerial ownership of the bidders is significantly higher. Based on these results, the authors suggest that bidders with a high level of managerial ownership will prefer cash offers. On the other hand, targets with a high level of managerial ownership will prefer an equity exchange. They explain this by the willingness of target's managers to keep a certain power in the new entity. Moreover, detaining shares is an assurance of keeping their job. In fact, Martin and McConnell (1991) show a significant higher turnover rate after a merger. Ghosh and Ruland (1998) also link the relative size with corporate control. If the target size is large compared to the bidder, target's management prefers to negotiate an exchange of shares in order to maintain an important control in the combined company. Conversely, the bidder's management will prefer to negotiate a cash exchange in order to preserve their own control in the new entity.

We can estimate, as Faccio and Masulis (2005) in the European context, that the choice of the payment method is a compromise between risks from a modification of the ownership structure and financial constraints. The ownership structure tends to have a negative influence on the use of equity whereas financial constraints tend to have a positive one.

Competition, tender offer & diversification

Fishman (1989) demonstrates that once an initial bidder identifies a target, competitor bidders have to endorse a cost to obtain relevant information for the valuation of their benefits if they acquire the target. Potential competitors will endorse this cost only if they think that the initial bidder valuation of the target is under a critical value. A cash offer signals the expected benefits from the acquisition and thus discourage competition from

other bidders. In this sense Amihud et al. (1990) reveal that a cash offer is the best way to win a deal against competitors but it increases the overpayment risk. Berkovitch and Narayanan(1990) also show that the more intense the competition to acquire a target is, the more important the fraction of cash in the offer is. Moreover the benefits for the target increase with the number of competitors.

Martin (1996) states a significant effect of tender offers on the use of cash. Faccio and Masulis (2005), Karampatsas et al. (2014) confirm this fact in their studies. A tender offer is a public takeover bid. It is a direct offer to the target's shareholders for a specified price during a certain period. The offer can be either in cash or equity.

Faccio and Masulis (2005) explain that in unrelated deals (deals where the acquirer and bidder are not from the same industry), sellers are not well acquainted with the acquirer industry risks and prospects. Thus, sellers are less likely to accept an equity exchange.

Growth opportunity, diversification & market conditions

Martin (1996) establishes a link between the medium of exchange and the growth opportunities of acquirers. He states that acquiring companies with bigger growth opportunities are more tempted to use equity to finance an acquisition. A possible explication is that companies with growth opportunities need cash to satisfy the growth and thus prefer to use equity in case of M&A. The author also analyzes the influence of business cycle conditions on the medium of exchange used to finance deals. The author describes the business cycle variable as changes in the Standard and Poor's 500, changes in Moody's BAA bonds yield and changes in other economic variables. The results show that good performance in overall stock market increases the use of share financing.

Faccio and Masulis (2005) find that sellers in cross-borders deals (bidder and target come from different countries) prefer to receive cash. Foreign stocks face higher trading costs and are less liquid than home stocks. Therefore sellers have less access to information over bidder and endorse the risk of an exchange rate change. Thus, sellers are more willing to accept cash to mitigate these risks.

A report from Mergermarket (2012) indicates that the main problem facing bidders since the Eurozone crisis is the financing. Lenders are reluctant to finance deals even though interest rates are quite low.

Debt capacity, financial condition & cash flows

The capital structure plays an important role on corporate financing decisions, especially on the financing form in M&A. Faccio and Masulis (2005) prove that the use of cash in financing deals is for a big part funded by debt. In their analysis, they study the debt capacity through the size of the firms. Bigger acquirers are more tempted to use cash because they can issue more debt. They are in general more diversified and have lower probability to default. However, Moeller et al. (2004) predict that large companies are more likely to make equity offers than small ones.

Karampatsas et al. (2014) use credit rating as a measure of debt capacity to test the effect on the use of cash in American M&A. They find that the credit rating level has a positive influence on the use of cash. Moreover, having a credit rating in the investment category also influences positively the use of cash compared to having a rating in the speculative category. However, they do not find a significant influence of the existence of ratings. The authors argue that better ratings mitigate financial constraints by reducing the cost of debt and enhancing the demand of investors. Credit ratings of high quality offer a better debt capacity, allowing firms to rely on debt to finance acquisition with cash.

It is difficult to predict the effect of bidders' financial condition on the method of payment. Faccio and Masulis (2005) use the bidder leverage as a measure of financial condition and find a negative association with the use of cash. Firms with a high level of debt prefer to finance acquisitions with equity to avoid issuing new debt. In this sense, Uysal (2011) indicates that overleveraged enterprises are less acquisitive and less likely to use cash in their offers. At the opposite, Harford et al. (2009) and Karampatsas et al. (2014) demonstrate a positive effect between bidder leverage and the use of cash. They explain that firms paying with cash have less growth opportunities and more leverage. Furthermore, Harford et al. (2009) show how deviation from target capital structure affects the payment

form. When the leverage of a bidder is over the target level, it is more likely to finance the acquisition with equity.

Based on the Pecking Order Theory, Jensen (1986) argues that managers operating in companies with excess of cash are likely to use it to undertake value destroying investments. Thus, firms with big amount of cash or enough debt capacity are more likely to use cash to finance their investments.

2.3.3 Previous studies

Beside the study of Karampatsas et al. (2014) on the American market, we found two others thesis dealing with credit ratings and European M&A. The first study from Ari and Bolt (2015) finds a negative impact of the existence of a rating on the use of cash. The second study of Blommegård Håkansson and Ranhult (2014) finds a positive impact of the rating existence and the rating quality on the German market. Even though they followed the same methodology as Karampatsas et al. (2014), we will not take their results into account.

3 Hypotheses and variables

3.1 Hypotheses

Inspired by the study of Karampatsas et al. (2014) and literature, we investigate the effect of credit ratings as a measure of debt capacity on the method of payment in European Mergers and Acquisitions. We expect that credit ratings have an impact on the medium of exchange used to finance European M&A.

As explained, holding a rating allows firms to enhance their debt capacity. Rated firms face less financial constraints and better access to public debt markets. Therefore, we expect that firms with a credit rating are more likely to finance deals with cash through debt.

H1: Companies holding a credit rating are more likely to finance deals with cash.

Moreover, firms holding ratings of better quality also face relatively lower cost of debt and higher demand. Thus, we assume that the rating quality is positively correlated with the use of cash.

H2: Companies holding a credit rating of a better quality are more likely to finance deals with cash.

Finally, investment grade firms produce lower bond yield spreads compared to speculative grade firms. Following our two first hypotheses, we suppose that rated bidders in the investment grade are more prone to use cash.

H3: Companies whose rating belongs to the investment grade are more likely to finance deals with cash.

3.2 Variables

In the Appendix C is reported a table that summarize the definition of all the following variables.

3.2.1 Dependent variables

In order to investigate how the medium of exchange is influenced by the factors analyzed, we define our dependent variables as measures of the payment form used in deals. As in the study of Karampatsas et al. (2013), two dependent variables will be used to investigate the relationships.

The first variable is the *fraction of cash* used during the transaction as part of the total price offered by the bidder to the target's shareholders. This variable lies into the interval $[0, 1]$ and will be used for the quantitative analysis.

The second variable is the *method of payment*, an ordinal variable taking the value 0 for pure stock deals, 1 for a combination of cash and stock and 3 for deals financed only with cash. This variable will be used for the qualitative analysis.

3.2.2 Explanatory variables

The explanatory variables aim to explain the behaviour of the dependent variables. They are our main variables of interest used to test our hypotheses. The explanatory variables are supposed to be independent (one variable does not depend on any other variables). Following our hypotheses, our main variables of interest are those describing credit ratings.

The first variable is the *rating existence*, a dummy variable taking the value 1 if the bidder has a credit rating one month prior to the acquisition and 0 otherwise. This variable is essential to determine if the existence of ratings has an impact on the method of payment. Following our hypothesis we expect a positive impact from this variable.

The two following variables are those describing the credit ratings characteristics and are used among a sample of rated firms. First we measure the ratings quality through the variable *rating level*. It is a continuous variable from 1 to 22 representing the rating level (AAA level takes 22 and D takes 1). Second we test the rating grade with the dummy variable *investment grade* taking the value 1 for investment grade bidders (above BB+ threshold), and 0 for speculative grade bidders (on or below BB+ threshold).

3.2.3 Control variables

The literature review has revealed many studies describing factors influencing the medium of exchange. Control variables ensure the effect of other factors having a possible influence on the dependent variable and their relationship to the explanatory variable. By doing this, we ensure that credit rating variables do not capture effects that belong to others. Moreover, it allows us to extend the analysis to others determinants.

Firm characteristics variables

Faccio and Masulis (2005) explain that larger firms are more diversified, have a lower probability of default and can thus rely more on debt. However, Moeller et al.(2014) predict that equity offers are more often made by large companies. This effect is represented with the variable *size* which is the bidder total assets at the fiscal year immediately prior to the acquisition announcement.

The Pecking Order Theory explains that companies should first use their internal fund to finance investment (Myers, 1984). Based on this theory, Jensen (1986) shows that value destroying acquisitions come from firms with large amounts of free cash flows. It emphasizes the role of managers in the phenomena. We define the variable *cash flows* which is the free cash flows to equity of the bidder at the fiscal year-end prior the acquisition announcement.

The variable *leverage* is the ratio of the total financial debt to the book value of total assets at the fiscal year immediately prior to the acquisition announcement. This variable represents the financial constraints of bidders. Bidders with existing debt have less flexibility and can less easily issue new debt. As a consequence, Faccio and Masulis (2005) claim a negative association between leverage and the use of cash, while Harford et al. (2009) and Karampatsas et al. (2014) argue a positive one. They explain it as firms willing to pay with equity usually have greater growth opportunities and less leverage.

Deal characteristics variables

Hansen (1987) declares that the level of asymmetric information about a target value drives the use of stock. The asymmetry increases with the size of the target compared to the bidder, as the risks of overpayment and dilution of the dominant shareholders are bigger. We employ the *relative size* which is the value of target total assets divided by bidder total assets before the acquisition announcement to capture the information asymmetry.

According to Faccio and Masulis (2005), diversification has an effect on the payment method. In fact, sellers are unwilling to accept bidder stocks if the offer comes from an unrelated business. In such case, sellers are not well acquainted with the bidder industry risk and prospects. We define the variable *diversifying deals* which is a dummy variable taking the value 1 for inter-industry transactions, and 0 for intra-industry transactions.

The nature of deals influences the payment choice. During hostile operations, bidders want to take the control against the management willingness. The goal is to convince shareholders and to quickly conclude the deal to prevent them going back on their decision, especially if competition among bidders occurs (Fishman (1989) and Berkovitch & Narayanan (1990)). The best way to conclude deals is by using cash, thus a hostile and competitive deal should be positively correlated with the use of cash. We create the dummy variable *hostile deals* which takes 1 if the deal is hostile or unsolicited, 0 otherwise. The variable *number of bidders* is the number –up to three- of bidders during the takeover deal.

The variable *transaction value* is the amount of the transaction. According to the model of Berk et al. (2014), this variable is normally negatively correlated with the use of cash as

targets are more likely to accept equity as the price become high. Moreover, Harford et al. (2009) explain that bidders are more prone to use equity when the target value is high because internal funds are limited.

Martin (1996), Faccio and Masulis (2005) and Karampatsas et al. (2014) report that tender offers are more likely to be financed with cash. The variable *tender offer* is a dummy variable taking the value 1 if the deal involves a tender offer, 0 otherwise.

As Faccio and Masulis (2005), we define the dummy variable *cross border* to study the possibility that investors have a home country bias in their portfolio. Seller are less likely to receive equity from bidders coming from other countries because of the exchange risk, higher trading costs and limited access to bidder information. If the deal is occurring between two players from the same country, the variable takes the value 0, 1 otherwise.

Market conditions variables

In order to capture the market credit conditions, we use the variable *interest rate* as a proxy which is the interest rate of the European Central Bank. Ross et al. (2008) state that cash financing choice is positively correlated with credit market conditions. If rates are low, firms tend to access the public debt market and to use cash.

4 Methodology

4.1 Approach

This section focuses on the methodology applied and all the parameters set up. We describe each analysis as well as its assumptions to be statistically valid. We discuss the results obtained from these analyses in the next section. We apply a deductive approach which consists of identifying theories based on the literature and then testing it with data.

The methodology used in this study is based on the approaches applied by Karampatsas et al. (2014) and Faccio and Masulis (2005). Karampatsas et al. (2014) investigate credit ratings as a measure of debt capacity on the US market. Faccio and Masulis (2005) analyze the determinants of the payment form in European M&A. We based our analysis on the credit rating analysis of Karampatsas and we accommodate our variables and approach to the European market considering Faccio and Masulis (2005).

