Distressed Mergers and Acquisitions

How do target's level of distress & bidder's financing method affect bidder's post-transaction default risk?

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Lund University School of Economics and Management

Stefan Rumenov Pelov & Hanh Hong Nguyen

Supervisor: Prof. Lars Oxelheim

Examiner: Niclas Andrén

Abstract

Title: Distressed Mergers and Acquisitions: How Do Target's Level of Distress and Bidder's Financing Method Affect Bidder's Post-Transaction Default Risk?

Authors: Stefan Rumenov Pelov and Hanh Hong Nguyen

Supervisor: Prof. Lars Oxelheim

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Keywords: Bidder Default Risk; Distressed Acquisitions; Default Risk; Distance-to-Default; Financing Methods; Mergers and Acquisitions; Probability of Default; Risk Effects; Target's Distress Level

Purpose: The purpose of this paper is to examine the risk effects of distressed M&As on bidder default risk, particularly focusing on target's distress level and deal financing methods as determinants for changes in bidder default risk. The paper distinguishes the default risk effects of permanently distressed and temporarily distressed targets, and of equity financing, debt financing and internal cash financing.

Theoretical framework: The paper is intensively built upon prior research and literature on default risk effects of distressed M&As, as well as default risk effects of acquiring temporarily and permanently distressed targets, and default risk effects associated with different deal financing methods.

Sample: 382 completed M&A deals in the US between 2011 – August 2017 are studied. The data is obtained from Thomson Reuters, Orbis, Bloomberg Terminal and firms' annual reports. Deals are classified into temporarily and permanently distressed based on target's financial performance and CEO turnover ratio.

Methodology: Besides the Merton's model for calculating Distance-to-Default, the study also employs a quantitative approach and multivariate regression models to test the significance of the hypotheses. Multiple diagnostic tests are used to further assess the significance of the results.

Conclusions: The study provides evidence of distressed M&As associated with lower increase in default risk compared to non-distressed M&As. However, in the case of permanently distressed M&As, the bidder default risk appears to be more negatively affected than those involved with temporarily distressed M&As. The study also confirms that equity financing is associated with more significant rise in bidder default risk than debt financing and internal cash financing.

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List of Abbreviations

CDS	Credit Default Swaps
DD	Distance-to-Default
ICR	Interest Coverage Ratio
M&As	Mergers and Acquisitions
MKMV	Moody's KMV
MTR	Management Turnover Ratio
OLS	Ordinary Least Square
PD	Probability of Default

1. Introduction

Mergers and acquisitions (M&As) have drawn researchers' attention for several decades. A great number of academic studies showed the value creation in M&As in different industries and countries (Alexandridis, Chen & Zeng, 2017; Cho & Ahn, 2017; Dell'Acqua et al., 2017; Rahman, Lambkinb & Hussain, 2016). Several papers discussed the case of acquiring distressed assets (Furfine & Rosen, 2011; Bruyland & Maeseneire, 2016; Clark & Ofek, 1994, Hotchkiss & Mooradian, 1998). For example, Meier and Servaes (2015) studied 428 fire sale transactions over the period of 1982-2012 and the stock price response of acquirers. They found evidence showing that stock price returns to acquirers are around 2% higher in fire sales than in regular M&A transactions. The stock returns tend to be especially high when the target's industry peers are associated with low liquidity and are financially constrained or the target's assets have fewer alternative uses. Similar results, supporting the positive effect of distressed M&As were found in Hotchkiss and Mooradian's (1998) and Clark and Ofek's (1994) papers.

The focus in these papers was mostly on the bright side of distressed transactions. Noticeably, not many papers discussed the other side - the effects of those M&As on the acquirers' default risk, except for Bruyland and Maeseneire (2016). In their paper they examined the risk effects of acquiring distressed companies on the acquirers and studied possible explanations for any dissimilarities by investigating the change in default risk of the acquirers using the Merton's (1974) model. Through a sample of 987 completed acquisitions by non-financial US firms over the period of 1990-2011, they found that both acquisitions of distressed and non-distressed companies raise bidder default risk, yet the increase in bidder default risk is substantially larger when acquiring distressed firms.

While some researchers proved the benefits of a distressed transaction to the acquirer (Hotchkiss & Mooradian, 1998; Clark & Ofek, 1994), others showed that distressed acquisitions can increase bidder post-transaction default risk (Bruyland & Masenere, 2016; Furfine & Rosen, 2011). All the papers classified distressed targets considering their prior-transaction financial performance and did not account for the target's level of distress. Schmuck (2013) suggested that financial distress could be temporary or permanent. Some companies are temporarily financially distressed due to external factors e.g. turbulences in the labor market and natural disasters etc.

Others are permanently financially distressed due to internal factors like problematic business operations, bad management, fraud problems, combined with high indebtedness (Adams, Muir & Hoque, 2014). Special attention should therefore be devoted to classifying distressed targets by distinguishing between temporarily and permanently distressed ones.

Another potential determinant of changes in bidder default risk is the deal financing method of distressed deals, which is barely examined in prior literature. Financing methods of big M&As could significantly change the leverage ratio of the post-transaction entity. Thus, based on several corporate finance theories including pecking order theory, static trade-off theory and information asymmetry there might be a significant impact from financing methods of those deals on the bidder default risk. Several papers showed the effects of deal payment methods on bidder post-transaction performance. Amihud, Lev, and Travlos (1990), Brown and Ryngaert (1991), Faccio, McConnell and Stolin (2006), Fuller, Netter and Stegemoller (2002), Servaes (1991), and others have shown in their studies the outperformance of cash payment over stock in M&As (Fischer, 2017). The common assumption of these papers is that payment method might be a valid approximation for the involved source of financing. Fischer (2017) criticized these assumptions to be oversimplified and have several shortcomings. One of which is that cash payment is assumed to be completely financed with debt. The possibility of internal cash being one of the major sources of financing was ignored. Because of this, it is important to investigate the underlying financing methods of distressed target deals to understand the change in the bidder's capital structure, which might have serious effects on their default risk exposure.

This paper studies more closely different types of distressed M&As, particularly temporarily and permanently, as well as different financing methods of those deals. At the same time, it examines the impact of those factors on the bidder default risk. The paper will be divided into two parts. The first part focuses on examining the difference in risk effects of acquiring/merging a distressed target and acquiring/merging a non-distressed target, as well as the difference in risk effects of acquiring/merging a temporarily distressed target and acquiring/merging a permanently distressed target. The second part focuses on examining the financing methods of each distressed deal and their effects on the default risk of the acquirers.

The purpose of this paper is to answer these research questions:

1. **Do temporarily and permanently distressed targets affect the bidder default risk differently?**
2. **Do the bidder's financing methods of distressed M&As affect its default risk differently?**

The figure below presents the decision tree and the hypotheses for each subsample in this study.

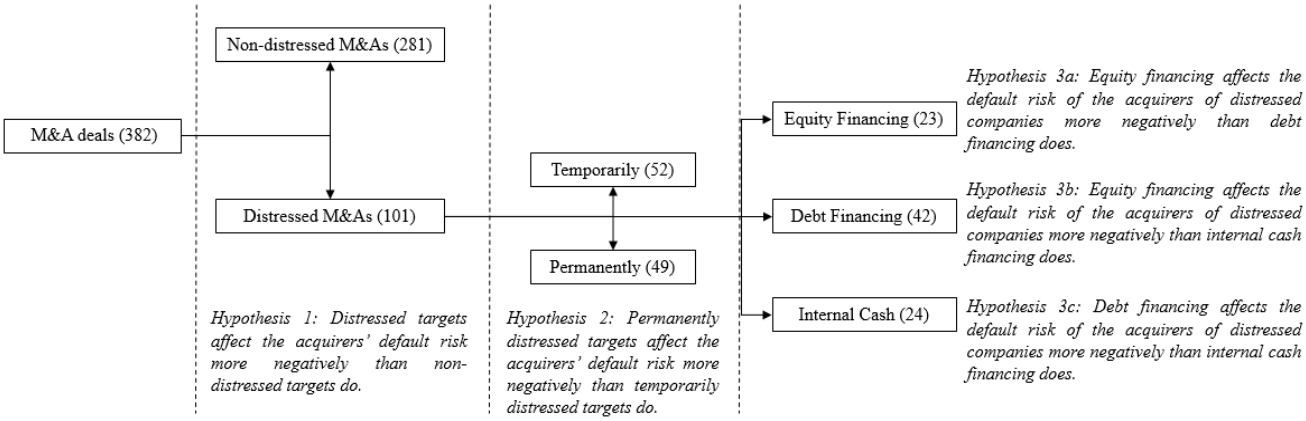

Figure 1: Decision tree

The hypotheses are tested by running an ordinary least square regression (OLS) with change in Distance-to-Default of the bidder as a dependent variable, a number of dummy variables to classify the deals as distressed/non-distressed, permanently/temporarily distressed, equity/debt/internal cash financing as explanatory variables and some control variables, containing targets' and bidders' financial health information. Secondary data is obtained from Thomson Reuters Eikon, Orbis, Bloomberg Terminal and annual reports. These hypotheses are tested on the sample of 382 completed deals in the US region from 2011 to August 2017[1]. Contrary to prior research, special attention is devoted to the classification of distressed M&As according to target's level of distress, since it is believed to be the main reason for the inconclusive empirical findings. Interest Coverage Ratio, Leverage Ratio, Cash flow from Operations ratio and CEO change dummy of the targets are used as proxies for this classification.

[1] The year 2011 is chosen as a starting year to exclude the years, associated with the global financial crisis period (2008-2011). The last quarter of 2017 is excluded due to post-transaction accounting data inaccessibility, required for distance-to-default calculations.

The paper contributes to the research field by providing a more in-depth view into different types of distressed M&As and their choice of financing in terms of risk effects, which remained narrowly discussed in previous studies. The research finds evidence of significant negative risk effects of acquiring distressed targets, permanently distressed targets and equity financing on the acquirers. This evidence highlights the importance and significant impact of targets' distress level and bidders' choice of financing on the bidder default risk. The application of this paper could assist analysts and investors regarding the default risk aspect of a company when acquiring a financially distressed target, and also be valuable for companies that are engaged in a distressed M&A as a recommendation for the choice of target and deal financing method.

There are some limitations in the paper that could affect the reliability of the results and conclusions. The first limitation is that numerous different proxies could be used to determine if a target is distressed or not and its level of financial distress, for example Altman' Z-Score, interest coverage ratio etc. Only one proxy, namely Interest Coverage Ratio, is used to classify distressed/ non-distressed firms due to time constraints and information unavailability. Thus, the classification of the sample might be impaired and the result concerning this hypothesis might not reflect complete accuracy. The second limitation is that only M&A deals in the US, not globally, are examined. This limits the application of the results to only the US, due to the differences in many aspects like corporate governance, legislation for bankruptcy, as well as laws and regulations concerning capital structure for different countries. The third limitation is that a clear distinction between companies that are purely in distress and those that are in bankruptcy is not defined. The companies that filed for Chapter 7 or Chapter 11 are imposed with special regulations (Gilson, John, & Lang, 1990), whose effects are not considered in the paper's models. The last limitation is that only publicly traded companies and completed deals are covered in this research, which could result in selection bias, missing observations and impaired accuracy of the conclusions.