Our hypotheses are tested with quantitative data measuring our variables defined in the previous section. Most of our data are secondary, meaning that these have been collected for another purpose by someone else (including common databases). Part of our data is primary collected by ourselves whenever required.

In order to perform our analysis, we use Microsoft Excel to manage our variable database and the SPSS software to perform a range of statistical tests. Subsequently, we use the R commander software which allows sophisticated empirical analysis for which SPSS is limited.

The first range of analysis is made on the overall sample without any transformation of variables. We use descriptive statistics and tests in order to get preliminary indications of the behavior of our variables. Moreover, we create a correlation table to distinguish correlation among variables. The second analysis consists of several regressions to determine factors impacting the medium of exchange. Finally, we perform additionally robustness tests to validate our results. These analyses require certain assumptions as well as the modification of our sample and variables.

4.2 Sample and Data

Similar to Karampatsas et al. (2014) in their study on the American market, we downloaded a sample of European domestic acquisitions announced over the period January 1, 2005 and December 31, 2015. Bidders come from countries member of the European Economic Area to ensure a certain homogeneity.

The sample consists of 8 576 observations from the database Thomson Financial SDC. We excluded all deals classified as repurchases, liquidations, restructurings, divestitures, leveraged buyouts, reverse takeovers, privatizations, bankruptcy acquisitions and going private transactions. Moreover, we required that all deals are completed and that the character of the deal is known. We imposed that the acquirer owns less than 10% of target shares before the announcement and acquired more than 50% after the operation to ensure a transfer of control. Deals worth less than 1 US \$ million are excluded to avoid noise in the analysis. Furthermore, we need to know the percentage of cash used as well as the transaction value for each deals and we make sure to delete potential outliers to perform a correct analysis. These manipulations reduced our data to 2 226 observations.

We used BLOOMBERG to obtain the credit ratings and companies information. Credit rating is the long-term foreign issuer credit ratings of Standard & Poor's (S&P). We chose the long-term foreign issue to have a better measurement scale among countries. As we said earlier, the foreign issue takes into account risks relative to differences between countries legislation contrary to the local issue. We consider Standard & Poor's because it is the largest agency providing the majority of ratings. We did not use ratings from other agencies because even if their process is similar, it happens that two agencies give two different rating level to the same firm. This can lead to imprecision in the analysis.

In our sample, the highest level of rating for the acquirer is AA and the lowest is CCC-. 175 companies had a rating one month prior the acquisition announcement against 723 without one. Out of our 889 observations, we obtained the *cash flows* information for 523 companies and the *leverage* information for only 362 companies.

The *interest rates* are the deposit facility rates mentioned on the European central bank website⁶.

It must be noted that as most of our data are secondary (BLOOMBERG, Thomson SDC), our results can be less reliable. However, these databases are well-known and widespread among researchers making them trustworthy. Moreover, our data are spread among different sources resulting in higher validity. We think that our data are robust and inferences will not be affected by our sample selection.

4.3 Descriptive statistics

We start our analysis with descriptive statistics. Descriptive statistics include the proportion of each variable, the mean as well as an associated mean test. We classify our variables categories in groups according to a factor. The first table reports the descriptive statistics for the overall sample regarding the payment methods. The second table reports the descriptive statistics according to the existence of a credit rating. The tables are shown in the results section.

The mean or expected value of each variable is simply the arithmetic mean. To test if the mean values of our variables are equal among groups, we use the **F-tests** for continuous variables. As we have more than two groups, we use the one-way **analysis of variance** (ANOVA) which is an extension of the two sample hypotheses testing for comparing means among two groups. (Thomas, 1996).

$$F = \frac{\text{Between group variability}}{\text{Within group variability}}$$

The null hypothesis states no difference between means. The analysis of variance is sensitive to some assumptions (Thomas, 1996). First, the observations are supposed to have a normal distribution. By looking at the histogram of distributions, we see that our variables do not have a normal distribution. However, our sample contains more than 30 observations and has approximately the same size for each group. Moreover, the distribution is symmetrical

⁶Retrieved from <https://www.ecb.europa.eu/stats/monetary/rates/html/index.en.html> on 22/06/2016

for each category. In this case the violation of normality should not be a problem. Second, the variance among groups is supposed to be homogeneous. We use the **Levene's test** to check the homogeneity of variances. Some of our variables reject the test whereas other fail to reject it. As the normal distribution and the variance homogeneity are not strongly respected, we prefer to use a non-parametric test to get the F-test. A non-parametric test is less powerful but less restrictive regarding the two previous assumptions. The **Brown-Forsythe test** for equality mean is robust to non homogeneity of variances and non normal distribution (Thomas, 1996).

For the categorical variables, we tested the mean differences by computing a **Pearson's chi-squared test**. This test evaluates how likely the mean difference between groups is due to chance. The null hypothesis states no difference among groups.

4.4 Correlation

We look at the correlation matrix of our variables to distinguish the relationships among them. As our variables do not follow a normal distribution, we use the **spearman coefficient** which is non parametric. This coefficient lies into $[-1,1]$ with -1 a perfect negative correlation and +1 a perfect positive correlation.

Figure 3: Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Rating existence (1)	1,000												
Rating level (2)	-	1,000											
Size (3)	,467	,316	1,000										
Transaction value (4)	,373	,218	,620	1,000									
Cash flows (5)	,431	,218	,508	,503	1,000								
Leverage (6)	,177	-,038	,238	,107	,231	1,000							
Tender offer (7)	,133	-,005	,228	,374	,030	-,107	1,000						
Number of bidders (8)	,364	,149	,252	,224	,179	,143	,087	1,000					
Diversifying deals (9)	,080	-,046	-,012	-,038	-,014	,038	,017	,047	1,000				
Interest rate (10)	-,025	,160	-,052	,021	,025	-,068	,087	-,211	-,013	1,000			
Relative size (11)	-,124	,023	-,003	-,003	-,135	,023	,002	-,043	-,054	-,053	1,000		
Hostile deals (12)	,139	,006	,082	,082	-,049	,153	,076	,002	,041	,084	-,018	1,000	
Cross-border (13)	,142	-,002	,212	,212	,144	-,003	,034	,063	-,057	,021	,016	,038	1,000

The figure 3 is the correlation matrix of the variables. There is no strong correlation of our main variables (*rating existence* and *rating level*) with the other variables. A higher correlation is seen between the variables *size* and *cash flows* as well as *transaction value* and *relative size*. This is not surprising considering that large transactions imply big companies with high cash flows. This is a first indication that we have to pay attention to multicollinearity problems that may occur in empirical analysis. We will address this issue in the next sections.

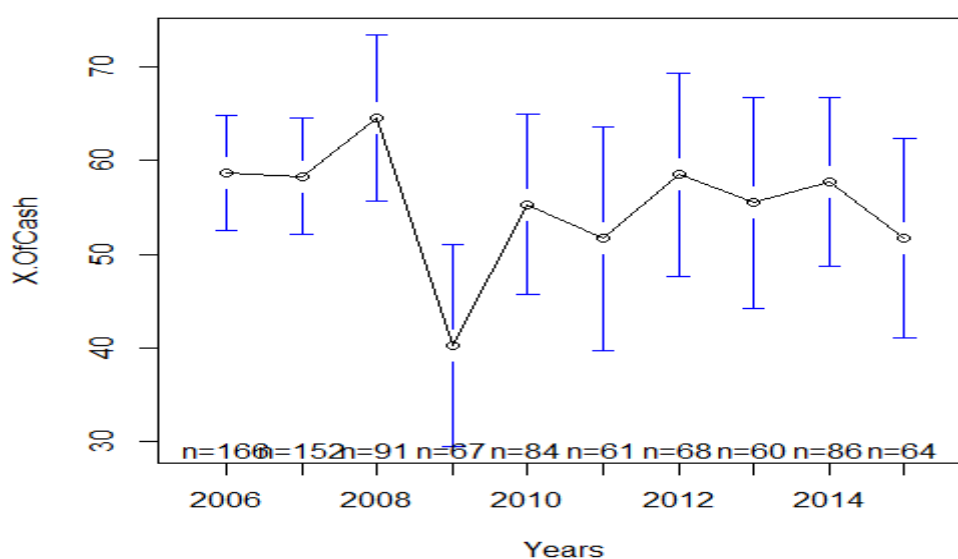
4.5 Empirical analysis

All the programming code used to perform the analyses with the software Rcommander are reported in the Appendix D.

4.5.1 Sample

Our panel data is a cross sectional time series data meaning that the behavior of our entities is observed across time. In our case, the entity is the fraction of cash used during a transaction. In the figure 4, the percentage of cash used is reported in function of years. Interestingly, we see an abrupt fall in the use of cash in 2009. This may be due to the financial crisis of 2008. As we mentioned in the literature review, companies face several problems of financing their deals since the Eurozone crisis.

Figure 4: Percentage of cash per year



By using a year factor in our solver which applies a dummy variable to each year, our regressions control fix-effects whose coefficients are suppressed (Zelig Project, 2015).

Our observations have to be adapted for the reliability of the empirical analysis. Three of our variables follow an exponential distribution. These variables are *size*, *transaction value* and *cash flows* which measure the amounts. We can see on graphs in the Appendix E that they have a positive skewness. Because time series are heteroskedastic, we use the natural logarithmic transformation to stabilize the variance of our series.

Finally, the variable *hostile deal* has not enough observations when taking the value 1 and causes the variance matrix to be singular when controlling fix-effects. Thus we decide to drop it.

4.5.2 Tobit models

We start our empirical analysis with regressions to observe the relationships between our variables. The purpose of regressions is to describe the behavior of the dependent variable when modifying independent variables. As we said, we want to explore the influence of credit ratings and others variables on the medium of payment. We begin with a quantitative analysis on our first dependent variable which is the *fraction of cash* used by the bidder to finance a deal. The variable lies into the interval $[0,100]$, so we use a two-boundary Tobit estimator with 0 and 100 as the censoring points. Censoring means that when a value is above or below the threshold, it takes the value of that threshold, so that the true value might be equal or outside the threshold (Zelig Project, 2015). However, the interpretation of the coefficient is not the same as with normal linear regressions (McDonald et al., 1980). Instead of seeing the influence of X on Y , we have to interpret coefficients as the combination of

- 1) The change in Y of those outside the censors weighted by the probability of being outside the censors.
- 2) The change in the probability of being outside the censors, weighted by the expected value of Y to be outside the censors.

Thus the coefficients do not give direct information on the proportion of cash but we use it as an indication for significance and sign.

The general form of our model is thus:

$$Y_i = \beta X_i + U_i, U_i \sim N(0, \sigma^2) \quad \text{with} \quad Y_i = \begin{cases} \text{if } Y_i \leq 0 \\ \text{if } 0 < Y_i < 100 \\ \text{if } 100 \leq Y_i \end{cases}$$

Since we have three hypotheses, we run three different regressions for each of them:

1. Regressions of the percentage of cash on the credit rating existence

We examine the first hypothesis: Companies holding a credit rating are more likely to finance deals with cash. Thus, our main interesting variable is the *rating existence* which takes the value of 1 if the company has a rating, 0 otherwise.

$$\begin{aligned} \text{Percentage of cash} = & \beta + \beta 1. \text{Rating existence} + \beta 2. \text{Ln(Size)} + \\ & \beta 3. \text{Ln(Cash flows)} + \beta 4. \text{Ln Leverage} + \beta 5. \text{Ln(Transaction value)} + \\ & \beta 6. \text{Tender offer} + \beta 7. \text{Number of bidders} + \beta 8. \text{Diversifying} + \beta 9. \text{Relative size} + \\ & \beta 10. \text{Interest rate} + \beta 11. \text{Cross border} \end{aligned}$$

2. Regressions of the percentage of cash on the credit rating level

We examine the second hypothesis: Among rated companies, the quality of rating influences positively the use of cash. Thus, our main variable becomes the *rating level* which takes a value between 1 and 22 according to the rating level.

$$\begin{aligned} \text{Percentage of cash} = & \beta + \beta 1. \text{Rating level} + \beta 2. \text{Ln(Size)} + \\ & \beta 3. \text{Ln(Cash flows)} + \beta 4. \text{Ln Leverage} + \beta 5. \text{Ln(Transaction value)} + \\ & \beta 6. \text{Tender offer} + \beta 7. \text{Number of bidders} + \beta 8. \text{Diversifying} + \beta 9. \text{Relative size} + \\ & \beta 10. \text{Interest rate} + \beta 11. \text{Cross border} \end{aligned}$$

3. Regressions of the percentage of cash on the investment grade

Finally, we examine our third hypothesis: Rated companies use more cash if their rating belongs to the investment grade. Our main variable becomes the *investment grade* which takes the value of 1 if the rating belongs to the investment grade, 0 otherwise.

$$\begin{aligned} \text{Percentage of cash} = & \beta + \beta 1. \text{Investment grade} + \beta 2. \text{Ln(Size)} + \\ & \beta 3. \text{Ln(Cash flows)} + \beta 4. \text{Ln Leverage} + \beta 5. \text{Ln(Transaction value)} + \\ & \beta 6. \text{Tender offer} + \beta 7. \text{Number of bidders} + \beta 8. \text{Diversifying} + \beta 9. \text{Relative size} + \\ & \beta 10. \text{Interest rate} + \beta 11. \text{Cross border} \end{aligned}$$

The first regression aims to determine if the existence of a credit rating affects the use of cash. The two second regressions are used to see whether rated companies are more likely to finance deals with cash in function of their rating level.

4.5.3 Regression assumptions

The Tobit regressions required several assumptions to be statistically valid (Thomas, 1996). First, the error term has to be normally distributed: $\epsilon | X \sim N(0, \sigma^2 I_n)$. We use a Q-Q (Quantile-Quantile) plot which is a probability plot comparing the residuals of a normal distribution against the residuals distribution of the model. If normality is respected, the graph shows a straight line. Moreover, the model should respect the homoscedasticity which means that the variances among the error terms are the same: $E[\epsilon_i^2 | X] = \sigma^2$. Because we have time series data, we expect the presence of heteroscedasticity. But we verify this by using a scatter plot of the residuals from the models on the expected residuals. If a pattern can be detected in the plot, we are in presence of heteroscedasticity and thus the assumption is violated (Thomas, 1996).

The Appendix F shows the Q-Q plots and residual scatter plots for the three regressions. We assume that the normality assumption is relatively respected for our three models. However, we are in presence of homoscedasticity because we can clearly identify a pattern among the model residuals. As our models are not heteroscedastic, our estimation risks are not consistent. Thus we use the heteroscedasticity-consistent covariance matrix estimator

based on sandwich estimator (Zelig Project, 2015). It gives robust standard errors against heteroscedasticity.

As we saw in the correlation matrix tabl, there are some important correlations between our dependent variables which can lead to multicollinearity problems. Multicollinearity means that one independent variable is linearly predicted from other independent variables (Thomas, 1996). The coefficients of the regression become extremely sensitive to a small change in the model or in the data. The reliability of the model remains the same but it affects the accuracy of the individual predictors. To detect this effect we use the **variance inflation factor** (VIF) which estimates the multicollinearity. The value of this factor lies into [1,10] with 1 meaning no co linearity and 10 strong co linearity. The acceptable value should remain under 5.

Figure 5: Table of variance inflation factors

Variables	First regression	Second regression	Third regression
Rating existence	1,588		
Rating level		1,356	
Investment grade			1,286
Ln (Size)	1,737	1,421	1,382
Ln(Cash flows)	2,520	1,582	1,539
Leverage	1,112	1,180	1,178
Ln(Transaction value)	1,951	1,543	1,543
Tender offer	1,169	1,382	1,402
Number of bidders	1,319	1,353	1,439
Diversifying deals	1,108	1,166	1,182
Relative size	1,037	1,069	1,069
Cross border	1,143	1,170	1,188
Interest rate	1,141	1,334	1,322

The table above (figure 5) shows the variance inflation factor for the three regressions. All the coefficients are quiet low. We can assume the absence of multicollinearity among our independent variables.

4.5.4 Coefficients analysis

After running the models, the coefficients are tested to know their significance. In the Tobit regressions, we use the **z-test** with the null hypothesis that a coefficient is equal to 0. The related p value indicates if we can reject or not the null hypothesis. Generally, we reject the null hypothesis if the p value is lower than 5%. In this study, we make the distinction between p values that are acceptable at the level of 1%, 5% and 10%. The results of these tests are debated in the results section.

Given that our regressions are not ordinary least squares (OLS), we cannot compute a R^2 value. The R^2 value indicates how the model explains the variance of the dependant variable. Using the Tobit regressions, we can compute a pseudo R^2 like the McFadden's pseudo R^2 . However, it does not measure that the model is adequately represented. It measures the changes in the likelihood and the related quantities (Thomas, 1996). For these reasons, we do not use a pseudo R^2 to avoid misunderstanding.

4.6 Endogeneity

As described by Blommegård Håkansson and Ranhult (2014), the problem of endogeneity is common in empirical finance studies. This phenomenon is the correlation between the dependent variables and the error term in the regression.

$$Cov(X_i, \varepsilon) \neq 0$$

When there is endogeneity, outcome can be biased and parameters might be inconsistent which makes impossible reliable inference (Thomas, 1996). Even if tools exist to overcome the endogeneity problem, as the error term is unobservable, we cannot be entirely sure that endogeneity is completely mitigated. In our case, endogeneity may have two main sources. First, omitted variables in the regression and second the selection bias. *Omitted variables* means that some variables which should be included in the model are not, and end up in the error term. It happens that omitted variables ending in the error term are correlated with the independent variables creating endogeneity. The *selection bias* means that the data are

not randomly assigned to different categories. In our model, we treat our credit ratings variables as exogenous. It supposes that credit ratings and ratings level have been assigned randomly across the sample. Karampatsas et al. (2014) show that in fact firms can partially decide if they want to be rated or if they want to be upgraded. Thus, we do not take into account that credit ratings are partially based on the firm characteristics and are potentially not randomly distributed.

The Hausman test is used to detect endogeneity by running regressions of our explanatory variables (credit rating variables) on the control and instrumental variables (Thomas, 1996). Instrumental variables must satisfy two requirements. First, they must be correlated with our credit rating variables which are endogenous. Second, they have to be uncorrelated with the error term. This second condition is more difficult to test as the error term is unobservable. Moreover, when an instrumental variable is correlated with the dependent variables, it has more probability to be correlated with the error term.

We follow the methodology used by Karampatsas et al. (2014) to choose our instrumental variables. The first variable is *regulated industry* which is included in the three regressions. This is a dummy variable taking the value of 1 if company is a financial institution, 0 otherwise. Regulated companies depend more on the debt market compared to others because they face lower agency costs and do not require monitoring. Karampatsas et al. (2014) argue that it facilitates the procurement of credit ratings because these firms reveal their cost of capital. In our study, we define financial institutions as: banks, credit institutions, insurances and investment firms.

The second instrumental variable is the *industry fraction*. Faulkender and Petersen (2006) explain that firms in well-established industries have more probability to get a credit rating. Investors know the industry and the associated risks. To account for this effect, the variable is measured as the log of 1 plus the fraction of firms in the same industry group at the year immediately prior to the acquisition announcement. For rated companies, we use the *industry level* which is the median of rating level of the companies within an industry. Public markets are more likely to invest in profitable or safe industries with low default risk. To control these effects we use the instrumental variable *industry cash flows* which is the median ratio of cash flows to equity from companies being in the same industry. Moreover,

to capture the effect of risk we define the variable *industry risk* which is the standard deviation of cash flows to equity from companies being in the same industry.

The first step for the Hausman tests is to define the reduced regressions. We run our credit ratings variables on the control and instrumental variables:

- 1) $Rating\ existence = \beta + \beta 1.Regulated\ industry + \beta 2.Industry\ fraction + \beta 3.Industry\ cash\ flows + \beta 4.Industry\ risk + \beta 5.Ln(Size) + \beta 6.ln(Cash\ flows) + \beta 7.Leverage + \beta 8.ln(Transaction\ value) + \beta 9.Tender\ offer + \beta 10.Number\ of\ Bidders + \beta 11.Diversifying + \beta 12.Relative\ size + \beta 13.Cross\ border + \beta 14.Interest\ rate$
- 2) $Rating\ level = \beta + \beta 1.Regulated\ industry + \beta 2.Industry\ level + \beta 3.Industry\ cash\ flows + \beta 4.Industry\ risk + \beta 5.Ln(Size) + \beta 6.ln(Cash\ flows) + \beta 7.Leverage + \beta 8.ln(Transaction\ value) + \beta 9.Tender\ offer + \beta 10.Number\ of\ Bidders + \beta 11.Diversifying + \beta 12.Relative\ size + \beta 13.Cross\ border + \beta 14.Interest\ rate$
- 3) $Investment\ grade = \beta + \beta 1.Regulated\ industry + \beta 2.Industry\ level + \beta 3.Industry\ profitability + \beta 4.Industry\ risk + \beta 5.Ln(Size) + \beta 6.ln(Cash\ flows) + \beta 7.Leverage + \beta 8.ln(Transaction\ value) + \beta 9.Tender\ offer + \beta 10.Number\ of\ Bidders + \beta 11.Diversifying + \beta 12.Relative\ size + \beta 13.Cross\ border + \beta 14.Interest\ rate$

Thereafter we take the fitted values of each regression and put it in the initial regressions. If the residuals of the variable are significant, it is endogenous.

Beside the p-value associated with each coefficient, we test the overall weakness of each model with an F-statistic. However, some of our regressions (1) and (3) are non linear which makes impossible the use of the F-statistic. As Karampatas et al. (2014), we report the identification statistics for the closest linear model analog. Thus, we compute the F-statistics of the ordinary least square regressions for all our reduced regressions.

The Appendix G shows the output of the reduced regressions and the Appendix H summarizes these output in a table. We see that the instrumental variables *regulated*

industry and *industry risk* are not significant in the three regressions. On the opposite, the variable *industry cash flows* shows significance at the level of 10%. The *industry fraction* and *industry level* show significance at the level of 1% in our three regressions. Moreover, the F-statistics show that all models are significant.

The table below (Figure 6) presents the results of the Hausman tests we performed after introducing the fitted values of the credit rating variables. In all cases, our main variables do not show any sign of endogeneity as the fitted values from the reduced regressions of *rating existence*, *rating level* and *investment grade* are not significant. This means that these variables are exogenous and are not correlated with the error term. Our regressions are thus robust against endogeneity, probably because of the reduced size of our sample. The complete regressions of Hausman tests are exposed in the Appendix I.

Figure 6: Table of Hausman tests

Variable	Total sample	Sample with credit ratings	
	<i>Rating existence (1)</i>	<i>Rating level (2)</i>	<i>Investment grade (3)</i>
Constant	272,23* (1,692)	1180,26** (2,307)	1188,44** (2,369)
Rating existence	138,75*** (2,879)		
Residual rating existence	26,95 (0,240)		
Rating level		15,816 (1,094)	
Residual Rating level		-6,136 (-0,323)	
Investment grade			42,63 (0,398)
Residual Investment grade			-62,48 (-0,427)
Ln (Size)	12,01 (1,320)	-9,375 (-0,649)	-7,86 (-0,606)
Ln (Cash flows)	4,58 (0,383)	44,41** (2,004)	42,26** (2,154)
Leverage	-168,56* (-1,820)	-763,23*** (-2,946)	-764,70*** (-3,051)
Ln (Transaction Value)	-61,73*** (-4,093)	-121,92*** (-2,697)	-120,26*** (-2,666)
Tender offer	107,56*** (2,936)	142,00 (1,593)	133,09 (1,540)
Number of bidders	-5,90 (-0,126)	97,016* (1,612)	109,17 (1,533)
Diversifying deals	37,51 (1,133)	155,25** (2,019)	159,24** (2,051)
Relative size	-60,14** (-2,172)	-92,42** (-2,174)	-91,6** (-2,101)
Cross-border	62,31* (1,749)	126,036* (1,686)	151,29* (1,916)
Interest rate	16,55 (0,247)	-153,68 (-0,739)	-111,9 (-0,593)
N	269	122	122

4.7 Further robustness test

In this section we focus on the qualitative choice to finance a deal with stock, cash or a combination of both. Often, the bidder does not determine the percentage of cash used to finance the transaction. Instead, the medium of exchange is rather defined as a choice between cash, stock or a combination.

We use an ordered Probit model where the dependent variable is the *payment method* taking 0 for pure stock deals, 1 for a combination of cash and stock and 2 for all cash deals. The Probit model is based on the cumulative normal distribution (Thomas, 1996):

$$F(Y_i) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{Y_i^2}{2}\right)$$

The equation is the following:

$$Y = \beta \cdot X^T + \varepsilon \quad \text{Whit } Y = \begin{cases} 0 & \text{if stock} \\ 1 & \text{if mix} \\ 2 & \text{if cash} \end{cases}$$

β is the vector of regression coefficients and X^T the vector of independent variables which are the same as in the previous model.