The paper proceeds as follows. The next section reviews the related literature and theoretical frameworks, as well as discusses the hypothesis development. Section 3 describes the process of data collection and sample characteristics. Section 4 explains the adopted methodology and specifies the models. Section 5 provides the empirical results as well as the analysis and

interpretation of those results. Finally, section 6 concludes the research's findings, theoretical contributions, practical implications and gives suggestions for future research on this topic.

2. Theoretical framework

2.1. Distressed and Non-Distressed Targets and Their Impact on Bidder Default Risk

Previous research has examined the effects of M&As and the potential value creation within different industries and countries (Alexandridis, Chen & Zeng, 2017; Cho & Ahn, 2017; Dell'Acqua et al., 2018; Rahman, Lambkin & Hussain, 2016). Companies are expected to grow annually and therefore, they have two alternatives to meet investor expectations - growing organically or acquiring other entities (Gaughan, 2007). Each of these strategies has its advantages and disadvantages. When it comes to time limitations, external growth appears to be faster (Gaughan, 2007). In this case, most companies acquire distressed assets to take advantage of their lower cost, as proposed by the fire sales hypothesis (Hotchkiss & Mooradian, 1998; Clark & Ofek, 1994).

Empirical evidence is inconclusive when it comes to estimating the impact of acquiring such distressed targets. While some studies showed that distressed targets have a negative impact on the bidder default risk (Bruyland & Maeseneire, 2016; Furfine & Rosen, 2011), others confirmed positive post-transaction risk effects of distressed deals (Hotchkiss & Mooradian, 1998; Clark & Ofek, 1994). Vallascas and Hagendorff (2011) examined the impact of mergers on bidder default risk in European banks using the Merton's Distance-to-Default framework. They found that mergers did not result in risk reduction, but they were rather risk-neutral.

Several studies showed evidence of negative default risk effects of M&A deals on post-transaction entities. Post-acquisition changes in bidder default risk are expected due to its systematic and idiosyncratic increase in volatility after merging with or acquiring a target (Langetieg, Haugen & Wichern, 1980).

The post-acquisition entity could raise their financial leverage due to increased debt capacity[2] (Ghosh & Jain, 2000), which might lead to a rise in the systematic risk of the post-transaction entity and its probability of default. Previous studies prove a statistically significant increase in acquirer's default risk after the completion of M&As (Furfine & Rosen, 2011; Bruyland & Maeseneire, 2016). Furfine and Rosen (2011) examined the impact of M&As on bidder default risk in the US between 1993 and 2006. They used the EDF framework developed by Moody's KMV (MKMV) and looked at the change in default risk of the acquirer six months after the completion of the deal and one month before the deal announcement. The results showed evidence of increased post-transaction default risk of the acquirer. Factors such as managerial behaviour, a larger share of option-based compensation and poor stock valuation before the deal provided the highest explanation for the significant increase in default risk. Bruyland and Maeseneire (2016) found that both distressed and non-distressed targets increase acquirer's risk exposure to default, but the risk is higher in distressed acquisitions.

Alternative academic research provides a wide variety of value-adding motives behind M&As such as growth, economic gains, financial benefits etc. (Gaughan, 2007). Acquiring an entity often results in risk diversification of the post-deal entity and thus leads to lower cost of financing, higher debt capacity, and potential tax deductions (Lewellen & Huntsman, 1970). In addition, operational synergies such as economies of scope, economies of scale, higher market power and financial synergies are potential considerations behind acquiring a company (Peel & Wilson, 1989; Bruton, Oviatt & White, 1994; Sudarsanam, Holl & Salami, 1996, Turetsky, 2003, Jory & Madura, 2009, Gaughan, 2007). Consequently, acquiring a company regardless of its distress exposure, might lead to potential operating improvements of the post-transaction entity and thus, a decrease in bidder default risk.

Hotchkiss and Mooradian (1998) looked at a sample of 55 acquisitions in Chapter 11 and found that merging with a bankrupt target shows operating improvements due to cost savings, while merging with a non-bankrupt target leads to no significant operating improvements. They found positive abnormal stock returns for acquirers and distressed targets on the day of the deal announcement. Furthermore, merging with a distressed firm may generate value to the acquirer by improving its processes and business model (Deloitte, 2009). Distressed M&As can represent

[2] This happens when the target has high debt capacity and the acquirer could benefit from it.

a beneficial opportunity for acquirers, due to the possibility of acquiring assets at a discount (Ernst & Young, 2010) as the fire sales hypothesis suggests firms that are financially distressed sell their assets at a discount. Other business benefits of combining a distressed target can come from the highly motivated acquired workforce, since the acquisition is seen as a final rescue plan (Bruton, Oviatt & White, 1994; Larsson, 1992). Thus, the integration process is easier and bigger room for synergy effects is expected. Clark and Ofek (1994) proposed another potential reason for the decrease in bidder default probability. They examined 38 takeovers of distressed companies and found that financially constrained targets are better transaction partners for restructuring due to tax motives and costs reductions thanks to tax loss carryforwards. However, these distressed deals should be completed faster than usual deals (Carapeto, Moeller & Faelten, 2009) because the potential value created fades over time (Deloitte, 2009).

To settle for the inconclusive opinion on the effects of distressed M&As on bidder default risk, the first hypothesis is as follows.

Hypothesis 1: Distressed targets affect the acquirers' default risk more negatively than non-distressed targets do.

2.2. Temporary and Permanent Financial Distress

Companies in financial distress are associated with high indebtedness compared to firm size, low-profitability or unsustainable asset composition (Schmuck, 2013; Lin, Lee & Gibbs, 2008). A financially distressed company may face severe liquidity problems when its revenue and cash flow stability are suffering. Schmuck (2013) suggested that financial distress can be temporary or permanent and therefore, the level of distress might require special attention.

Temporarily distressed companies are economically viable firms with competent management, solid customer-base and strong market position (Kahl, 2002), but exposed to exogenous shocks such as seasonal changes, commodity price volatility, regulatory changes, labor market turbulence, natural disaster etc. (Adams, Muir & Hoque, 2014). Simply put, the causes for the distress are external factors, instead of their own business operations and management competencies. Another potential reason for their distressed situation can be a short-term decline in profitability, due to increased competition from other market players. However, since the management has the expertise to turn the company around, the distress is not expected to persist

for long. Weitzel and Jonsson (1989) found that short-term financial distress is associated with minimum reactions by the management in terms of changes in the business strategy. The bidders of these firms might not be required to spend substantial restructuring costs.

Permanently distressed firms are linked to constrained ability to raise external funds to meet their current obligations (Hotchkiss et al., 2008). In contrast to temporarily distressed companies, the permanently distressed ones are highly leveraged for a longer period. This usually leads to substantial losses in market share, compared to other conservatively financed competitors within the industry (Kahl, 2002). These permanently distressed companies are characterized with poor sales growth, declining market share, and unpopular products and services (Opler, Saron & Titman, 1997). All of these factors may affect not only the viability of a firm's financial structure, but also the business operations (Opler, Saron & Titman, 1997). Therefore, permanent financial distress may often force companies to undertake substantial changes in the business model as well as in the corporate structure. Gilson (1989) investigated the management turnover rate in financially distressed companies and found that 52% of the sampled firms experienced management turnover and are associated with default, bankruptcy or private restructuring of their debt. Jostarndt (2007) examined 267 German firms in financial distress between 1996 and 2004 and found that investors and creditors of those firms often initiate substantial management turnover. Ang and Chua (1981) examined the CEO turnover rate of 52 firms for the period 1969-1973 and found that 30% of managers lost their job post-bankruptcy filing date. In short, permanent financial distress was proved to be associated with frequent changes in the management and bad business operations.

Based on the previous studies mentioned above, permanently distressed firms seem more constrained and risky, thus being associated with higher default risk. For that reason, the post-transaction entities associated with those firms might be exposed to higher default risk. This leads to the second hypothesis.

Hypothesis 2: Permanently distressed targets affect the acquirers' default risk more negatively than temporarily distressed targets do.

2.3. Financing Methods of Distressed M&As

The choice of financing method in M&As can have a significant impact on the acquirer's ownership structure, financial leverage and subsequent financing decisions (Faccio & Masulis, 2005). Prior literature classifies three main payment methods in M&As - cash offers, equity issues and combinations of both. Three main financing methods [3] are identified as internal cash financing, debt financing and equity financing, in which the first two represent cash offers as a way of payment method. Most prior literature unfortunately oversimplified and assumed that payment method is a valid approximation for the involved financing method (Fischer, 2017). As a result, studying the financing methods of the deals is more appropriate for predicting the change in bidder post-transaction default risk.

Several corporate finance theories can be related to financing decisions in distressed M&As such as the static tradeoff theory, the pecking order theory, information asymmetry, adverse selection, and agency problem. The static tradeoff theory, which compares debt financing and equity financing, is particularly present in previous studies. When companies acquire leveraged targets, they can benefit from tax shield advantages, however, they should be aware of the increased financial distress costs (Myers, 1984; Abel, 2018; Ross, 1977). An alternative financing method to raising debt is issuing equity. Considering the choice between debt and equity, the acquirer faces a tradeoff between debt-related costs in the case of issuing debt and diluted corporate control in the case of issuing equity (Ross, 1977; Jensen, 1986).

The choice of financing method in M&As could be greatly influenced by the pecking order theory, which was discussed by Donaldson (1961) in his study of the financing practices of large corporations. He observed that management prefers internally generated funds to raising debt or issuing equity when it comes to raising capital for investment opportunities. Myers and Majiluf (1984), who suggested that the preference of internal cash over debt and equity is a result of adverse selection problems, also supported this finding. Information asymmetry problem in M&A deals arises when both the acquirer and the target lack information regarding the other entity's value in the deal (Luypaert & Caneghem, 2017). This leads to bidders' inaccurate assessment of the target value and potential synergies, as well as the uncertain wealth effect of

[3] The paper distinguishes between the method of payment and financing method, since cash payment can comprise either debt raising or internal cash financing.

target shareholders in stock transactions since it also depends on the acquirer's real value and potential synergistic gains (Luypaert & Caneghem, 2017). For this reason, equity financing can be a useful instrument for mitigating this problem between the two parties. From the acquirer's perspective, however, issuing equity might send a negative signal to the market that the shares are overvalued, which could lead to adverse selection problem (Ogden, Jen & O'Connor, 2002). Thus to avoid this, bidders might prefer a cash offer[4] when conducting M&As instead of issuing new shares. Nevertheless, the original information asymmetry problem between the target and the bidder is not mitigated in this case. Additionally, Facio et al. (2006) found that the financing decision in M&As can be affected by management's actions to maintain the existing corporate governance structure as stock issuance dilutes the shareholders' voting and control power. Harris and Raviv's (1988) and Stulz's (1988) models showed that managers with significant ownership positions are reluctant to dilute their voting power and risk losing control over the company by issuing stocks; therefore they prefer debt financing or internal cash. Stulz (1988) observed that growing firms can rely on debt financing to maintain managements' ownership level and voting power. Because of this misalignment of interests between management and shareholders (agency problems theory), the acquirers have greater incentives to use cash financing instead of issuing equity.