Our sample already fit all the assumptions required to run a Probit model. First, there is no multicollinearity among our observations. Second, the residuals do not show any outliers. Third, our sample is quite large. Moreover, we still control fixed-effect in our regressions by using a year factor which put a dummy variable on each year.

The ordered Probit model coefficients differ by a scale factor which makes impossible the interpretation of the magnitude. However, the coefficients are useful to analyze the significance on the *payment method*. The sign of the coefficient indicates if a coefficient is more likely or less likely to be in the higher categories (cash) or in the lower categories (stock). For these reasons, we use the Probit regressions in this study as a robustness test of our previous models.

5 Results

5.1 Descriptive statistics

Figure 7: Table of descriptive statistics - payment method

Variable	Total sample	Cash	Stock	Mix	Test statistic (p value)
Rating existence (%)	19,5	42,4	10,5	4,3	X=167,15 (0,000)
Size (US \$ million)	11018,03	16261,57	15876,76	2147,00	F=4,013 (0.019)
Cash flows (US \$ million)	359,64	518,29	247,92	103,71	F = 2,4 (0,101)
Leverage (US \$ million)	0,20	0,21	0,22	0,18	F=0.997 (0.376)
Transaction value (US \$ million)	674,22	571,24	1095,38	444,03	F=2.477 (0.085)
Tender offers (%)	21	36,4	19,9	8,3	X=75,963 (0,000)
Number of bidders	1,09	1,18	1,07	1,06	X=25,728 (0,000)
Hostile deals (%)	2,7	4,1	2,0	2,1	X=3,222 (0,200)
Diversifying deals (%)	43,9	52,2	40,6	38,5	X=13,809 (0,001)
Relative size	0,49	0,36	0,49	0,44	F=0.814 (0.484)
Cross borders (%)	26,1	31 ,6	24,6	22,3	X=7,917 (0,019)
Interest rate	1,19	1,17	0,99	1,35	F=6,224 (0.002)
N	889	316	256	327	

The table shows the mean for our total sample and for the three different methods of payment (cash, stocks and a combination of both). It indicates that for the entire sample of 889 deals, 316 operations were financed only with cash and 256 operations only with stocks. In 327 deals, there is a combination of cash and stocks. The highlighted variables are significantly different between categories.

The goal of this section is to investigate how is composed our sample before performing the empirical analysis. It gives some useful initial indications on the behaviour of the variables.

The *rating existence* is significantly different among the three categories (cash, stocks and mix). The average rate of acquirers holding a credit rating is higher in cash payment (42 %) whereas acquirers using the combination of cash and shares have the lowest rate (4,3 %). This is a first indication supporting the influence of credit ratings on the use of cash as method of payment.

Regarding characteristics of the firms, the average acquirer *size* is quite large in pure cash (16 261 US \$ million) and pure stock (15 876 US \$ million) compared to the combination (2 174 US \$ million). The average *cash flows* is also higher in pure cash (518 US \$ million) than in pure stock (247 US \$ million) and in mix (103 US \$ million) at a 10% level of significance. Regarding the *leverage* we cannot see a significant difference between the categories, but the sample is reduced for this variable (n=362). It reveals that firms paying in pure cash or in pure stocks are bigger and enjoy large cash flows.

Concerning deal characteristics, the averages of *tender offer* (36,4%) and of *number of bidders* (1,09) are both quite higher in pure cash than in pure stocks (respectively 8,3% and 1,06). Moreover, the averages of *diversifying deals* and *cross border deals* are the lowest in pure stocks (respectively 28,5 % and 30,1%). The average *cross border deals* is 26,1% meaning that most of European M&A are between participants from the same country. The average transaction value is the highest in pure stocks (1095 US \$ million) followed by pure cash (571 US \$ million) and the combination of both (444 US \$ million). This follows the findings of Moeller et al. (2004) that larger firms are more likely to settle transactions with equity exchange. The average percentage of *hostile deals* and the *relative size* are not significantly different between categories.

The *interest rate* is statistically quite different among groups and higher in mix (1,35 %) than in pure cash (1,17 %) and in stocks (0,99 %). This is surprising as literature tends to indicate that low interest rates encourage cash utilization (Ross et al., 2008).

The first set of descriptive statistics gives a first indication on the positive influence of a credit rating on the use of cash as a method of payment. Moreover, it reveals that some deal characteristics (*tender offer*, *number of bidders*, *diversifying deals* and *cross border deals*) are higher in pure cash deals. At the opposite, the *transaction value* is higher in pure stock deals. The *bidder size* and *cash flows* are bigger in pure cash and in pure stocks compared to the combination of both.

Figure 8: Table of descriptive statistics - credit rating

Variable	With credit ratings		Without credit ratings		Test statistic (p value)
	Mean	N	Mean	N	Test
Percentage of cash	80,22	175	50,42	724	F=84,736 (0,000)
Size (US \$ million)	42972,89	175	3294,14	724	F=15,101 (0,000)
Cash flows (US \$ million)	1127,52	151	52,90	378	F=7,090 (0,009)
Leverage	0,24	166	0,18	196	F=8,809 (0,003)
Transaction value (US \$ million)	2173,18	175	311,90	724	F=12,446 (0,001)
Tender offers (%)	32,6	175	18,80	724	X=15,889 (0,000)
Number of bidders	1,39	175	1,03	724	X=119,499 (0,000)
Hostile deals (%)	7,40	175	1,70	724	X=17,362 (0,000)
Diversifying deals (%)	52,0	175	42,0	724	X=5,734 (0,017)
Relative size	0,36	154	0,44	473	F=0,720 (0,397)
Cross border (%)	38,9	175	23,1	724	X=18,202 (0,000)
Interest rate	1,14	175	1,2	724	F=0,318 (0,573)

The table shows descriptive statistics depending upon the existence of a credit rating. It indicates that for a sample of 889 deals, 175 operations include a rated bidder whereas 724 operations include unrated bidders. The highlighted variables are significantly different between categories.

The *percentage of cash* (part of the total price paid by the bidder to the target's shareholders) is bigger for rated companies (80,22 %) compared to unrated companies (50,42 %). This is a second indication of our first hypothesis arguing that the existence of credit ratings positively impacts the use of cash.

The table reveals a lot of differences in the variables between firms holding a rating and those without one. Regarding characteristics of the firms, rated acquirers are larger, have more leverage and enjoy more cash flows. Rated firms involve usually more mature companies with steady cash flows and a certain level of debt. Moreover, the difference in leverage supports the findings from Faulkender and Petersen (2006) who discovered that rated firms have on average 35% more leverage.

All the deal characteristics variables are on average significantly higher among rated companies except the *relative size* which is on average higher in pure stocks. However, this last variable is not statistically significant. The average *interest rate* measuring the market conditions is not statistically different between groups.

By matching the two tables, we see that companies who pay with cash have similar characteristics than companies holding a credit rating: large size, higher cash flows and leverage. However, this does not imply that rated firms pay with cash. We present in the next sections a multivariate analysis that will determine which influence is significant on the financing form.

5.2 Empirical analysis

The table below summarized the output of the Tobit regressions. The entire results are in the Appendix J.

Figure 9: Table of Tobit regressions

Variable	Total sample		Credit ratings sample			
	Rating existence		Rating level		Investment grade	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	27,97*** (2,547)	250,54 (1,558)	431,03** (2,128)	1120,08** (2,176)	505,95*** (2,650)	1166,32** (2,337)
Rating existence	84,13*** (6,345)	135,94*** (3,228)				
Rating level			7,98 (0,733)	18,37 (1,311)		
Investment grade					52,42 (0,587)	52,59 (0,563)
Ln (Size)	5,15*** (2,885)	13,91* (1,666)	-25,78 (-1,585)	-8,75 (-0,572)	-25,60 (-1,586)	-6,33 (-0,459)
Ln (Cash flows)		4,43 (0,435)		42,60** (1,967)		44,86** (2,056)
Leverage		-175,09** (-1,890)		-796,51*** (-2,950)		-797,79*** (-3,003)
Ln (Transaction Value)		-62,31*** (-4,336)		-123,04*** (-2,688)		-119,53*** (-2,636)
Tender offer		101,79*** (2,808)		131,77 (1,493)		115,99 (1,330)
Number of bidders		18,66 (0,498)		117,49* (1,827)		117,52* (1,655)
Diversifying deals		52,58* (1,631)		178,64** (2,211)		179,41** (2,190)
Relative size		-62,48** (-2,192)		-95,60** (-2,117)		-97,10** (-2,100)
Cross-border		51,14 (1,537)		93,61 (1,340)		117,91 (1,574)
Interest rate		17,43 (0,253)		-176,32 (-0,922)		-121,29 (-0,676)
N	832	277	175	125	175	125

The table regroups the Tobit regressions with percentage of cash as the dependent variable. The first, third and sixth regressions include only bidder characteristics, meanwhile the other ones include all the control variables. The p-value is in italic with ***, **, * indicates a significance at a level of respectively 1%, 5%, 10%. The z value is between brackets and the highlighted variables are significant in all regressions.

Credit rating existence

The goal of this section is to answer our hypotheses through an empirical analysis. Our first hypothesis states that **companies holding a credit rating are more likely to finance deals with cash**. Two regressions are performed with some specifications. The first specification (1) is a regression including only the *rating existence* and the *bidder size* because they are both a measure of debt capacity. The second specification (2) includes all the other dependent variables.

In the first specification (1), the *rating existence* and *bidder size* are positive and significant at a level of 1%. The *bidder size* is positive and supports the debt capacity theory arguing that large firms are more diversified and are able to issue more debt to finance deals with cash (Karampatsas et al. 2013). In the second specification (2), the *bidder size* is still significant but at a lower level whereas the *rating existence* is still strongly significant. Consequently, these results support our first hypothesis: companies holding a rating are more likely to finance deals with cash. We believe this is due to the fact that ratings improve the debt capacity by reducing financial constraints and enhancing access to public debt markets. Therefore, rated companies can rely more on debt to finance their acquisitions with cash. Our results are not in line with the results from Karampatsas et al. (2014) who did not find any relationship between quotation existence and use of cash. However, it reflects previous studies showing the impact of credit rating on financing choices (Tang (2009), Kisgen (2006, 2007, 2009)).

Among our dependent variables, *transaction value*, *leverage*, *tender offer*, *diversifying deals* and *relative size* are significant. *Transaction value* has a negative impact on the use of cash as expected. It supports the idea that if the target size is important, the bidder will finance the deal with equity because its internal funds are limited (Harford et al., 2009). Moreover, this is in line with the model of Berk et al. (2014) indicating that the propensity of a seller to accept an equity offer increases as its own share value increases. The *leverage* variable has a negative influence on cash. In accordance with Faccio and Masulis (2005), it supports the idea that firms with more leverage are more likely to use equity to avoid the issue of new debt. Interestingly, American studies (Karampatsas et al. 2014, Harford et al., (2009)) report a positive effect of leverage on cash. They argue that firms willing to pay with equity usually

have larger growth opportunities and less leverage. It may indicate a potential difference between European and American bidders on the way their financial condition influences their medium of exchange. As in the study of Karampatsas et al. (2014) and Faccio and Masulis (2005), *tender offers* are more likely to be financed by cash. The diversification (*diversifying deals*) has a positive impact on the use of cash supporting the idea that sellers are less likely to accept an equity offer if the bidder is operating in another industry. In this case, sellers have less information about the risks and prospects of the bidder business and the true value of the bidder (Faccio & Masulis, 2005). By accepting cash they mitigate the risk of overvaluation.

Once again, the study of Karampatsas et al. (2014) does not report a significant impact of diversification on American M&A. The significance in European studies may reveal a higher risk aversion among European participants who are more risk sensitive. Finally, the *relative size* variables impact negatively the use of cash. It measures the information asymmetry occurring between the bidder and the seller. Thus, when the target size relative to the bidder increases, the bidder is more likely to use equity to overcome the increasing information asymmetry (Hansen, 1987).

Cash flows, *number of bidders* and *cross border* are not statistically significant but have a positive sign as expected. The *cash flows* variable has a positive sign supporting the Pecking Order Theory (Myers, 1984) which explains that managers use first internal funds, followed by debt and then the issue of new equity. It is also in line with the theory of Jensen (1986) about the use of excessive cash by managers. The *number of bidders* variable is positive showing that bidders tend to use cash to mitigate the competition. Cash is the fastest way to conclude the deal ((Fishman (1989) and Berkovitch & Narayanan (1990)). The variable *cross border* transaction is positive. Sellers prefer to receive cash in cross border deals because through the acceptance of foreign stocks, they face exchange risk, higher trading costs and limited access to bidder's information (Faccio & Masulis, 2005).