Many research papers have studied the relationship between M&A financing methods and acquirer post-transaction performance, comparing cash and equity issues. A number of studies documented significant negative average announcement returns to acquirers of publicly traded targets when the payment method is stock rather than cash (Heron and Lie, 2002). Rahman (2002) studied the long-term operating post-transaction performance of Malaysian acquirers, using more acquisitions' characteristics than the method of payment only, as well as event study methodology to test his hypotheses. He found that method of payment is a relevant determinant of M&As, with cash transactions being more effective than equity-paid acquisitions in the long run. Agrawal, Jaffe and Mandelker (1992), through their study of 5-year post-transaction performance on samples of M&A on the NYSE and AMEX between 1955 and 1987, proved that the transactions that were financed with cash outperformed those that were financed with equity. Tichy (2001) obtained similar conclusions.

[4] Either internal cash or debt raising.

On the other hand, there are studies that found cash financing of M&As does not have a positive effect on post-transaction performance. Dube and Glascock (2006) examined 255 acquirers and mergers, listed on NYSE, AMEX and NASDAQ to determine which method, among cash, equity and cash-equity combination, brought the relatively best results three years after the transaction. They found that although the stock-paid mergers significantly underperformed, there were no abnormalities observed in the operating performance of cash-paid deals. Heron and Lie (2002) claimed that the payment method could not be perceived as a determinant of bidder's post-transaction performance.

Amihud, Lev and Travlos (1990) tested the static trade-off theory via a probit regression explaining the choice of equity issue versus cash financed M&As as a function of officer and director share ownership and target size. Their result showed that manager share ownerships have a significant negative relationship to equity issues. It is possible that a stock offer would indicate that the acquirer takes advantage of potential information asymmetry problem, offering overvalued equity as payment instead of paying in cash. On the other hand, Hansen (1987) studied the transacting process of M&As focusing on adverse selection and incentives for wealth-maximizing transactors as determinants for exchange mechanisms in those transactions. The results of his study showed that the acquirer is more likely to offer equity payment when they think that the target is holding back information from them. In addition, Hansen (1987) found supportive evidence for the conclusion that the probability of an equity issue is a function of the firm's' assets and debt, increasing with the acquirer's debt and decreasing with the acquirer's assets. Similarly, Faccio, McConnell & Stolin (2006) stated that the bidder's M&A financing decision can be significantly influenced by its debt capacity and existing capital structure. Thus, it is possible that equity financing of M&As could be seen as an indicator of the acquiring firm's high leverage and low retained earnings.

To sum up, from the pecking order theory point of view, the use of internal cash for financing M&A is associated with low risk and low transaction costs. Therefore, it could result in lowest impact on bidder default risk among the three financing methods. The second method is debt raising, which is preferred to equity issuance. This method is associated with both financial distress costs and tax shield advantages. The third financing method - equity issuance is linked with highest level of transaction costs and leads to adverse selection problems between the

bidder and the market as proposed by the signaling theory. This method is a useful tool for mitigating information asymmetry problems between the two entities of the deal. So theoretically, each financing method comprises of both advantages and disadvantages. Empirically, existing research has only looked at the impact of financing payment choice of M&A on the acquirer's performance post-transaction with mixed opinions and conclusions so far.

Academic research hardly discussed the financing methods of M&As, not to mention its impact on the acquirers' default risk in the specific case of acquiring financially distressed targets. Thus, it is crucial to investigate the financing methods of distressed M&As and their impact on the default risk of the post-transaction entity. To put it differently, this paper examines if there is any correlation between financing method choice of distressed M&As and the acquirers' probability of default, comparing the three main financing methods: equity, debt and internal cash through this set of hypotheses.

Hypothesis 3a: Equity financing affects the default risk of the acquirers of distressed companies more negatively than debt financing does.

Hypothesis 3b: Equity financing affects the default risk of the acquirers of distressed companies more negatively than internal cash financing does.

Hypothesis 3c: Debt financing affects the default risk of the acquirers of distressed companies more negatively than internal cash financing does.

3. Data Collection and Sample

3.1. Data Collection Process

The paper covers completed M&A deals by US acquirers and targets that occurred between January 2011 - August 2017[5]. One potential advantage of the chosen period is the fact it does not capture the global financial crisis period 2008-2011. However, it is possible that a part of the sample is still affected by lagging crisis effects.

[5] The last quarter of 2017 is excluded due to the inaccessibility of post-transaction accounting data, which is required for the Merton's model calculations.

The main data sources are Thomson Reuters Eikon and Orbis; Bloomberg Terminal is used to supplement accounting data. Additional information regarding the financing method of the transactions is obtained from companies' websites and annual reports. Financial information comprising financial ratios like ICR and MTR is collected manually for each firm. The dataset follows these criteria: (1) the acquirer and the target are publicly-traded entities, (2) the sample excludes targets and acquirers from the financial sector, (3) deals of all sizes are included (4) the acquirer has a prior-acquisition equity stake of <50% and post-acquisition equity stake of >50% (following Bruyland and Maeseneire, 2016).

In pursuance to construct a meaningful and reliable sample and to enhance the reliability of the drawn conclusions for the entire US corporate sector, the paper does not focus on one specific industry. Following practice in the corporate finance studies, all transactions by companies in the financial sector (finance, insurance, real estate, holding and other investments companies) are excluded because of their difference from industrial companies, mostly in terms of leverage level (Johannsson & Kopitz, 2012).

The next step is to filter out transactions in which the time span between the announcement and the completion date is greater than one year as deals with long time span between announcement and completion date run the risk of being influenced by factors, which are not related to the transaction (Johannsson & Kopitz, 2012). Observations where the target is too small or too large compared to the bidder (below 2% and above 150%) are excluded, following Furfine and Rosen (2011). The last imposed restriction is to capture only the transactions where the acquirer held less than 50% pre-transaction equity stake and holds 90% + post-transaction (Bruyland & Maeseneire, 2016). Finally, observations with missing accounting information are excluded. After all adjustments and exclusions of observations, the final sample comprises of 382 US M&As. Table 1 presents the sample distribution classified in terms of industry using two-digit codes. It provides evidence that about 60% of all non-distressed M&As and more than 75% of distressed ones took place within three main industries – Energy and Power, Healthcare and High Technology.

Table 1. Distressed and non-distressed M&As within industries.

	Non-Distressed M&As		*Distressed M&As*	
	Obs.	*%*	*Obs.*	*%*
Sample breakdown by M&A target industry				
Consumer Products and Services	14	5.0	3	3.0
Consumer Staples	13	4.6	1	1.0
Energy and Power	**42**	**14.9**	**13**	**12.9**
Healthcare	**52**	**18.5**	**36**	**35.6**
High Technology	**76**	**27.0**	**28**	**27.7**
Industrials	26	9.3	7	6.9
Materials	25	8.9	3	3.0
Media and Entertainment	10	3.6	2	2.0
Retail	13	4.6	2	2.0
Telecommunications	10	3.6	6	5.9
Total	281	100	101	100

Table 2 presents the distribution over the years. It shows no predominant occurrence of M&A transactions for the period January 2011 – August 2017.

Table 2. Distressed and non-distressed M&As over the years.

	Non-Distressed M&As		*Distressed M&As*	
	Obs.	*%*	*Obs.*	*%*
Sample breakdown over years				
2011	39	13.9	17	16.8
2012	46	16.4	19	18.8
2013	29	10.3	9	8.9
2014	45	16.0	14	13.9
2015	58	20.6	15	14.9
2016	46	16.4	17	16.8
2017	18	6.4	10	9.9
Total	281	100	101	100

3.2. Sample Classification: Distressed and Non-Distressed M&As

Once the final data sample is collected, target companies are split into distressed and non-distressed, which requires a suitable proxy for financial distress. Numerous prior studies (Beaver, 1966; Altman, 1968 and Ohlson, 1980) defined corporate distress in terms of default, insolvency or bankruptcy. Bruyland and Maeseneire (2016), in their study of risk effects of distressed acquisitions, presented a wide variety of proxies used in prior literature to account for financial distress e.g. Altman Z-score (Altman, 1984), interest coverage ratio (Baever, 1966; Ohlson, 1980) etc. They defined financial distress following prior studies (Asquith, Gertner &

Scharfstein, 1994; Rajan & Zingales, 1995; and Pindado, Rodrigues & Torre, 2008) as company's inability to meet its financial obligations. The paper follows Asquith, Gertner & Scharfstein (1994), Rajan & Zingales (1995), Pindado, Rodrigues & Torre (2008) and Bruyland & Maeseneire (2016), using interest coverage ratio (ICR) as a proxy for financial distress. It is calculated as the earnings before interest and tax (EBIT) divided by interest expense on debt. A target company is categorized as *"distressed"* when ICR is less than one during the two prior years of the deal as proposed by Bruyland and Maeseneire (2016). The categorization yields a sample of 101 M&As of distressed companies and 281 M&As of non-distressed companies [6].

3.3. Sample Classification: Temporarily and Permanently Distressed Targets

As mentioned above, the paper goes one step further and distinguishes between temporarily and permanently distressed targets. The analysis of changes in management and business operations is required for capturing the differences between temporary and permanent financial distress. Management Turnover Rate (MTR) is a good approximation of long-term financial distress because bankruptcy filings are associated with higher level of CEO turnover (Gilson, 1989; Jostarndt, 2007). Gilson (1989) and Jostarndt (2007) proved that high levels of MTR are linked to severely financially constrained firms. Due to data inaccessibility and thus the inability to obtain such a proxy, the analysis is limited to CEO change during the last 5 years prior the deal announcement as frequent CEO change is also an indicator of more severe distress.

The level of financial leverage and liquidity are determinants of a firm's financial viability as Gilson (1989) found that distressed companies that went through debt restructurings are associated with higher leverage ratios compared to competitors within the same industry. To account for current operating distress, the paper uses a supplementary proxy – *Cash from Operations (CFO)* as a multiple of average current liabilities. High values for the last 5 years would indicate the company's ability to finance its current obligations without raising additional debt. To account for leverage level, *Total Debt/Total Assets ratio* is used because it is comparable across companies and provides useful information for the indebtedness of the target. Distressed targets are classified as *"permanently distressed"* if the firm has a *CFO/Current*

[6] See Table 2.

Liabilities ratio lower than the average of -0.92 for the 5 years prior the transaction, *Total Debt/Total Assets ratio* higher than the average of 30.09 for the same period and had CEO changes. The rest of the distressed sample is classified as *"temporarily distressed firms"*.

When analyzing the financial performance of the targets to categorize them according to their level of distress, the paper includes accounting information from the financial crisis period (2008 - 2011). It is noted that there is a possibility of a greater number of financially-distressed companies due to the unstable environment. All criteria yield a sample of 49 permanently distressed targets and 52 temporarily distressed targets[7].

Table 3. Temporarily and permanently distressed M&As within industries.

	Temporarily Distressed M&As		*Permanently Distressed M&As*	
	Obs.	*%*	*Obs.*	*%*
Sample breakdown by M&A target industry				
Consumer Products and Services	3	5.8	0	0.0
Consumer Staples	1	1.9	0	0.0
Energy and Power	11	21.2	2	4.1
Healthcare	11	21.2	**25**	**51.0**
High Technology	17	32.7	11	22.4
Industrials	3	5.8	4	8.2
Materials	2	3.8	1	2.0
Media and Entertainment	0	0.0	2	4.1
Retail	2	3.8	0	0.0
Telecommunications	2	3.8	4	8.2
Total	52	100	49	100

3.4. Sample Classification: Equity Financing, Debt Financing and Internal Cash Financing

As previously mentioned, the paper aims to distinguish between three methods of financing in distressed M&As. The focus is placed on cash offer deals and these deals are split according to their financing method – raising debt or using internal cash generated by the company. Table 4 shows the results of the sample breakdown of M&As into different subsamples according to their financing method. Equity financing method represents nearly 16% of all non-distressed deals and almost 26% of all distressed transactions. This indicates that distressed M&As tend to be more

[7] See Table 3.

equity-financed because of potential information asymmetry problems as proposed by Hansen's study (1987). The combined number of distressed deals financed with debt and internal cash is much higher (74%) than the number of distressed deals financed with equity (26%). This supports prior academic research's evidence for cash payment preferences over stock payment (Agrawal, Jaffe & Mandelker, 1992; Tichy, 2001).

Table 4. Distressed sample breakdown by M&A financing method.

	Non-Distressed M&As		*Distressed M&As*	
	Obs.	*%*	*Obs.*	*%*
Sample breakdown by M&A financing method[8]				
Equity Financing	35	15.8	23	25.8
Cash Offers	186	84.2	66	74.2
Debt Financing			*42*	*47.2*
Internal Cash Financing			*24*	*27.0*
Total	**221**	**100.0**	**89**	**100.0**

3.5. Target and Acquirer Characteristics

Characteristics of distressed and non-distressed targets and their acquirers

Table 5. shows that distressed targets are smaller and less profitable than non-distressed in line with Bruyland and Maeseneire (2016). Distressed targets are more, although not highly, leveraged compared to others. A significant proportion of distressed deals are concentrated in the Health Care Sector[9], which is not characterized by high leverage levels (Schwab, 2018), because creditors are reluctant to provide funds to healthcare firms, which are considered to be risky and rather dependent on R&D expenditures (Musmar, 2016).

The majority of the detailed bidder univariate results presented are consistent with Bruyland and Maeseneire (2016) - bidders of distressed firms are smaller and less revenue generating than those of non-distressed. 85% of distressed transactions are in the same industry, compared to 74% of non-distressed i.e. bidders of distress firms tend to be players within the same industry which is in line with Clark and Ofek (1994) and Bruyland and Maeseneire (2016).

[8] The missing observations in this sample breakdown are deals financed with both cash and equity.
[9] See Table 1.

Table 5. Target and Acquirer Characteristics – Distressed and Non-distressed M&As.

	Non-Distressed M&As		*Distressed M&As*	
	Mean	*Median*	*Mean*	*Median*
Panel A: Target Characteristics				
Deal Value	18 973.28	1 960.16	15 687.16	450.22
Interest Coverage Ratio (2 years prior)	45.96	3.50	-8.62	-1.60
Interest Coverage Ratio (1 year prior)	18.86	4.20	-15.77	-1.90
Premium 1 Day prior	89.03	28.21	45.06	32.43
Premium 1 Week	83.72	30.72	48.76	38.16
Premium 4 Weeks	75.90	33.69	57.95	46.41
Cash and short-term/Assets	0.22	0.13	0.28	0.20
EPS	0.76	0.78	-1.07	-0.59
EBIT/Assets	0.07	0.08	-0.10	-0.04
EBITDA/Assets	0.12	0.12	-0.04	0.02
Net Debt/Assets	0.02	0.07	0.07	0.12
Net Income/Assets	**0.03**	0.04	**-0.17**	-0.09
Net Sales/Assets	**1.02**	0.85	**0.77**	0.67
Pre-tax Income/Assets	**0.04**	0.06	**-0.17**	-0.09
Short-term Debt/Assets	0.03	0.00	0.05	0.01
Total Assets	**17 370.23**	1 307.91	**15 722.57**	323.51
Total debt/Assets	**0.24**	0.19	**0.36**	0.31
Total Liabilities/Assets	**0.50**	0.45	**0.58**	0.59
Dummy (1-Equity;0-Cash)	0.13	0.00	0.24	0.00
Industry dummy (1-same industry)	0.73	1.00	0.75	1.00
Panel B: Acquirer Characteristics				
EPS	2.20	1.67	3.39	0.62
EBIT/Assets	0.09	0.08	0.01	0.06
Net Income/Assets	0.05	0.05	-0.02	0.04
Net Sales/Assets	**0.86**	0.65	**0.69**	0.57
Pre-tax Income/Assets	0.07	0.07	0.00	0.04
Total Assets	**18 898.14**	5 700.51	**14 457.33**	1 822.21
Dummy (1-Equity;0-Cash)	0.12	0.00	0.29	0.00
Dummy Industry (1-same industry)	**0.74**	1.00	**0.85**	1.00
Leverage	0.29	0.16	0.28	0.10

Characteristics of temporarily and permanently distressed targets and their acquirers

Permanently distressed targets are less profitable and happen to be larger compared to temporarily distressed targets. The acquirers of these targets however are less profitable and more leveraged than those of only temporarily distressed targets. Both types of acquirers are almost at the same size. 87% of them are operating within the same industry in line with Bruyland and Maeseneire (2016). These industry-related bidders might have more specific industry information (Shleifer & Vishny, 1992), and therefore, more room for synergies can be expected (Chatterjee & Lubatkin, 1990; and Servaes, 1991) as Jory and Madura (2009) found distressed targets are more valuable when they merge with a bidder in the same industry. In brief,

the observed pattern is that one group of bidders prefers big, deeply in distress companies, and the other group prefers small, slightly distressed.

Table 6. Target and Acquirer Characteristics – Temporarily and Permanently Distressed M&As.

	Temporarily-Distressed M&As		*Permanently-Distressed M&As*	
	Mean	*Median*	*Mean*	*Median*
Panel A: Target Characteristics				
Deal Value	2 633.92	636.19	18 008.46	270.10
Interest Coverage Ratio (2 years prior)	-7.17	-1.20	-96.22	-3.85
Interest Coverage Ratio (1 year prior)	-9.57	-1.70	-493.15	-1.85
Cash and short-term/Assets	0.39	0.24	0.37	0.26
EBIT/Assets	-0.11	-0.03	-0.41	-0.14
Net Debt/Assets	-0.17	-0.06	0.26	0.02
Net Income/Assets	**-0.20**	-0.06	**-0.37**	-0.16
Net Sales/Assets	**0.81**	0.72	**0.59**	0.40
Pre-tax Income/Assets	**-0.20**	-0.08	**-0.43**	-0.20
Short-term Debt/Assets	0.03	0.00	0.05	0.01
Total assets	**3 146.96**	397.58	**17 802.00**	117.00
Total Debt/Assets	0.23	0.19	0.41	0.30
Total Liabilities/Assets	0.50	0.48	0.79	0.57
Panel B: Acquirer Characteristics				
EPS	0.64	0.65	3.60	0.48
EBIT/Assets	**0.05**	0.07	**-0.02**	0.04
Net Income/Assets	**0.01**	0.05	**-0.04**	0.03
Pre-tax Income/Assets	**0.03**	0.07	**-0.02**	0.04
Total Assets	**18 413.82**	2 375.18	**20 627.56**	3 595.86
Net Sales/Assets	**0.82**	0.62	**0.56**	0.57
Dummy Industry (1-same industry)	**0.73**	1.00	**0.87**	1.00
Leverage	**0.09**	0.00	**0.25**	0.06

Characteristics of targets and acquirers that use different deal financing methods

The distressed targets that were offered equity have less cash and short-term assets than those that were offered cash as payment. These targets are almost at the same size, although those who were offered equity appeared to be slightly smaller than the others in terms of total assets. The acquirers who offered stock payment nevertheless are less profitable than those who offered cash payment, which is understandable, as they might not have enough retained earnings or debt capacity to be able to offer cash payment. This is consistent with Faccio, McConnell & Stolin (2006) who found that equity financing is associated with bidder's low retained earnings and high leverage. These acquirers are also smaller and more leveraged (50%) than those who offered cash (in line with Hansen, 1987), which completely supports the reasoning above.

Table 7. Target and Acquirer Characteristics – Equity, Debt and Internal Cash Financed M&As.

	Equity Financed Distressed M&As		*Debt Financed Distressed M&As*		*Internal Cash Financed Distressed M&As*	
	Mean	*Median*	*Mean*	*Median*	*Mean*	*Median*
Panel A: Target Characteristics						
Deal Value	449.76	111.45	2 419.02	880.38	1 079.18	104.55
Interest Coverage Ratio (2 years prior)	-313.46	-6.75	-131.13	-4.50	-19.82	-5.25
Interest Coverage Ratio (1 year prior)	-99.01	-4.90	-610.23	-3.30	-52.69	-0.25
Cash and short-term/ Assets	**0.19**	0.18	**0.43**	0.37	**0.54**	0.21
EPS	-0.79	-0.23	-0.01	0.00	-0.58	-0.21
EBIT/Assets	-0.30	-0.11	-0.13	-0.03	-0.11	0.04
EBITDA/Assets	-0.23	-0.04	-0.13	-0.03	-0.11	0.04
Net Debt/Assets	0.08	0.02	-0.16	-0.24	-0.28	-0.02
Net Income/Assets	-0.09	-0.11	-0.24	-0.14	-0.17	-0.02
Net Sales/Assets	0.77	0.40	0.65	0.54	0.72	0.62
Pre-tax Income/Assets	-0.20	-0.11	-0.25	-0.20	-0.19	-0.03
Short-term Debt/Assets	0.05	0.00	0.03	0.00	0.06	0.01
Total assets	**1 056.69**	88.03	**1 313.28**	321.58	**1 993.02**	195.64
Total Debt/Assets	0.26	0.20	0.29	0.20	0.25	0.26
Total Liabilitites/Assets	0.63	0.54	0.51	0.51	0.51	0.54
Panel B: Acquirer Characteristics						
EPS	4.58	-0.35	2.56	1.92	0.98	0.88
EBIT/Assets	**-0.11**	-0.05	**0.11**	0.11	**0.08**	0.08
Net Income/Assets	**-0.11**	-0.05	**0.07**	0.08	**0.05**	0.05
Net Sales/Assets	**0.60**	0.47	**0.71**	0.64	**0.75**	0.56
Pre-tax Income/Assets	**-0.11**	-0.06	**0.09**	0.10	**0.07**	0.07
Total Assets	**2 587.67**	314.58	**31 285.25**	14 316.00	**30 872.12**	11 408.41
Leverage	**0.50**	0.43	**0.04**	0.01	**0.05**	0.01

4. Methodology

4.1. Approaches for Measuring Default Risk

A vast variety of accounting-based models for estimating default probabilities of corporations have been proposed by Altman (1968) and Beaver (1968), Altman and Katz (1976), Ohlson's (1980) O-Score, Lee and Urrutia (1996), Kavvathas (2000), Chava and Jarrow (2004), etc. Each of these models takes a constrained approach by modeling default probability based on an econometric specification that does not directly model companies' ability to repay its debt (Duffie, 2011). These models are constrained due to managerial discretion, manipulation (Hillegeist et al. 2004) and backward-looking financial statement information (Vassalou & Xing, 2004; Grimaldi, 2018; Duffie, 2011). An alternative approach for measuring default risk involves the use of credit default swaps (CDS) and credit ratings (Grimaldi, 2018). However, they are incomplete and lagging as shown by Landoa and Skødeberg (2002) and therefore unable to predict default events with sufficient predictive accuracy (Grimaldi, 2018).