The *Interest rate* is the only variable showing unexpected behavior. It has a positive sign which is counter intuitive because high interest rate should discourage debt financing (Ross et al., 2008). However, this variable is insignificant meaning this market condition does not affect the use of cash.

Credit rating level

In the previous section we showed that the existence of a credit rating positively impacts the use of cash. We link this to the higher debt capacity implied by ratings. In this section, we try to determine how the quality of a rating impacts the financing choice in M&A. Precisely, we are looking for an answer to our second hypothesis: **companies holding a credit rating of a better quality are more likely to finance deals with cash**. We use the *credit rating level* as our main variable. The sample consists of rated companies. As in the previous section, two regressions are performed with some specifications. The first specification (3) is a regression including only the *rating level* and the *bidder size* because they are both a measure of debt capacity. The second specification (4) includes all the other dependent variables. This time, the sample is only composed of rated firms and we can observe in the table above (figure 9) that the behavior of some variables is different. This may be because the nature of the firms being rated is different and/or because the sample is reduced (unrated firms are excluded).

In the specifications (3) and (4), the *rating level* variable has a positive sign in both regressions but is insignificant above the 10% level. As a consequence, it does not support our second hypothesis. Karampatsas et al. (2014) found a significantly positive impact of the rating level on the use of cash. Kisgen (2006, 2007, 2009) explains that rated companies pay attention to their capital structure, which may explain our findings. In fact, firms manage their capital structure to maintain the targeted rating level. They take the risk of being downgraded when they issue too much debt. Being downgraded can result in significant financial constraints (higher debt cost and less demand for the issues). Thus, when firms are threatened of being downgraded or are effectively downgraded, they tend to reduce their debt level. This could mean that even though a company has a high credit rating, hence a high debt capacity, they could decide not to issue debt in order to main their rating level. Since we did not take into account the change of rating level nor the companies being threatened of a change, we cannot determine which effect may incite them to limit their debt. The *bidder size* is also insignificant confirming the limits of the debt capacity theory. However, the variable now has a negative sign which is aligned with Moeller et al. (2004) who state that large companies are more likely to finance acquisitions with stocks.

The significance of the variable *cash flows* among rated firms has several implications. First, it confirms the Pecking Order Theory of Myers (1984). Second, it validates the findings of Jensen (1986) supporting that managers exerting in firms with excess cash are tempted to undertake investments with cash. Finally, it is in line with Lemmon and Zender (2010) arguing that the Pecking Order Theory is valid for firms.

The variables *transaction value*, *relative size*, *leverage* and *diversifying deals* have the same influence and significance for rated and unrated firms. Furthermore, the variables *interest rate* and *cross border deals* are still insignificant. *Interest rate* has now a negative sign as expected but is still insignificant. The variable *tender offer* is now insignificant which may be due to the sample reduction. In contrast, the variable *number of bidders* is now significant.

Investment grade

In the two previous sections we studied the impact of the credit rating existence and the rating level. Following our two previous hypotheses, we now investigate the impact of credit rating grade. Our third hypothesis is the following: **companies whose rating belongs to the investment grade are more likely to finance deals with cash**. As in the previous section, two regressions are performed with some specifications. The first specification (5) is a regression including only the *investment grade* and the *bidder size* because they are both a measure of debt capacity. The second specification (4) includes all the other dependent variables. The sample is only composed of rated firms.

The results of specifications (5) and (6) are quite similar from those obtained in (3) and (4). This is normal as these regressions have the same sample composed of rated firms. An *investment grade* rating has a positive sign as expected. Firms being rated in the investment grade face lower debt costs (Chen et al., 2007) and enjoy a larger part of investors due to the absence of regulation restriction for this category (Kisgen, 2007). However, the variable is insignificant, we have thus to reject our third hypothesis. These findings support the idea that debt capacity may not explain the use of cash for rated firms. In fact, even though rated firms face a higher debt capacity, they may not issue debt to maintain their targeted rating (Kisgen, 2007, 2009).

5.3 Further robustness tests and sum up

In this section we perform a qualitative analysis on the payment form in order to validate our previous results. As mentioned in the methodology, the coefficients of the ordered Probit model are complicated to analyze and it is beyond the scope of this study. As a consequence, we just briefly look at the sign and at the significance of the regression. The Appendix K shows the results of the regressions. Most of the results are in line with the previous Tobit regressions. Especially, the variable *rating existence* is still significant and the variables *rating level* and *investment grade* are still insignificant. The rest of the variables follow the same description as previously supporting the reliability of our findings.

This leads us to the conclusion of our results. The following table sums up the hypotheses made on each variable and the results obtained. The positive significance of the variable *rating existence* **validates our first hypothesis** through debt capacity: companies holding a credit rating are more likely to finance deals with cash. However, the variables *rating level* and *investment grade* do **not validate the second and third hypotheses** stating that firms holding ratings of high quality or a investment grade rating are more likely to pay deal with cash. Instead, they rather suggest that European rated companies control their capital structure by moderating their debt level to maintain their rating.

Besides the credit rating variables, we can assume that other variables play a significant role on the payment method in European M&A. *Leverage* is the only variable of firm characteristics significant in all regressions. Its negative effect may highlight a difference between European and American companies. The leverage effect among European companies acts as a financial constraint limiting the issuance of new debt (Faccio & Masulis, 2005). On the contrary, American companies which are likely to pay with cash usually have less growth opportunities and higher leverage (Harford et al., 2009; Karampatsas et al., 2014).

The deal characteristics variables *transaction value*, *relative size* and *diversifying deals* are also significant in all regressions. The variables *transaction value*, *relative size* and *leverage* have a predicted negative impact on cash. The variable *diversifying deals* is significant but to a lesser extent. Once again Faccio and Masulis (2005) report the same for this variable contrary to Karamptsas et al.(2014). This may reflect that European bidders are more risk averse than the American ones.

Figure 10: Table of the results of each variable

Variables	Hypotheses	Results
<i>Credit rating characteristics</i>		
Rating existence	Significantly positive	✓
Rating level	Significantly positive	Positive but insignificant
Investment grade	Significantly positive	Positive but insignificant
<i>Firm characteristics</i>		
Size	Significantly positive	Ambiguous
Cash flows	Significantly positive	✓ for rated firms
Leverage	Ambiguous	Significantly negative
<i>Deal characteristics</i>		
Tender offer	Significantly positive	✓ for the total sample
Transaction value	Significantly negative	✓
Number of bidders	Significantly positive	✓ for rated firms
Diversifying deals	Significantly positive	✓
Relative size	Significantly negative	✓
Cross-border	Significantly positive	Positive but insignificant
<i>Market conditions</i>		
Interest rate	Significantly negative	Ambiguous and insignificant

5.4 Limitations & direction for future research

The source of funding is not determined in our sample. As we explained, cash used by companies can come from internal or external funds. Even if some authors demonstrate that cash comes largely from debt, it would be interesting to further study the theory of debt capacity stating that cash used comes mainly from debt. And if cash used to finance transactions comes from internal funds, it is the auto financing capacity which would be determining and not the credit rating.

This research is based on data from different countries. Even if they are all members of the same economic area which makes the sample more homogeneous, countries have different laws, regulations and taxation systems which is a big issue in the European Union currently. The variable *cross border* may not be enough to capture the home countries effects which might be influencing the results.

Furthermore, we do not distinguish the capital structure of the companies which is determinant. For instance, our sample includes financial institutions which have a capital structure sensibly different from others companies and face less information asymmetry.

The sample studied is relatively small and a larger one may provide more precise results. Another data, the level of managerial ownership, would be an interesting parameter to test as it is reported as an important factor influencing the payment form.

Finally, this analysis could be applied to emerging countries. The mergers and acquisitions activity is in expansion and these markets are in general less creditworthiness and transparent.

6 Conclusion

The aim of this study was to investigate the influence of credit ratings on the payment methods in European mergers and acquisitions. This relationship has been studied through a quantitative analysis using Tobit regressions to answer our research questions.

The first research question analyses the relationship between credit ratings and payment methods.

The results support our first hypothesis which states that companies holding a credit rating are more likely to finance deals with cash. This conclusion is probably due to the fact that rated firms have easier access to public debt markets and usually face lower financial constraints due to lower interest rate granted to such companies. Thus, **rated firms can issue more debt to finance acquisitions with cash than unrated firms.**

The second and third research questions focus on the impact of the rating quality on the payment form.

Our hypotheses state that firms holding a better quality rating and an investment grade are more likely to settle M&A deals in cash rather than with stocks. **The results do not indicate that neither the rating quality nor the rating grade has an effect on the payment form.** This can be explained by the will of the rated firms to keep their capital structure in order to maintain their rating level. They preserve their level of indebtedness to avoid a downgrading of their credit rating. Moreover, if they are threatened of being downgraded or if they are effectively downgraded, they will reduce their leverage.

Thus, the debt capacity theory is supported by the fact that rated companies have more leverage and are more likely to pay with cash. However, even if rated companies face a high debt capacity, they are willing to preserve rating quality by limiting the issuance of new debt.

Concerning the rest of the variables, the results indicate that four **factors are determining for the choice of the payment method.** First, the *transaction value* is negatively correlated with the use of cash. Firms are limited with internal resources. Therefore, the higher the

target value is the more they will use equity. Second, the *relative size* of the target compared to the bidder has also a negative influence on the use of cash. Bidders are less likely to pay with cash as the information asymmetry increases with the relative size. Third, the bidder *leverage* influences positively the use of equity. Our results indicate that European bidders with high leverage are less likely to issue new debt at the opposite of American bidders using cash when they have less growth opportunity and more leverage. Fourth, the *diversifying deal* increases the use of cash. Sellers are reluctant to accept equity because they have little knowledge on the bidder industry risks and prospects. This fact is confirmed by another study on European bidders whereas studies on American bidders do not find this factor significant. It may reveal that European companies are more risk averse compared to American firms.

The credit ratings variables are tested as being exogenous. In addition to the quantitative analysis, we performed a qualitative analysis on the payment methods through Probit regressions. As findings are consistent with the quantitative analysis on the use of cash, we can therefore assert the reliability of our findings.

However, the number of observations is quite small and a bigger sample could provide a better view on the factors influencing the medium of exchange. The limited size of the sample is therefore the reason why results provided in this thesis must be analyzed with caution.

Our work is subject to some other limitations. The financing source is not taken into account. Thus we do not know whether the cash used comes from debt or internal funds. Moreover, changes in credit ratings are not specified making complicated the inference on how rated companies manage their capital structure and their financing choice. Finally, bidders are all part of a common economic area but come from different countries where regulations, law and taxation systems may have an incidence.

This study provides solid indications on how credit rating influences the use of cash in European mergers and acquisitions. This observation could be further studied regarding the limitations stated previously. Moreover, a deeper study of the qualitative analysis regarding the payment choice could be done to understand how credit ratings impact each form of payment. Many studies like ours focus on developed countries where markets are well

established. This analysis could be applied to emerging countries where mergers and acquisitions are in expansion. Those markets are considered as more risky and more opaque, complicating the access to public debt markets.

As demonstrated, financing decisions on the European merger and acquisition arena are strongly influenced by credit rating agencies, whose main actors are institutions that form a kind of oligopoly on the American market. However, the many recent criticisms on their independence and on their lack of anticipation may lead to the creation of new European rating agencies. This will thus restructure the credit rating market and in such cases, new researches will be required to analyze the influence of the newcomers. Research that repeats itself continuously...