Due to the drawbacks of these two approaches, a third alternative approach - structural models that are widely applied in prior literature (Grimaldi, 2018; Duffie, 2011) is used. In a structural model, firm's default exposure is determined by measuring its Distance-to-Default using market-based equity data and accounting-based data for firm's debt (Duffie, 2011). Typical examples of these models are the Black and Scholes (1973), Merton (1974), Fisher, Heinkel, and Zechner (1989), Leland (1994), Vasicek (1984), and Crosbie and Bohn (2003) (Grimaldi, 2018; Duffie, 2011). The Merton (1974) model is chosen as it is based on Black-Scholes option pricing theory (Grimaldi, 2018) and plays a fundamental role in all structural models.

4.2. Merton (1974) Model

Merton's (1974) model for estimating default risk is based on market-based information (Vassalou & Xing, 2004; Duffie, 2011 and Grimaldi, 2018). What makes the model superior to others is the fact that it makes use of market data, which reflects investors' expectations for the future performance of the companies. In other words, forward-looking information is used for the default risk computations (Vassalou & Xing, 2004; Bharath & Shumway, 2008; Grimaldi, 2018), therefore more accurate default predictions and classifications are expected. Hillegeist et

al. (2004) and Bharath and Shumway (2008) concluded that extracting DD measures from the model is superior to accounting-based models (e.g. Altman's Z-score and Ohlson's O-Score model) and provides more accurate default predictions. Additionally, it is a combination of theoretical foundation and updated market information (Grimaldi, 2018). The model uses several simplifying assumptions[10], some of which are previously criticized by researchers (Bharath & Shumway, 2008; Vassalou & Xing, 2004).

Following Grimaldi's (2018) article and assuming a relationship between default risk and capital structure, the equation for firm's assets value is as follows:

$$V_A = V_E + V_D \tag{I}$$

Where, at time *t,* a firm has assets V_A financed by equity V_E and zero-coupon debt V_D. When assets value V_A is higher than debt value V_D, firm's debtholders are paid the full amount of debt and shareholders' equity value equals V_A - V_D. Alternatively, the firm is in distress when assets value V_A is lower than debt value V_D and debtholders have the superior claim on assets, while shareholders lose their claims. Assuming the firm has a debt component, with a face value F and maturity T, and shareholders are residual claimants of the firm assets, the market value of equity can be represented as a call option with risk-free interest rate r_f, time to maturity T and strike price *F.*

Shareholders would exercise the call option if the firm's assets value V_A exceeds the face value of the debt *F*. If the value of company's assets drops below the strike price *F*, the value of the equity call option is zero. In this case, shareholders would let the option expire. Applying the Black-Scholes option pricing theory the equation for valuing the firm's equity V_E is as follows:

$$V_E = V_A\ N\ (d_1)\ -\ Fe^{-r_f T} N\ (d_2) \tag{II}$$

Where

$$d_1 = \frac{ln\left(\frac{V_A}{F}\right) + \left(r_f + 0.5\sigma_A^2\right) T}{\sigma_A \sqrt{T}} \tag{III}$$

$$d_2 = d_1 - \sigma_A \sqrt{T} \tag{IV}$$

[10] See Appendix A.

$N\ (d_1)$ and $N\ (d_2)$ is the standard normal distribution function for d_1 and d_2 .

Under the assumption that the equity value of a company V_E is a function of the value of the firm V_A and time, Ito's lemma is applied for linking the asset volatility σ_A to the volatility of firm equity σ_E:

$$\sigma_E = \left(\frac{V_A}{V_E}\right)\left(\frac{dV_E}{dV_A}\right)\sigma_A \tag{V}$$

Since $\left(\frac{dV_E}{dV_A}\right) = N(d_1)$ as shown in the Black-Scholes-Merton model, the volatility of the company and its equity can be derived as:

$$\sigma_E = \left(\frac{V_A}{V_E}\right) N(d_1)\ \sigma_A \tag{VI}$$

Where d_1 is defined in Equation (III).

Once assets value V_A and volatility σ_A are estimated from equations (II) and (V), the individual firm's Distance-to-Default is calculated as:

$$DD_t = \frac{ln\left(\frac{V_A}{F}\right)+\left(r_f - 0.5\sigma_A^2\right)T}{\sigma_A\sqrt{T}} \tag{VII}$$

DD value measures the number of standard deviations by which the total assets exceed the default barrier F at time maturity T. Since the risk-free rate is used instead of expected growth of the assets, the DD calculated is also known as risk-neutral DD. It is the most widely used approach in academic literature when it comes to measuring default risk (Grimaldi, 2018).

To estimate the probability of default, the theoretical normal cumulative distribution following Bruyland and Maeseneire (2016) and Vassalou and Xing (2004) is applied:

$$P_{def} = \text{N (-DD)} = \text{N (-} \frac{ln\left(\frac{V_A}{F}\right)+\left(r_f - 0.5\sigma_A^2\right)T}{\sigma_A\sqrt{T}} \text{)} \tag{VIII}$$

Moody's KMV (MKMV) calculated an empirical distribution of defaults using its huge historical database of over 250,000 companies and about 4,700 default cases (Crosbie & Bohn, 2003).

Although MKMV's empirical distribution leads to more accurate default predictions, cumulative normal distribution is used due to inaccessibility of MKMV distribution.

4.3. Merton (1974) Model Inputs

To calculate DD for the sample of 382 M&As, these following inputs are used:

- Time horizon T – a standard period of 1 year is used following prior research (Bruyland & Maeseneire, 2016; Furfine & Rosen, 2011, Bharath & Shumway, 2008; Vassalou & Xing, 2004).
- Default barrier F – the sum of 100% short-term liabilities and 50% long-term liabilities is calculated (Bharath & Shumway, 2008; Vassalou & Xing, 2004; Bruyland & Maeseneire, 2016; Duffie, Acharya & Schaefer, 2009) with annualized data[11].
- Market value of equity V_E – calculated as the product of the number of shares outstanding and the current stock price using daily market values[12].
- Risk-free rate r_f – 1-year Treasury bill [13] interest rate is used following Bharath and Shumway (2008) who used the risk-neutral framework.
- V_A and σ_A are unknowns and Microsoft Excel Solver is used for calculation. The paper follows Loeffler and Posch's (2010) approach for iterative calculation of asset values and assets volatility. An alternative approach for the calculations could be Bharath and Shumway's (2008). However, the output of their model depends significantly on the leverage level, which would impose inevitable limitations to the paper.

To examine changes in bidder default risk, the total change in the bidder DD was calculated, measured by the average bidder DD following deal completion minus the average bidder DD minus the average bidder DD prior to deal announcement[14], for the respective estimation windows + 3 days to +252 days and -280 days to -31 days (Bruyland & Maeseneire, 2016). Similarly, Hotchkiss and Mooradian (1998) examined the stock abnormal returns + 5 days following the announcement and - 250 to - 30 days prior. Alternatively, Furfine and Rosen (2011) and Clark and Ofek (1994) focused on the period around the deal and studied returns up

[11] Obtained from Thomson Reuters Datastream
[12] Obtained from Thomson Reuters Datastream
[13] Obtained from the FED
[14] See Figure 2.

to 5 days before and after. Bruyland and Maeseneire's (2016) approach is chosen to control for more market information on firms' performance and for more accurate default risk computations.

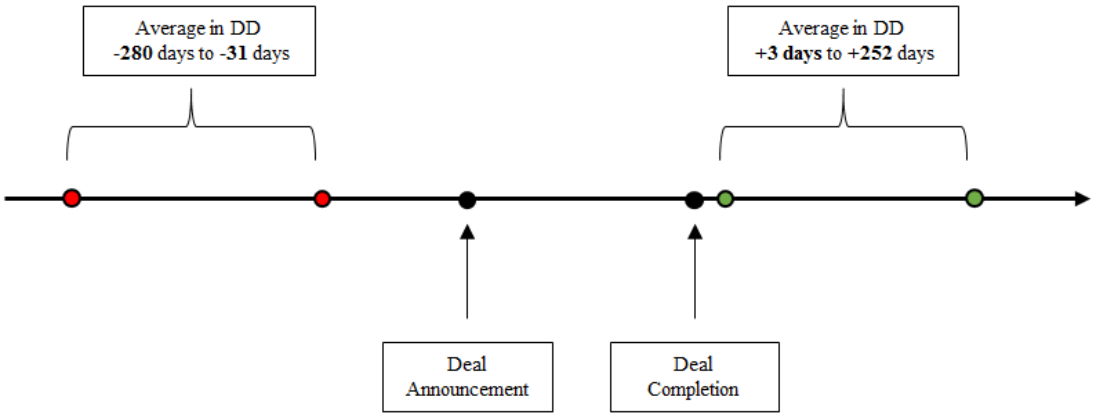

Figure 2: Selection of pre and post M&As points of measurement of DD.

4.4. Regression Models Specifics

The paper empirically examines the impact of different levels of distress in the targets and different deal financing methods on the bidder default risk. It tests whether permanently distressed targets affect the bidder default risk more negatively than temporarily distressed targets do, and whether using equity, debt or internal cash to finance for those deals would impact the bidder default risk differently and if yes, at what level. Various dummy variables[15] are created for this purpose. A number of control variables[16] are added to help with identifying the relationship between the dependent variables and the dummy variables. Since the dependent variable *CHANGE_IN_DD* is continuous data, and the independent variables, on the other hand, are a mix of binary and quantitative data, an Ordinary Least Squares method is suitable for testing the hypotheses.

Several regressions are created in an attempt to test the significance of the dummy variables. The general regression is explained below. Each hypothesis is then tested by running a regression that contains only the appropriate dummy variable.

$$CHANGE\_IN\_DD = \alpha + \beta_1 DUMMY\_DA + \beta_2 DUMMY\_PER + \beta_3 DUMMY\_EQUITY + \beta_4 DUMMY\_DEBT + \beta_5\text{-}\beta_{18}\ Controls_i + \varepsilon$$

[15] See Appendix C for detailed definitions
[16] See Appendix C for detailed definitions

Where:

Dependent variable: change in Distance-to-Default (*CHANGE_IN_DD*), which was defined previously in part 4.3.

Explanatory variables

Type of targets

In order to evaluate if the bidder default risk is affected by its target's financial health, the variable *DUMMY_DA* is used to classify the targets into two groups: distressed and non-distressed[17].

Level of distress

To evaluate if the target's level of distress has any impact on the bidder default risk, another dummy variable *DUMMY_PER* is used to classify the distressed targets into two groups: permanently and temporarily distressed[18].

Financing method

Regarding the effects of deal financing method on bidder default risk, two dummy variables are used to classify the targets into three groups: equity financing, debt financing, and internal cash financing as follows:

DUMMY_EQUITY: a dummy variable that classifies bidders of distressed targets that used equity financing[19]. *DUMMY_DEBT*: a dummy variable that classifies bidders of distressed targets that used debt financing[20].

Control variables

Several control variables that may influence the interpretation of the results were added. First, to control for the acquirer financial health and operating performance, the variables *A_DEBT_ASSETS, A_EBIT_ASSETS, A_EPS, A_NETINCOME_ASSETS* are added, representing the acquirer's debt-to-assets ratio, EBIT-to-assets, earnings-per-share and net income-to-assets.

17 $\beta 1 = 1$ if distressed targets and $\beta 1 = 0$ if non-distressed targets.
18 $\beta 2 = 1$ if permanently distressed and $\beta 2 = 0$ if temporarily distressed.
19 $\beta 3 = 1$ if the acquirer used equity financing and $\beta 3 = 0$ if otherwise.
20 $\beta 4 = 1$ if the acquirer used debt financing and $\beta 4 = 0$ if otherwise.

The *A_DEBT_ASSETS* control variable is included because bidder' leverage ratio has an impact on firm's financing method decision for the deal. In other words, highly leveraged acquirers would prefer equity and internal cash financing to debt financing. *A_EBIT_ASSETS, A_EPS, A_NETINCOME_ASSETS* variables control for acquirers' prior transaction operating performance, since acquirers with superior financial results are associated with lower business risk (Amato & Furfine, 2004). These high-performing bidders might not be affected by distressed M&As as significantly as others as shown in Bruyland and Maeseneire (2016).

To control for the target's financial and operating performance, the variables *T_ASSETS, T_CASH_ASSETS, T_DEBT_ASSETS, T_EPS, T_NETINCOME_ASSETS* are added, representing targets' assets, cash-to-assets ratio, debt-to-assets ratio, net income-to-assets ratio and earnings-per-share. Because deal terms are increasingly seller-friendly as transaction size increases (Rauch & Burke, 2016), the acquisition premiums are higher for larger targets. Therefore, *T_ASSETS* controls for target size as it may affect the change of post-transaction default risk. Wruck (1990) concluded that companies in financial distress are associated with debt overhang problem or cash shortage and therefore lacking sufficient cash flows to meet their current financial obligations. Consequently, *T_CASH_ASSETS* variable is included to control for targets' cash availability. *T_DEBT_ASSETS* variables controls for target's leverage as a more highly leveraged target might substantially increase the risk exposure of the combined post-merger entity (Chatterjee & Lubatkin, 1990; Geppert & Kamerschen, 2008). Furthermore, *T_EPS, T_NETINCOME_ASSETS* variables control for target's financial results; a target with low operating performance may affect bidder default risk through significant risk transfer as proposed by Furfine and Rosen (2011).

The target-bidder relative size is explicitly controlled for by adding the variable *REL_SIZE,* because acquisitions of large targets can complicate the integration process and particularly lead to restructurings in the case of distressed targets, thus setting off the diversification benefits from M&As (Clark & Ofek, 1994). Industry related transactions are controlled by adding *DUMMY_IND*. Bruyland and Maeseneire (2016) proved that acquirers repeatedly buy distressed firms in domestic or related industries. These bidders are associated with a higher initial equity stake in the target and for this reason the *PERC_SHARE_ACQ* control variable is used. Lastly,

control variables for the acquisition premium are added, since Bruyland and Maesenerie (2016) suggested acquisition premium as a potential measure for overpayment.

Unlike Bruyland and Maeseneire (2016), instead of using financial data of 1 year prior to the deal announcement, financial data at the time of deal announcement is employed. This is in line with Bugeja (2015) and Furfine and Rosen (2011) who used data that is closer to the deal announcement for more relevant and accurate information about the targets and acquirers' financial health.

4.5. Methodology Limitations

A potential limitation of the Merton (1974) model is that it is based on the Black-Scholes model, which requires a number of simplifying assumptions that might not hold in practice (Teneng, 2011). Acharya and Schaefer (2009) showed that the Merton (1974) model tends to under-predict defaults, compared to MKMV approach. The model has also been criticized for several other limitations as follows.

Risk-free rate as a drift term

By using a risk-free rate as a drift term in the model, instead of expected asset growth, the specific risk preferences of investors are not taken into considerations (Hull, 2015). While Acharya and Schaefer (2009) criticized the use of constant risk-free rates because it does not model the relation between interest rate risk, default risk and asset risk for example, most of the prior research adopts the risk-neutral DD framework (assuming risk-free rate) instead (Grimaldi, 2018).

Normal distribution vs. MKMV empirical distribution

Prior empirical studies suggested that default rates do not follow a normal cumulative distribution, but a "fat-tailed" instead (Crosbie & Bohn, 2003; Jarrow, Lando & Turnbull, 1997). Therefore, adopting a normal cumulative distribution might lead to inaccurate default predictions, especially those which are more leptokurtic (Lütkebohmert, 2008). An alternative solution is to use the above mentioned MKMV empirical distribution, which is constructed on real-life data and accounts for the fact default rates have much wider tails (Crosbie & Bohn, 2003).

Default barrier

Another assumption of the Merton (1974) model is that default occurs only at maturity and when assets value falls below debt value. Theoretically, the assumption holds, however, Gray and Malone (2008) suggested that in reality, companies might file for bankruptcy even when assets value is higher than debt value. Additionally, a wide variety of proxies for default barriers was proposed in prior academic research e.g. Bharath and Shumway, 2008; Vassalou and Xing, 2004; and therefore resulted in diverse DD calculations.

Complicating computations

Bharath and Shumway (2008) concluded that Merton's (1974) model is useful for forecasting default probabilities, but it is not a sufficient statistic for default[21]. The iterative procedure for estimating assets value and assets volatility does not appear to be useful, but rather time-consuming and complicated. Acharya and Schaefer (2009) supported this point by emphasizing that structural models depend significantly on these two unknown values, which are not directly observable.

To sum up, the Merton (1974) model is previously criticized for inaccurate default predictions (Acharya & Schaefer, 2009). The use of risk-free rate, normal cumulative standard distribution and default barrier are also believed to affect the absolute results of the model negatively. However, this study is focused on the relative change in DD prior and post the deal, therefore, these drawbacks should not have significant effects on the empirical results.

[21] Alternatively, Bharath and Shumway (2008) proposed a naïve model, which performs surprisingly well and is rather easy to execute.

5. Empirical Results and Discussion

5.1. Univariate Analysis

Based on the calculations of Distance-to-Default and Probability of Default, different DD trends are observed within the target groups that were classified.

Table 8. Univariate Analysis – All M&As

	Obs.	Δ PD
Type of Transaction		
Merger	*257*	0.14%
Acquisitions	*42*	0.24%
Type of M&A		
Non-distressed	*281*	**0.17%**
Distressed	*101*	**0.15%**
Industrial Diversification		
Same Industry	*288*	0.14%
Different industry	*94*	0.18%

While the mean of ΔPD is positive for both non-distressed and distressed M&As [22] which means that M&A activity in general increases the bidder default risk, acquirers of non-distressed targets on average have a more positive change in default probability than those of distressed targets. In other words, acquirers of distressed targets have a lower average change in DD than acquirers of non-distressed targets do. This result is inconsistent with Bruyland and Maeseneire (2016) and contradicts Furfine and Rosen (2011) who found that buying distressed targets raises the bidder default risk more than buying non-distressed targets. Also, it supports the opinion that there is a positive post-transaction effect in distressed target deals, discussed previously by Hotchkiss and Mooradian (1998) and Clark and Ofek (1994).

[22] See Table 8.

Table 9. Univariate Analysis – Distressed M&As

	Distressed Transactions		*Temporarily*		*Permanently*	
	Obs.	Δ PD	*Obs.*	Δ PD	*Obs.*	Δ PD
Type of Transaction						
Mergers	*85*	0.15%	*47*	0.15%	*38*	0.08%
Acquisitions	*16*	0.24%	*5*	0.16%	*11*	0.25%
Target's Level of Distress	-	**-**	*52*	**0.15%**	*49*	**0.21%**
Industrial Diversification						
Same Industry	*81*	0.17%	*38*	0.17%	*43*	0.21%
Different Industry	*20*	0.18%	*14*	0.24%	*6*	0.09%
Financing Method in Distressed M&As[23]						
Cash Offer	*66*	**0.15%**	*35*	0.18%	*31*	0.21%
Equity Offer	*23*	**0.17%**	*11*	0.17%	*12*	0.02%
Cash Offer M&As						
Internal Cash Financing	*24*	**0.25%**	*16*	**0.0035%**	*8*	**0.29%**
Debt Financing	*42*	**0.15%**	*19*	**0.25%**	*23*	**0.05%**

The table above presents univariate results of distressed deals and the split subsamples according to target's level of distress. It can be noted that the mean of Δ PD is higher in permanently distressed deals than in temporarily distressed ones, implying that acquiring permanently distressed targets raises bidder default risk more than acquiring temporarily distressed targets. A potential reason for the difference might be different post-transaction leverage i.e. permanently distressed targets put more debt on the post-entity balance sheet since they are more leveraged (as seen in Table.6) and thus, the default risk increases (Ghost & Jain, 2000; Morellec & Zhdanov, 2008).

In regards to financing method, it is observed that equity-financed deals might raise bidder default risk more considerably than cash offer deals do. From the Pecking Order Theory point of view, companies that preferred cash payment (irrespective of debt or internal cash) had a lower average Δ PD compared to those, which issued equity. The expected findings might be consistent with Agrawal, Jaffe, & Mandelker (1992)'s and Tichy (2001)'s studies where they found the cash-offer transactions outperformed those with equity offer.

[23] There are 12 missing observations, which are deals with a combination of stock and cash offer.

Regarding cash-offer deals, acquirers that financed distressed deals with internal cash have a higher average ∆ PD than those financed deals through debt raising. Two completely different trends are observed when examining cash offers for temporarily and permanently distressed deals separately. For bidder of temporarily distressed targets, debt raising has a significantly more negative impact on the bidder default risk than internal cash does. Meanwhile, the opposite trend is apparent for permanently distressed cases. It could be explained by the risk shifting theory and the tax shield advantage of debt. Since permanently distressed targets are risky investments for bidders, it might be wiser for the bidder to take on debt to finance the deal. By issuing debt, the bidder could maximize its shareholders' value by shifting the risk from these investments to the creditors, thus reducing the riskiness for its own equity. In addition, the bidders' shareholders value increases even more when they could exploit tax shield benefits from the debt and the management would get stricter monitoring from debtholders through various covenants attached to it. Even though higher leverage leads to higher default risk, the combination of these listed benefits might be greater than the added default risk that issuing more debt brings to the bidders in this particular case. On the other hand, if the bidders decide to use internal cash for the financing of these deals instead, all the mentioned benefits would not be present while their shareholders value decreases because of bearing all the risk and financing for these risky investments.

In conclusion, the sample of 382 M&A deals displays a negative average impact on the bidder default risk post-transaction, especially in the transactions, which include non-distressed targets. However, if distressed transactions are split according to target's level of distress, permanently distressed M&As are associated with a more negative effect on the bidder compared to temporarily distressed. In regards to financing method, there is an indication that equity-financed deals are associated with more negative impact on post-transaction bidder default risk.