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Appendices

Appendix A: Largest deals in Europe

Figure 11: Ten largest deals in Europe⁷

Rank ↕	Year ↕	Acquirer	↕ Target	↕ Value (in bil. USD)
1	1999	Vodafone AirTouch PLC	Mannesmann AG	202.79
2	2000	America Online Inc	Time Warner	164.75
3	2013	Verizon Communications Inc	Verizon Wireless Inc	130.3
4	2015	Anheuser-Busch Inbev	SABMiller PLC	109.28
5	2007	Spin-off	Philip Morris Intl Inc	107.65
6	2007	RFS Holdings BV	ABN-AMRO Holding NV	98.19
7	1999	Pfizer Inc	Warner-Lambert Co	89.17
8	1998	Exxon Corp	Mobil Corp	78.95
9	2000	Glaxo Wellcome PLC	SmithKline Beecham PLC	75.96
10	2004	Royal Dutch Petroleum Co	Shell Transport & Trading Co	74.56

⁷ Retrieved from <https://imaa-institute.org/statistics-mergers-acquisitions> on 24/07/2016

Appendix B: Credit rating process

Figure 12: Credit rating process⁸



⁸Retrieved from <https://www.moodys.com/Pages/amr002001.aspx> on 16/07/2016

Appendix C: Definition of variables

Figure 13: Definition of variables

Variable	Definition
	<i>Measures of payment form</i>
Fraction of cash	Fraction of cash as part of the total price offered by the bidder to the target's shareholders.
Payment method	Categorical variable: 0 for deals financed with stock, 1 for deals financed with a combination of cash and stock, 2 for deals financed with cash.
	<i>Credit rating characteristics</i>
Rating existence	Dummy variable: 1 for rated bidders, 0 for unrated bidders.
Rating level	Continuous variable for rated bidders from 1 (lowest level) to 22 (highest level).
Investment grade	Dummy variable: 1 for investment grade bidders (above BBB-), 0 for speculative grade bidders (below BBB-)
	<i>Firm characteristics</i>
Size	Book value of total assets at the fiscal year-end immediately prior to the acquisition announcement.
Cash flows	Free cash flow to equity at the fiscal year-end immediately prior to the acquisition announcement.
Leverage	Total financial debt divided by the book value of total assets at the fiscal year-end immediately prior to the acquisition announcement.
	<i>Deals characteristics</i>
Tender offer	Dummy variable: 1 if the deal is a tender offer, 0 otherwise.
Transaction Value	Value of the transaction
Number of bidders	Continuous variable from 1 to 3 indicating the number of bidders
Hostile deals	Dummy variable: 1 if the deal is hostile, 0 otherwise.
Diversifying deals	Dummy variable : 1 if the deals implies companies from different industries, 0 otherwise
Relative size	The ratio of the target's total assets on the bidder's total assets
Cross-border	Dummy variable: 1 if bidder and target come from different countries, 0 otherwise.
	<i>Market conditions</i>
Interest rate	Interest rates of the European Central Bank
	<i>Instrumental variables</i>
Regulated industry	Dummy variable: 1 if firms is
Industry fraction	Log of 1 plus the fraction of firms in the same industry that have credit ratings the fiscal year prior to the acquisition announcement
Industry level	The median credit level of firms in the same industry group the fiscal year prior acquisition announcement.
Industry cash flows	The median ratio of free cash flows to equity from companies being in the ssame industry.
Industry risk	The standard deviation of cash flows to equity from companies being in the same industry.

Appendix D: Programming code

Tobit regressions

```
First_regression <- zelig(PercentageOfCash ~ Rating.existence + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), robust = TRUE, below = 0, above = 100, model = "tobit", data = Dataset)
```

```
Second_regression <- zelig(PercentageOfCash ~ Rating.level + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), robust = TRUE, below = 0, above = 100, model = "tobit", data = Dataset)
```

```
Third_regression <- zelig(PercentageOfCash ~ Investment.grade + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), robust = TRUE, below = 0, above = 100, model = "tobit", data = Dataset)
```

Ordered Probit regressions

```
First_regression <- polr(factor(CashorStock) ~ Rating.existence + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), data = Dataset, Hess=TRUE, method=c("probit"))
```

```
Second_regression <- polr(factor(CashorStock) ~ Rating.level + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), data = Dataset, Hess=TRUE, method=c("probit"))
```

```
Third_regression <- polr(factor(CashorStock) ~ Investment.grade + Ln..Size. + Ln.Cash.flows. + Leverage +
Ln..Transaction.value. + Tender.offer + Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border +
Interest.rate + factor(Years), data = Dataset, Hess=TRUE, method=c("probit"))
```

Reduced regressions

```
First_regression <- glm(Rating.existence ~ Regulated.industry + Industry.fraction + Industry.cashflows +
Industry.risk + Ln..Size. + Ln..Transaction.value. + Ln.Cash.flows. + Leverage + Tender.offer +
Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border + Interest.rate + factor(Years),
family=binomial(link="probit"), data=Dataset)
```

```
Second_regression <- glm(Rating.level ~ Regulated.industry + Industry.level + Industry.cashflows + Industry.risk
+ Ln..Size. + Ln..Transaction.value. + Ln.Cash.flows. + Leverage + Tender.offer + Number.of..Bidders +
Diversifying.deals + Relative.size + Cross.border + Interest.rate + factor(Years), family=binomial(link="probit"),
data=Dataset)
```

```
Third_regression <- glm(Investment grade ~ Regulated.industry + Industry.level + Industry.cashflows +
Industry.risk + Ln..Size. + Ln..Transaction.value. + Ln.Cash.flows. + Leverage + Tender.offer +
Number.of..Bidders + Diversifying.deals + Relative.size + Cross.border + Interest.rate + factor(Years),
family=binomial(link="probit"), data=Dataset)
```

Fitted residuals

```
ResidualsRegression <- fitted(Regression)
```

Haufman tests

```
First_regression <- glm(Rating.existence ~ Regulated.industry + Industry.fraction + Industry.cashflows +
  Industry.risk + Ln..Size. + Ln..Transaction.value. + Ln.Cashflows. + Leverage + Tender.offer + Number.of..Bidders
  + Diversifying + Relative.size + Cross.border + Interest.rate + factor(Years), family=binomial(link="probit"),
  data=Dataset)
```

```
Second_regression <- lm(Rating.level ~ Regulated.industry + Industry.level + Industry.cashflows + Industry.risk
  + Ln..Size. + Ln..Transaction.value. + Ln.Cashflows. + Leverage + Tender.offer + Number.of..Bidders +
  Diversifying + Relative.size + Cross.border + Interest.rate + factor(Years), data=Dataset)
```

```
Third_regression <- glm(Investment.grade ~ Regulated.industry + Industry.level + Industry.profitability +
  Industry.Risk + Ln..Size. + Ln..Transaction.value. + Ln.Profitability. + Racine.Lever + Tender.offer +
  Number.of..Bidders + Diversifying + Relative.size + Interest.rate + Cross.border + factor(Years),
  family=binomial(link="probit"), data=Dataset)
```

Q-Q plots and residual plots

```
Dataset$yhat <- fitted(m)[,1]
Dataset$rr <- resid(m, type = "response")
Dataset$rp <- resid(m, type = "pearson")[,1]
par(mfcol = c(2, 3))
with(Dataset, {
  plot(yhat, rr, main = "Fitted vs Residuals")
  qqnorm(rr)
  plot(yhat, rp, main = "Fitted vs Pearson Residuals")
  qqnorm(rp)
  plot(X.OfCash, rp, main = "Actual vs Pearson Residuals")
  plot(X.OfCash, yhat, main = "Actual vs Fitted")
})
```

P value of the ordered Probit model

```
summary(m)
ctable <- coef(summary(m))
ctable
p <- pnorm(abs(ctable[, "t value"]), lower.tail = FALSE) * 2
ctable<-cbind(ctable, "p value" = p)
ctable
```

Appendix E: Transformation of variables

Figure 14: Ln transformation of the variable transaction value

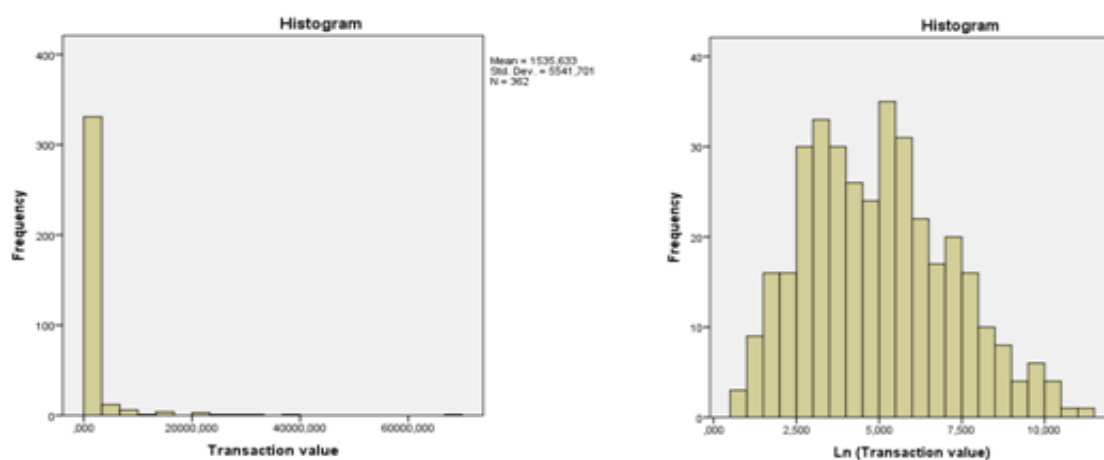


Figure 15: Ln transformation of the variable size

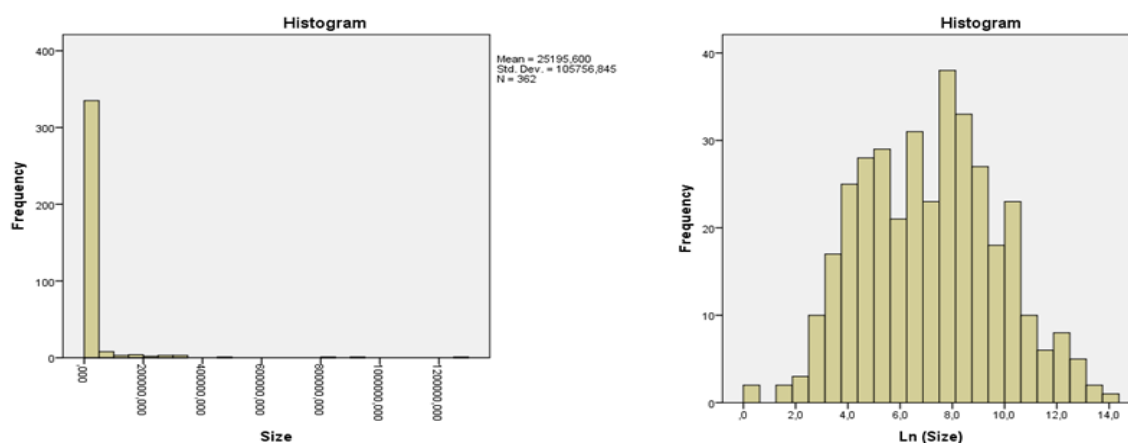
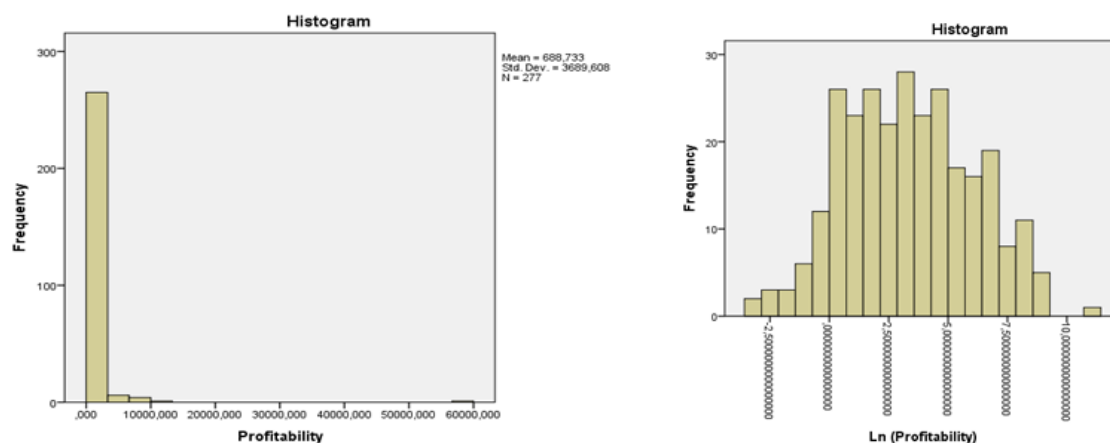
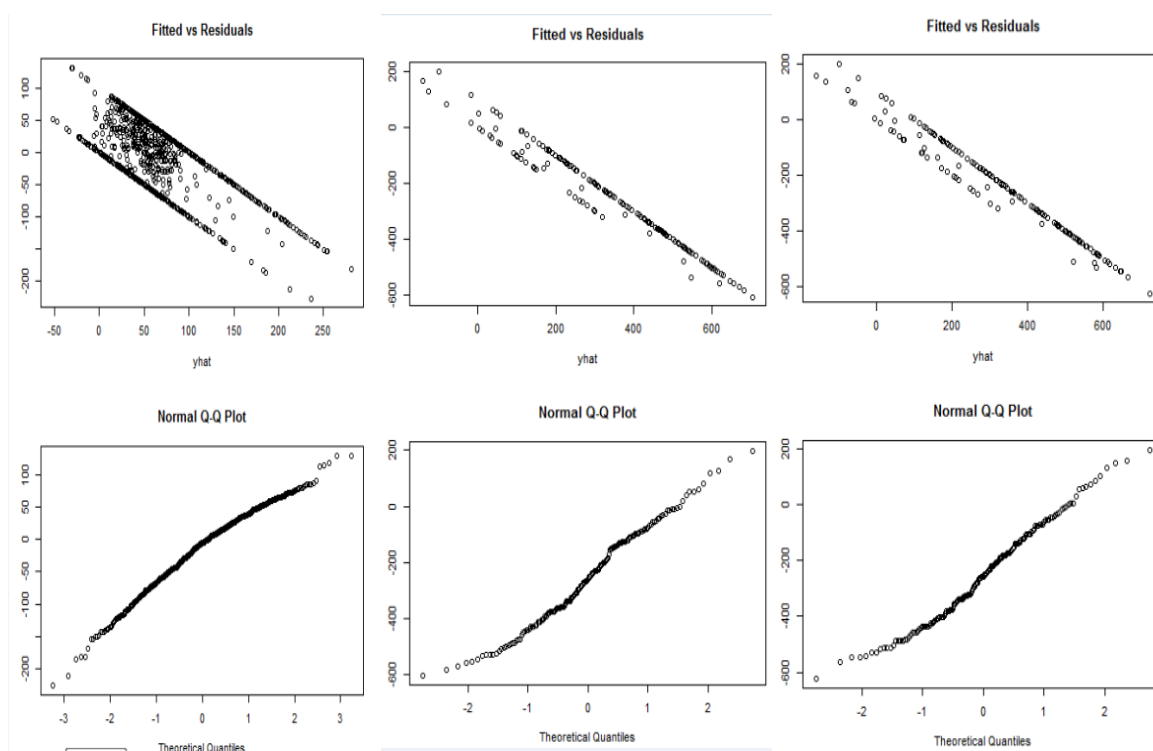