5.2. Regression Results

5.2.1. Distressed and Non-Distressed M&As

The first regression is run on all sample and includes only DUMMY_DA as an explanatory variable to compare the two groups: distressed M&As and non-distressed M&As.

Table 10. Hypothesis 1 regression result – comparing distressed and non-distressed M&As' effect on acquirers' change in DD

Dependent Variable: *CHANGE_IN_DD_Q*
Method: Ordinary Least Squares
Included observations: 382

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	0.13	1.17	0.11	0.91
Explanatory variable				
DUMMY_DA	0.66	0.29	2.28	0.02
Control variables				
DUMMY_IND	-0.23	0.35	-0.65	0.51
A_DEBT_ASSETS	1.03	1.24	0.83	0.41
A_EBIT_ASSETS	0.37	2.85	0.13	0.90
A_EPS	-0.09	0.02	-4.14	0.00
A_NETINCOME_ASSETS	0.97	3.00	0.32	0.75
T_ASSETS_Q	3.45E-05	2.40E-05	1.44	0.15
T_CASH_ASSETS	-0.01	0.13	-0.06	0.95
T_DEBT_ASSETS_Q	0.11	0.41	0.26	0.79
T_EPS	-0.06	0.03	-1.77	0.08
T_NETINCOME_ASSETS	-0.05	0.22	-0.24	0.81
REL_SIZE	-2.31	1.23	-1.79	0.07
N PERC_SHARE_ACQ	0.01	0.01	0.50	0.61
PREMIUM_1_DAY_Q	-0.01	0.01	-0.81	0.42
PREMIUM_1_WEEK_Q	-0.01	0.01	-0.33	0.74
PREMIUM_4_WEEKS_Q	-0.01	0.01	-0.97	0.33
R-squared	0.20	F-statistic		5.17
Adjusted R-squared	0.16	Prob (F-statistic)		0.00

The variable *DUMMY_DA* has a positive statistically significant coefficient at 0.66 and a P-value at 0.02, which means that the increase in *CHANGE_IN_DD_Q* variable is 0.66 more in distressed M&As than the rest of the sample. The adjusted R-squared being 0.16 indicates a medium effect size of all independent variables on the *CHANGE_IN_DD_Q* (Cohen, 1992).

The result is significant, but it does not support *Hypothesis 1*. It proves the opposite: M&As of distressed targets are in fact risk-decreasing for the bidder. The regression results are consistent with the Fire Sales Hypothesis and with Clark and Ofek (1994), Hotchkiss and Mooradian (1998), who found that merging a distressed target has a more positive post-transaction impact on the bidder's financial performance compared to merging a non-distressed target. Operating

improvements, tax motives and financial distress costs reductions could be more substantial in those transactions. Operating enhancements might be apparent due to acquirers' expertise in restructuring the target as 85% of the bidders are industry-related in the sample[24]. It can be assumed that tax motives might affect the default risk positively since distressed targets are more leveraged[25]. Additionally, non-distressed M&As are associated with higher level of cash offers which means post-transaction entities become more leveraged. As proposed by Ghosh and Jain (2000), the systematic risk of these entities tends to increase. The result could indicate that a motivated workforce in distressed targets is the main driver for the more fruitful completion of the deal as proposed by Bruton, Oviatt & White (1994) and Larsson (1992). Technically, the better default risk results of distressed M&As can be explained by the abnormal stock returns after a distressed deal announcement as proved by Hotchkiss and Mooradian (1998). Since the market value of equity is a major input in the Merton (1974) model, the DD computations would reflect this positive market signal.

Hypothesis 1: Distressed targets affect the acquirers' default risk more negatively than non-distressed targets do.

Result: Rejected

[24] See Table 5.
[25] See part 3.5.

5.2.2. Temporarily and Permanently Distressed M&As

The second regression is run on only distressed deals, thus non-distressed deals are excluded for this regression. *DUMMY_PER* is used as an explanatory variable to compare the two groups: permanently and temporarily distressed M&As.

Table 11. Hypothesis 2 regression result – comparing temporarily and permanently distressed M&As' effects on acquirers' change in DD

Dependent Variable: *CHANGE_IN_DD_Q*
Method: Ordinary Least Squares
Sample: 1 382 IF *DUMMY_DA*=1
Included observations: 92[26]

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	2.38	1.18	2.15	0.04
Explanatory variable				
DUMMY_PER	-1.24	0.57	-2.19	0.03
Control Variables				
R-squared	0.76	F-statistic		8.05
Adjusted R-squared	0.67	Prob (F-statistic)		0.00

Supporting the hypothesis, the coefficient of *DUMMY_PER* variable is statistically significant at 95% confidence level. The adjusted R-squared being 0.67 indicates a substantially large effect of all independent variables on bidder's change in DD (Cohen, 1992). With the coefficient at -1.24, the result ascertains the negative effect of acquiring permanently distressed targets on bidder default risk.

The result showed evidence that targets, which were distressed for a longer period and were associated with prior CEO change have a more negative effect on the bidder compared to those that were distressed only temporarily and did not have significant changes in the management structure. This also confirms that target characteristics like larger size, a higher level of leverage, lower profitability and less revenue generating are linked to higher risk of default for the acquirers. Theoretically, the result is eloquent since permanently distressed firms are associated with dramatic changes in the business operations and corporate structure as proposed by Weizel and Jonsson (1989). This might create serious disorganization, disorientation and employee

[26] 9 missing observations due to missing financial information of control variables. Due to the small proportion of the missing observations compared to the sample size in case, their effects on the results are not expected to be significant.

resistance during the integration process and therefore influence the bidder default probability negatively. It is worth mentioning that even though the proportion of industry-related deals is higher in permanently distressed M&As and thus higher synergies and operating improvements are expected (Chatterjee & Lubatkin (1990) and Servaes (1991), the bidders are not successful enough in exploiting them.

All these findings are in stark contrast to the findings in Hypothesis 1, where non-distressed M&As were associated with more negative impact on bidder default risk. This finding proves that acquiring distressed targets are only beneficial when the targets are temporarily distressed. When targets are severely distressed, the benefits of acquiring these firms are replaced by the drawbacks mentioned above.

Hypothesis 2: Permanently distressed targets affect the acquirers' default risk more negatively than temporarily distressed targets do.

Result: Accepted at 95% confidence level.

5.2.3. Financing Method Results

5.2.3.1. Equity financing vs. Debt Financing

The third regression is run on only distressed deals with equity or debt financing, thus non-distressed deals and distressed deals with internal cash financing are excluded from the sample[27]. *DUMMY_EQUITY* is used as an explanatory variable in order to compare the two groups: equity financing and debt financing M&As.

[27] Potential effects of missing observations (internal cash financed M&As) on the results are insignificant since the target and acquirer characteristics of debt-financed distressed M&As are similar to internal cash-financed distressed M&As (See table 7.)

Table 12. Hypothesis 3a regression result – comparing equity and debt financing method's effects on acquirers' change in DD

Dependent Variable: *CHANGE_IN_DD_Q*
Method: Ordinary Least Squares
Sample: 1 382 IF *DUMMY_DA*=1 AND *DUMMY_RE*=0
Included observations: 62[28]

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	1.84	1.80	1.02	0.31
Explanatory variable				
DUMMY_EQUITY	-2.02	1.03	-1.96	0.06
Control Variables				
R-squared	0.68	F-statistic		4.63
Adjusted R-squared	0.53	Prob (F-statistic)		0.00

The *DUMMY_EQUITY* has a coefficient of -2.02, representing a significant negative impact of equity financing on bidder's change in DD. The adjusted R-squared being 0.53 supports a large effect of all independent variables on the dependent variable (Cohen, 1992). The statistically significant coefficient at 90% confidence level of *DUMMY_EQUITY* allows us to confirm the third hypothesis.

The result is consistent with Agrawal, Jaffe & Mandelker (1992), Tichy (2001) and Rahman's (2002) conclusion on bidder post-transaction performance even though they compare stock offers with cash offers without considering the fact cash offers can imply both debt and internal cash financing. The result is in line with Pecking Order Theory, where issuing new shares is the riskiest and costliest method of raising capital and potentially affects the bidder default risk negatively. Bidders that used equity financing are highly-leveraged, less profitable and revenue generating and their targets hold less cash compared to others[29]. All of these might explain the negative post-transaction effect on bidder default risk. This result is also a reflection of static trade-off theory. The benefits of tax deduction, risk shifting and maintained voting power of debt financing were proved to outweigh the drawbacks of increased leverage, added financial distress risk and agency problems between managers and creditors. According to Hansen (1987), paying with stock is an indicator of information asymmetry between the bidder and the target, especially

[28] 3 missing observations due to missing financial information of control variables. Due to the small proportion of the missing observations compared to the sample size in case, their effects on the results are not expected to be significant.
[29] See Table 7.

when the bidder thinks that the target is holding back critical information. The result indicates that the consequence of information asymmetry problem between the acquirers and the targets might be more severe than all the problems arisen by debt financing combined. The negative stock market reaction towards stock financing (Heron & Lie, 2002) could be another technical explanation for this result, since the market value of equity is an input that was used for DD computations.

Hypothesis 3a: Equity financing affects the default risk of the acquirers of distressed companies more negatively than debt financing does.

Result: Accepted at 90% confidence level.

5.2.3.2. Equity Financing vs. Internal Cash Financing

The fourth regression is run on only distressed deals with equity or internal cash financing, thus non-distressed deals and distressed deals with debt financing are excluded from the sample. *DUMMY_EQUITY* is used as an explanatory variable to compare the two groups: equity financing and internal cash financing M&As.

Table 13. Hypothesis 3b regression result – comparing equity and internal cash financing method's effects on acquirers' change in DD

Dependent Variable: *CHANGE_IN_DD_Q*
Method: Ordinary Least Squares
Sample: 1 382 IF *DUMMY_DA*=1 AND *DUMMY_DEBT*=0
Included observations: 44[30]

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	1.60	1.25	1.28	0.21
Explanatory variable				
DUMMY_EQUITY	-2.43	1.10	-2.20	0.04
Control Variables				
R-squared	0.80	F-statistic		6.70
Adjusted R-squared	0.68	Prob (F-statistic)		0.00

[30] 3 missing observations due to missing financial information of control variables. Due to the small proportion of the missing observations compared to the sample size in case, their effects on the results are expected to be insignificant.

The regression result shows statistically significant coefficient for *DUMMY_EQUITY* at 95% confidence level and a negative coefficient at (-2.43). This proves that the fourth hypothesis is true. The adjusted R-squared shows a large effect size at 0.67 (Cohen, 1992).

This conclusion again is consistent with Agrawal, Jaffe and Mandelker (1992), Tichy (2001) and Rahman's (2002) findings on bidder post-transaction underperformance in the case of equity financing. Further, this result reflects Pecking Order Theory; in this case, internal cash is the safest method of raising funds for a distressed deal. The bidders that used internal cash are larger, more profitable and less leveraged. All of this indicates more cash flows available to these bidders and therefore lower default risk of the post-deal entity.[31]

As Hansen (1987) suggested, distressed targets would have more incentives to hide certain information to the bidder to be able to sell at a higher price based on the theory of wealth-maximization. Thus, equity-financed deals are more likely to be associated with information asymmetry problems, which could lead to adverse selection problem for the bidder, thus affecting the bidder default risk negatively. Although management's incentives to maintain corporate control through opting internal cash financing over equity financing could be a negative factor to a firm's default risk (Stulz, 1988), the result did not prove this factor to have a significant impact compared to the negative impacts from equity financing on bidder default risk. Moreover, both types of financing do not require the bidder to raise debt, thus maintaining their leverage level and avoiding increased default risk from leverage as shown by Ghosh and Jain (2000).