Figure 16: Ln transformation of the variable cash flows



Appendix F: Q-Q and residuals scatter plots

Figure 17: Q-Q plots and residuals scatter plots



The graph on the left represents the first Tobit regression, the one on the middle the second regression and the one on the right the third one. The graph above is the residuals scatter plots and the one below is the Q-Q plot. We can clearly identify a pattern on the residual scatter plots indicating the presence of heteroscedasticity. The graphs below show that all the regressions' residuals are relatively normally distributed (straight line).

Appendix G: Table of reduced regressions

Figure 18: Reduced regressions

Variable	Total sample	Credit ratings sample	
		Linear :Rating level	Probit :Investment grade
Constant	-3,95 (-3,385) 0,00007***	-3,74 (1,303) 0,1956	-23,31 (-2,480) 0,0131**
Regulated industry	-0,42 (-1,481) 0,138	-0,67 (-1,257) 0,2117	-1,57 (-1,186) 0,2355
Industry cash flows	-0,20 (-1,864) 0,0623*	-0,30 (-1,743) 0,0843*	-0,6976 (-2,034) 0,0419**
Industry fraction	11,65 (4,859) 0,00000***		
Industry level		0,87 (7,844) 0,0000***	1,09 (2,949) 0,0031***
Ln (Size)	0,16 (2,727) 0,0063***	0,44 (3,882) 0,0001***	0,83 (2,176) 0,0295**
Ln (Transaction Value)	-0,27 (-3,432) 0,0005***	-0,02 (-0,227) 0,8205	-0,46 (-1,036) 0,0881*
Ln (Cash flows)	0,31 (4,348) 0,0000***	-0,00 (-0,085) 0,9326	-0,06 (-0,276) 0,7822
Leverage	-0,00 (-0,017) 0,9862	-0,00 (-0,950) 0,3441	-0,03 (-1,036) 0,3000
Tender offer	0,05 (0,222) 0,8241	-0,78 (-1,593) 0,1142	0,19 (0,216) 0,8291
Number of bidders	1,24 (3,852) 0,0001*	0,64 (1,566) 0,1205	3,16 (2,718) 0,0065
Diversifying deals	0,40* (1,833) 0,0668	-0,82 (-1,873) 0,0639*	0,56 (1,344) 0,4195
Relative size	0,03 (1,125) 0,2606	0,02 (2,778) 0,0065***	2,08 (1,622) 0,1048
Interest rate	0,10 (0,220) 0,8260	1,55 (1,328) 0,1873	1,36 (0,783) 0,4335
Cross borders	0,16 (0,691) 0,4895	0,23 (0,540) 0,5906	0,52 (0,651) 0,5153
F-test	10,84***	4,238***	6,293***

Appendix H: Reduced regressions output

Figure 19: Reduced regression of the rating existence variable

```

      Min      1Q   Median      3Q      Max
-2.0538 -0.6599 -0.1552  0.5802  3.7533

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    -3.983e+00  1.165e+00  -3.418  0.00063
Regulated.industry -3.401e-01  2.989e-01  -1.138  0.25515
Industry.fraction  9.537e+00  2.295e+00   4.155 3.25e-05
Industry.cashflows -1.586e-01  1.168e-01  -1.358  0.17437
Industry.risk     1.521e-05  4.619e-05   0.329  0.74200
Ln..Size.        1.069e-01  5.449e-02   1.961  0.04988
Ln..Transaction.value. -2.350e-01  7.912e-02  -2.970  0.00297
Ln.Cash.flows.    3.433e-01  7.437e-02   4.617 3.90e-06
Leverage         -5.863e-01  5.767e-01  -1.017  0.30934
Tender.offer     -3.974e-03  2.292e-01  -0.017  0.98617
Number.of..Bidders  1.309e+00  3.360e-01   3.894 9.85e-05
Diversifying.deals  5.896e-01  2.172e-01   2.715  0.00663
Relative.size    -1.055e-02  1.185e-01  -0.089  0.92906
Cross.border     3.143e-01  2.336e-01   1.345  0.17851
Interest.rate    2.444e-01  4.739e-01   0.516  0.60604
factor(Years) [T.2007] -2.429e-01  5.373e-01  -0.452  0.65120
factor(Years) [T.2008]  3.239e-01  6.472e-01   0.500  0.61678
factor(Years) [T.2009]  4.915e-01  9.355e-01   0.525  0.59932
factor(Years) [T.2010]  3.708e-01  8.723e-01   0.425  0.67076
factor(Years) [T.2011]  1.105e+00  8.409e-01   1.315  0.18864
factor(Years) [T.2012]  8.969e-02  1.004e+00   0.089  0.92882
factor(Years) [T.2013] -1.819e-01  1.080e+00  -0.168  0.86622
factor(Years) [T.2014]  3.089e-01  1.047e+00   0.295  0.76790
factor(Years) [T.2015]  4.877e-01  1.153e+00   0.423  0.67232
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 370.59  on 268  degrees of freedom
Residual deviance: 211.52  on 245  degrees of freedom
(630 observations deleted due to missingness)
AIC: 259.52

```

Figure 20: Reduced regression of the rating level variable

```

      Min      1Q  Median      3Q      Max
-7.7295 -0.9890  0.0456  1.1486  6.3092

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   -7.031e-01  3.059e+00  -0.230   0.8187
Regulated.industry -4.035e-01  6.224e-01  -0.648   0.5183
Industry.level  5.547e-01  9.614e-02   5.769  9.3e-08
Industry.cashflows -1.560e-01  2.136e-01  -0.730   0.4670
Industry.risk    6.125e-07  6.369e-05   0.010   0.9923
Ln..Size.        2.724e-01  1.183e-01   2.304   0.0234
Ln..Transaction.value. 2.185e-01  1.374e-01   1.590   0.1150
Ln.Cash.flows.   9.185e-02  1.287e-01   0.714   0.4770
Leverage        -2.611e-01  1.452e+00  -0.180   0.8577
Tender.offer    -3.294e-01  5.676e-01  -0.580   0.5630
Number.of..Bidders 1.114e+00  4.910e-01   2.269   0.0255
Diversifying.deals 2.169e-01  4.932e-01   0.440   0.6611
Relative.size    -5.551e-02  3.049e-01  -0.182   0.8559
Cross.border     -2.138e-02  5.066e-01  -0.042   0.9664
Interest.rate    1.102e+00  1.267e+00   0.870   0.3865
factor(Years) [T.2007] 2.519e-01  1.424e+00   0.177   0.8600
factor(Years) [T.2008] 5.332e-01  1.762e+00   0.303   0.7628
factor(Years) [T.2009] 2.710e+00  2.709e+00   1.000   0.3196
factor(Years) [T.2010] 3.050e+00  2.312e+00   1.319   0.1902
factor(Years) [T.2011] 1.838e+00  2.119e+00   0.867   0.3880
factor(Years) [T.2012] 1.420e+00  2.589e+00   0.548   0.5846
factor(Years) [T.2013] 1.377e+00  2.727e+00   0.505   0.6148
factor(Years) [T.2014] 3.149e-01  2.799e+00   0.113   0.9107
factor(Years) [T.2015] 1.864e+00  2.933e+00   0.636   0.5266
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.359 on 98 degrees of freedom
(777 observations deleted due to missingness)
Multiple R-squared:  0.5013,    Adjusted R-squared:  0.3842
F-statistic: 4.283 on 23 and 98 DF,  p-value: 2.064e-07

```

Figure 21: Reduced regression of the investment grade variable

```

      Min      1Q      Median      3Q      Max
-2.54051  0.00000  0.02997  0.33134  1.44921

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept) -5.407e+00  3.315e+00 -1.631  0.10287
Regulated.industry  6.132e-01  8.962e-01  0.684  0.49381
Industry.level    3.271e-01  1.015e-01  3.223  0.00127
Industry.cashflows -4.855e-01  2.706e-01 -1.794  0.07285
Industry.risk     6.470e-04  5.117e-04  1.264  0.20612
Ln..Size.        7.201e-02  1.206e-01  0.597  0.55041
Ln..Transaction.value.  2.655e-02  1.442e-01  0.184  0.85395
Ln.Cash.flows.   1.486e-01  1.525e-01  0.974  0.32987
Leverage        -2.938e-01  1.368e+00 -0.215  0.82993
Tender.offer     9.660e-01  5.966e-01  1.619  0.10541
Number.of..Bidders  2.229e+00  8.308e-01  2.683  0.00730
Diversifying.deals  9.456e-01  5.005e-01  1.889  0.05887
Relative.size     4.861e-01  7.113e-01  0.683  0.49435
Cross.border     -1.998e-01  5.123e-01 -0.390  0.69645
Interest.rate    -1.078e+00  1.204e+00 -0.895  0.37082
factor(Years) [T.2007]  2.018e+00  1.545e+00  1.307  0.19133
factor(Years) [T.2008]  2.376e+00  1.773e+00  1.341  0.18007
factor(Years) [T.2009] -3.042e+00  2.594e+00 -1.173  0.24092
factor(Years) [T.2010]  1.936e-01  2.076e+00  0.093  0.92571
factor(Years) [T.2011] -1.289e-01  1.820e+00 -0.071  0.94352
factor(Years) [T.2012]  2.080e+00  7.122e+03  0.000  0.99977
factor(Years) [T.2013] -3.018e+00  2.569e+00 -1.175  0.23994
factor(Years) [T.2014] -4.289e+00  2.651e+00 -1.618  0.10566
factor(Years) [T.2015] -4.395e+00  2.805e+00 -1.567  0.11709
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 118.115  on 121  degrees of freedom
Residual deviance:  52.053  on  98  degrees of freedom
(777 observations deleted due to missingness)
AIC: 100.05

```

Appendix I: Hausman tests output

Figure 22: Hausman test of the first regression

	Total 269	Left-censored 69	Uncensored 39	Right-censored 161
Coefficients:				
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	272.9951	161.0449	1.695	0.09005
Rating.existence	138.5049	47.8204	2.896	0.00378
ResidualsRatingexistence	29.3920	112.5117	0.261	0.79391
Ln..Size.	11.9379	9.0580	1.318	0.18753
Ln.Cash.flows.	4.4099	12.0379	0.366	0.71411
Leverage	-168.3768	92.6433	-1.817	0.06914
Ln..Transaction.value.	-61.6302	15.0573	-4.093	4.26e-05
Tender.offer	107.5963	36.6551	2.935	0.00333
Number.of..Bidders	-6.5740	47.0631	-0.140	0.88891
Diversifying.deals	37.1510	33.2104	1.119	0.26329
Relative.size	-60.1399	27.6850	-2.172	0.02983
Cross.border	61.9181	35.6708	1.736	0.08260
Interest.rate	16.4736	67.0498	0.246	0.80592
factor(Years) [T.2007]	-9.5395	77.2180	-0.124	0.90168
factor(Years) [T.2008]	-69.4820	97.2350	-0.715	0.47487
factor(Years) [T.2009]	-199.7804	128.6625	-1.553	0.12048
factor(Years) [T.2010]	7.5606	127.1106	0.059	0.95257
factor(Years) [T.2011]	-21.9979	124.1358	-0.177	0.85934
factor(Years) [T.2012]	115.4861	148.6784	0.777	0.43731
factor(Years) [T.2013]	-9.0012	144.6395	-0.062	0.95038
factor(Years) [T.2014]	13.1126	150.7213	0.087	0.93067
factor(Years) [T.2015]	36.4133	158.9924	0.229	0.81885
Log(scale)	5.2130	0.1484	35.134	< 2e-16
Scale: 183.6				
Gaussian distribution				
Number of Newton-Raphson Iterations: 5				
Log-likelihood: -381.8 on 23 Df				
Wald-statistic: 39.06 on 21 Df, p-value: 0.0096557				

Figure 23: Hausman test of the second regression

	Total 122	Left-censored 22	Uncensored 10	Right-censored 90
--	--------------	---------------------	------------------	----------------------

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1188.4499	501.5892	2.369	0.01782
Investment.grade	42.6334	107.2312	0.398	0.69094
ResidualsRatingexistence	-62.4848	146.3808	-0.427	0.66948
Ln..Size.	-7.8648	12.9884	-0.606	0.54483
Ln.Cash.flows.	46.2690	21.4766	2.154	0.03121
Leverage	-764.7015	250.6717	-3.051	0.00228
Ln..Transaction.value.	-120.2657	45.1107	-2.666	0.00768
Tender.offer	133.0973	86.4075	1.540	0.12348
Number.of..Bidders	109.1703	71.2317	1.533	0.12537
Diversifying.deals	159.2485	77.6309	2.051	0.04023
Relative.size	-91.6044	43.5978	-2.101	0.03563
Cross.border	151.2911	78.9677	1.916	0.05538
Interest.rate	-111.9094	188.7657	-0.593	0.55328
factor(Years) [T.2007]	-113.2021	216.1148	-0.524	0.60041
factor(Years) [T.2008]	-262.2788	259.7161	-1.010	0.31256
factor(Years) [T.2009]	-694.7557	389.2464	-1.785	0.07428
factor(Years) [T.2010]	-288.1894	400.5934	-0.719	0.47189
factor(Years) [T.2011]	-396.4545	329.3842	-1.204	0.22874
factor(Years) [T.2012]	-245.9504	388.7918	-0.633	0.52699
factor(Years) [T.2013]	-642.6409	428.1085	-1.501	0.13333
factor(Years) [T.2014]	-648.0385	427.6383	-1.515	0.12967
factor(Years) [T.2015]	-325.7658	440.8932	-0.739	0.45998
Log(scale)	5.3377	0.2623	20.351	< 2e-16

Scale: 208

Gaussian distribution

Number of Newton-Raphson Iterations: 6

Log-likelihood: -105.2 on 23 Df

Wald-statistic: 13.01 on 21 Df, p-value: 0.90812

Figure 24: Hausman test of the third regression

	Total 122	Left-censored 22	Uncensored 10	Right-censored 90
--	--------------	---------------------	------------------	----------------------

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1180.274	511.576	2.307	0.02105
Rating.level.	15.816	14.457	1.094	0.27393
ResidualsRatinglevel	-6.137	19.012	-0.323	0.74686
Ln..Size.	-9.375	14.445	-0.649	0.51634
Ln.Cash.flows.	44.417	22.161	2.004	0.04504
Leverage	-763.239	259.091	-2.946	0.00322
Ln..Transaction.value.	-121.926	45.203	-2.697	0.00699
Tender.offer	142.006	89.149	1.593	0.11118
Number.of..Bidders	97.017	60.178	1.612	0.10693
Diversifying.deals	155.254	76.896	2.019	0.04349
Relative.size	-92.421	42.510	-2.174	0.02970
Cross.border	126.037	74.776	1.686	0.09189
Interest.rate	-153.679	207.976	-0.739	0.45995
factor(Years) [T.2007]	-75.590	215.074	-0.351	0.72524
factor(Years) [T.2008]	-253.572	269.385	-0.941	0.34655
factor(Years) [T.2009]	-788.200	450.546	-1.749	0.08022
factor(Years) [T.2010]	-395.521	451.000	-0.877	0.38049
factor(Years) [T.2011]	-481.089	371.830	-1.294	0.19572
factor(Years) [T.2012]	-345.533	433.162	-0.798	0.42504
factor(Years) [T.2013]	-735.174	480.523	-1.530	0.12603
factor(Years) [T.2014]	-716.740	467.394	-1.533	0.12516
factor(Years) [T.2015]	-403.348	476.983	-0.846	0.39776
Log(scale)	5.325	0.257	20.718	< 2e-16

Scale: 205.4

Gaussian distribution

Number of Newton-Raphson Iterations: 6

Log-likelihood: -104.6 on 23 Df

Wald-statistic: 12.73 on 21 Df, p-value: 0.91762

Appendix J: Empirical analysis output

Figure 25: First Tobit regression

```

Observations: (622 observations deleted due to missingness)
      Total   Left-censored   Uncensored   Right-censored
      277         73           40           164

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    250.5446   160.8230    1.558  0.11926
Rating.existence 135.9485    42.1097    3.228  0.00124
Ln..Size.       13.9194     8.3529    1.666  0.09563
Ln.Cash.flows.   4.4375    10.1933    0.435  0.66332
Leverage        -175.0939    92.6495   -1.890  0.05878
Ln..Transaction.value. -62.3121    14.3694   -4.336 1.45e-05
Tender.offer    101.7996    36.2490    2.808  0.00498
Number.of..Bidders 18.6602    37.4510    0.498  0.61830
Diversifying.deals 49.3173    30.6593    1.609  0.10771
Relative.size    -62.4859    28.5060   -2.192  0.02838
Cross.border     51.1407    33.2650    1.537  0.12420
Interest.rate    17.4344    69.0449    0.253  0.80065
factor(Years) [T.2007] -13.2793    78.5738   -0.169  0.86579
factor(Years) [T.2008] -66.8176    98.4655   -0.679  0.49740
factor(Years) [T.2009] -202.9461   131.8882   -1.539  0.12386
factor(Years) [T.2010]  10.2931   130.6203    0.079  0.93719
factor(Years) [T.2011]   3.2561   126.0478    0.026  0.97939
factor(Years) [T.2012] 114.1410   151.2689    0.755  0.45051
factor(Years) [T.2013] -56.2598   148.5464   -0.379  0.70488
factor(Years) [T.2014]  -1.2193   154.3780   -0.008  0.99370
factor(Years) [T.2015]  -7.8836   161.1343   -0.049  0.96098
Log(scale)       5.2304     0.1466   35.675 < 2e-16

Scale: 186.9

Gaussian distribution
Number of Newton-Raphson Iterations: 5
Log-likelihood: -394.4 on 22 Df
Wald-statistic: 39.71 on 20 Df, p-value: 0.0054385

```

Figure 26: Second Tobit regression

```

Observations: (774 observations deleted due to missingness)
      Total   Left-censored   Uncensored   Right-censored
      125         24           10           91

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    1120.0879    514.7470   2.176  0.02956
Rating.level.     18.3762    14.0139   1.311  0.18976
Ln..Size.        -8.7579    15.3139  -0.572  0.56740
Ln.Cash.flows.    42.6007    21.6530   1.967  0.04913
Leverage       -796.5151   269.9989  -2.950  0.00318
Ln..Transaction.value. -123.0466    45.7743  -2.688  0.00719
Tender.offer     131.7708    88.2509   1.493  0.13540
Number.of..Bidders  117.4981    64.3021   1.827  0.06766
Diversifying.deals  178.6445    80.7929   2.211  0.02703
Relative.size     -95.6094    45.1704  -2.117  0.03429
Cross.border      93.6194    69.8506   1.340  0.18015
Interest.rate   -176.3247   191.2140  -0.922  0.35646
factor(Years) [T.2007]  -59.3391   204.5921  -0.290  0.77179
factor(Years) [T.2008] -252.4673   252.3584  -1.000  0.31710
factor(Years) [T.2009] -848.9063   431.1988  -1.969  0.04899
factor(Years) [T.2010] -459.6141   424.0627  -1.084  0.27844
factor(Years) [T.2011] -529.0765   346.5447  -1.527  0.12683
factor(Years) [T.2012] -444.3508   406.6341  -1.093  0.27450
factor(Years) [T.2013] -866.8063   471.2665  -1.839  0.06587
factor(Years) [T.2014] -781.8045   450.3238  -1.736  0.08255
factor(Years) [T.2015] -546.3198   451.5800  -1.210  0.22636
Log(scale)         5.3648     0.2545  21.077 < 2e-16

Scale: 213.7

Gaussian distribution
Number of Newton-Raphson Iterations: 6
Log-likelihood: -106.7 on 22 Df
Wald-statistic: 12.02 on 20 Df, p-value: 0.91544

```

Figure 27: third Tobit regression

```

Observations: (774 observations deleted due to missingness)
      Total  Left-censored  Uncensored  Right-censored
      125      24          10          91

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    1166.3268   499.0826    2.337  0.01944
Investment.grade    52.5934    93.4207    0.563  0.57345
Ln..Size.        -6.3394    13.8124   -0.459  0.64626
Ln.Cash.flows.    44.8692    21.8224    2.056  0.03977
Leverage        -797.7990   265.6518   -3.003  0.00267
Ln..Transaction.value. -119.5353    45.3487   -2.636  0.00839
Tender.offer     115.9973    87.2400    1.330  0.18364
Number.of..Bidders  117.5215    71.0262    1.655  0.09800
Diversifying.deals  179.4110    81.9283    2.190  0.02853
Relative.size     -97.1081    46.2436   -2.100  0.03574
Cross.border     117.9145    74.9343    1.574  0.11559
Interest.rate    -121.2956   179.4607   -0.676  0.49911
factor(Years) [T.2007] -105.3909   210.4733   -0.501  0.61656
factor(Years) [T.2008] -267.1622   249.8580   -1.069  0.28495
factor(Years) [T.2009] -723.5710   381.3645   -1.897  0.05779
factor(Years) [T.2010] -328.8596   385.2766   -0.854  0.39334
factor(Years) [T.2011] -426.1810   312.6348   -1.363  0.17282
factor(Years) [T.2012] -313.6424   380.0559   -0.825  0.40923
factor(Years) [T.2013] -748.7893   425.4528   -1.760  0.07841
factor(Years) [T.2014] -671.2480   417.5404   -1.608  0.10792
factor(Years) [T.2015] -426.1875   431.1562   -0.988  0.32292
Log(scale)         5.3834     0.2592   20.770 < 2e-16

Scale: 217.8

Gaussian distribution
Number of Newton-Raphson Iterations: 6
Log-likelihood: -107.7 on 22 Df
Wald-statistic: 12.37 on 20 Df, p-value: 0.90268

```

Appendix K: Ordered Probit model

Figure 28: Ordered Probit regressions

Variable	Total sample	Sample with credit ratings	
	<i>Rating existence (1)</i>	<i>Rating level (2)</i>	<i>Investment grade (3)</i>
Rating existence	1,25*** (3,454)		
Rating level		0,16 (1,521)	
Investment grade			0,65 (0,873)
Ln (Size)	0,14* (-5,18)	-0,05 (-0,433)	-0,042 (-4,198)
Ln (Cash flows)	0,04 (0,493)	0,39** (2,090)	0,41** (2,24)
Leverage	-1,35* (-1,686)	-6,32*** (-6,32)	-6,15*** (-3,012)
Ln (Transaction Value)	-0,57*** (-5,18)	-0,39*** (-4,257)	-1,13*** (-4,198)
Tender offer	0,95*** (3,169)	1,20* (1,703)	1,10 (1,583)
Number of bidders	0,13 (0,382)	1,061** (2,02)	0,97* (1,723)
Diversifying	0,40* (1,422)	1,65*** (2,62)	1,68*** (2,687)
Relative size	-0,66*** (-3,15)	-0,01** (-1,665)	-0,85** (-2,478)
Cross-border	0,47 (1,459)	0,92 (1,417)	1,15 (1,821)
Interest rate	0,25 (0,388)	-1,25 (-0,609)	-0,59 (0,318)
N	277	125	125

In the table are reported the three regressions with the method of payment as the dependent variable. The p-value is in italic with ***, **, * indicates a significance at a level of respectively 1%, 5%, 10%. The t-value is in parenthesis. The z value is between brackets and the highlighted variables are significantly in all regressions.