Hypothesis 3b: Equity financing affects the default risk of the acquirers of distressed companies more negatively than internal cash financing does.

Result: Accepted at 95% confidence level.

5.2.3.3. Debt Financing vs. Internal Cash Financing

The last regression is run on only distressed deals with debt or internal cash financing, thus non-distressed deals and distressed deals with equity financing are excluded from the sample.

[31] See Table 7.

DUMMY_DEBT is used as an explanatory variable in order to compare the two groups: debt financing and internal cash financing M&As.

Table 14. Hypothesis 3c regression result – comparing debt and internal cash financing method's effects on acquirers' change in DD

Dependent Variable: *CHANGE_IN_DD_Q*
Method: Ordinary Least Squares
Sample: 1 382 IF *DUMMY_DA*=1 AND *DUMMY_EQUITY*=0
Included observations: 60[32]

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	2.26	1.08	2.09	0.04
Explanatory variable				
DUMMY_DEBT	0.77	0.54	1.43	0.16
Control Variables				
R-squared	0.31	F-statistic		1.22
Adjusted R-squared	0.06	Prob (F-statistic)		0.29

Unlike expected, the coefficient *DUMMY_DEBT* is statistically insignificant with the P-value being 0.16 and adjusted R-squared being 0.06. Therefore, debt financing is not associated with a larger negative effect on default risk compared to internal cash financing. The result indicates no significant difference in change in DD when comparing debt financing with internal cash financing. The Pecking Order Theory was not reflected in the result for this regression, which was not originally expected. It could be possible that the benefits and the drawbacks of debt financing balance out those of internal cash financing. The benefits of debt financing include risk shifting and tax advantages while the drawbacks include increased leverage and costs of financial distress. On the other hand, the benefits of internal cash financing include less transaction costs and less leverage while the drawbacks include the lack of scrutiny on bidders' management from creditors as a measure to prevent empire building. Another reason for the insignificant finding could be that the sample size for these types of deals is relatively small, and that the classification of the deals is not optimal, therefore there might be errors in the classification process due to the lack of information.

[32] 6 missing observations due to missing financial information of control variables. Due to the small proportion of the missing observations compared to the sample size in case, their effects on the results are expected to be insignificant.

Hypothesis 3c: Debt financing affects the default risk of the acquirers of distressed companies more negatively than internal cash financing does.

Result: Rejected

5.3. Summary of Hypotheses and Results

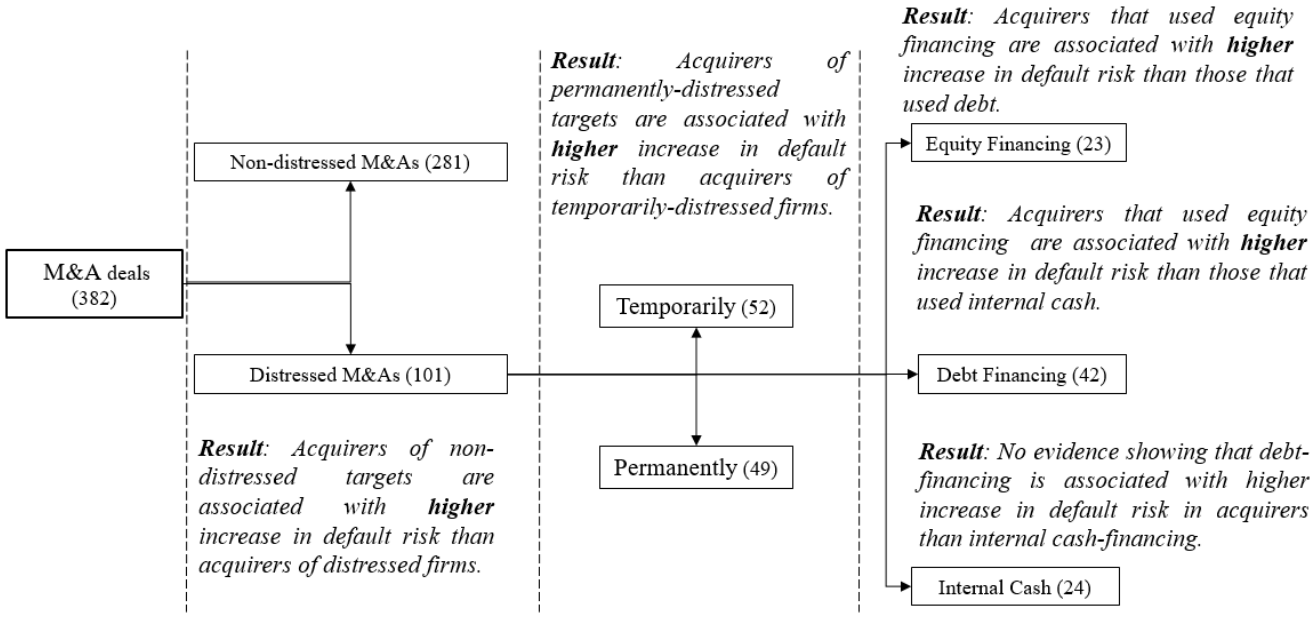

Figure 3. Overview of results

5.4. Diagnostics and Robustness

To test the reliability and relevance of the regression results, diagnostics and specification tests are performed for problems that might occur in multivariate linear regressions such as heteroscedasticity, non-normality, multicollinearity and non-linearity problem.[33].

The data suffers from heteroscedasticity problem, therefore, the regressions are run with Huber-White to correct the problem. Ramsey-Reset test[34] is carried out to test for non-linearity and found that several control variables have a non-linear relationship with the dependent variable *CHANGE_IN_DD_Q*. To mitigate this, all regressions were modified by adding square terms of

[33] The same diagnostics and specification tests are performed for all 5 regressions. Similar results are obtained.
[34] See Appendix D – Table 15

the problematic control variables. After that the Jarque-Bera values [35] improved, the non-linearity problem and the distribution of residuals problem were mitigated.

Multicollinearity problem is tested by examining the independent variables to find correlation coefficient higher than 0.80 (Brooks, 2014)[36]. No correlation coefficient higher than 0.80 was found, except for three pairs of variables, namely *A_EBIT_ASSETS* and *A_NETINCOME_ASSETS,* *PREMIUM_1_WEEK_Q* and *PREMIUM_1_DAY_Q,* *A_DEBT_ASSETS* and *REL_SIZE.* The first pair is correlated due to the similarity in firm's EBIT and net income trends. The second is correlated due to the similar nature of the variables. The third pair is correlated due to the possibility of the acquirer taking on more debt to finance big M&As. Since these variables are control variables in the models, not the variables of interest, it is safe to ignore this multicollinearity problem (Allison, 2012).

Altman Z- Score and credit ratings could be used for robustness testing. It would help to see if the target's level of distress and the deal financing method affect these scores the same way as they affect change in DD. Unfortunately, this information was hard to obtain for most of the targets in the sample, making this step unmanageable considering the time constraints. Thus, no robustness test is provided in this paper.

[35] See Appendix D – Figure 5
[36] See Appendix D – Table 16

6. Conclusion

Vast attention of academic research was directed to the analysis of M&A activities and their effect on the post-transaction entity's performance, especially in the case of acquiring distressed assets. Most findings showed post-transaction performance improvements in distressed acquisitions (Meire & Servaes, 2015; Hotchkiss & Mooradian, 1998; Clark & Ofek, 1994), still there exists evidence shown by other researchers that these acquisitions affect the acquirer default risk more significantly than acquisitions of financially healthy companies do (Bruyland & Maeseneire, 2016; Furfine & Rosen, 2011). Bruyland and Maeseneire (2016) claimed their article to be the first assessment of the risk effects of distressed deals and the determinants of the changes in bidder default risk. However, some of the determinants of the same importance were missing, namely the target's level of distress and the deal financing method. None of the researchers so far has mentioned the target's level of distress as a contributing factor to the bidder default risk. Some studies do mention the effects of M&A financing methods on post-transaction entity's performance, however none has yet to touch upon their effects on the bidder default risk. For that lack of literature on those topics, this study was set out to explore and fill in those gaps.

The empirical study re-examines the risk effects of distressed acquisitions, confirms the risk effects of the target's level of distress and sheds some light on the risk effects of the deal financing methods. Contrary to Bruyland and Maeseneire (2016), the paper shows that acquiring non-distressed targets can increase the acquirers' default risk more significantly than acquiring distressed firms. It also proves that permanently distressed targets affect the acquirer's default risk more negatively than temporarily distressed targets do. From these findings, it can be concluded that the target's level of distress plays a significant role in determining the acquirers' default risk and it is only beneficial for the acquirers to buy temporarily distressed firms. This conclusion emphasizes the importance of assessing distressed targets' business operations, management and corporate governance before an M&A decision.

Concerning financing methods, evidence was found that equity financing is linked to a more negative change in the acquirers' Distance-to-Default than debt financing or internal cash financing. This confirms that equity financing for distressed deals has the worst impact on the

acquirers' default risk. The conclusion emphasizes the severity of the information asymmetry problem that most acquirers face in an M&A deal and the indirect impact of negative stock market reaction on acquirers' default risk. Unfortunately, no evidence was found to confirm that debt financing has more negative default risk effects than internal cash financing does. Therefore, the risk effects comparison between these two financing methods are still left unanswered. This could be due to the limitation of the sample size being not big enough due to missing information, thus the paper could not capture the sufficient population to enable significant empirical evidence.

The findings on default risk effects of targets' distress level and deal financing method in distressed M&As contribute a small yet essential piece to the academic research field of distressed M&As. Future exploration of the topic could complete what this paper has yet to achieve, which is comparing the risk effects of debt financing and internal cash financing on the acquirers. The relationship between target's level of distress and bidder's choice of financing could also be explored further to identify any patterns, preference or linkage. Further research could also focus on this paper's limitations, considering the use of proxies, sample criteria and collection techniques, clear distinction between financial distress and bankruptcy as well as avoidance of selection bias problem and missing observations.

Appendix A – Merton's model assumptions

Several essential assumptions in Merton's (1974) model are used:

- Frictionless capital markets - market players face no taxes and transaction costs. They can buy and sell assets at any time regardless of quantity. The bankruptcy process is costless and the strict priority of claims is preserved.
- Structure of the debt - the only liability of a company is a zero coupon bond.
- Default occurs only at maturity and when assets value falls below the value of debt.
- Constant volatility of the firm value; market value of company is the same regardless of its capital structure as proposed by Modigliani and Miller (1958) in their Proposition I.
- Continuous asset trading.
- Constant interest rates.
- The model assumes the market value of a firm's assets follows a stochastic process also known as geometric Brownian motion:

$$dV_A = \mu V_A dt + \sigma_A V_A dW, \tag{IX}$$

Where (V_A) is the market value of firm's assets with a drift (μ), volatility (σ_A) and (W) is a standard Wiener process.

Appendix B – Merton's model description

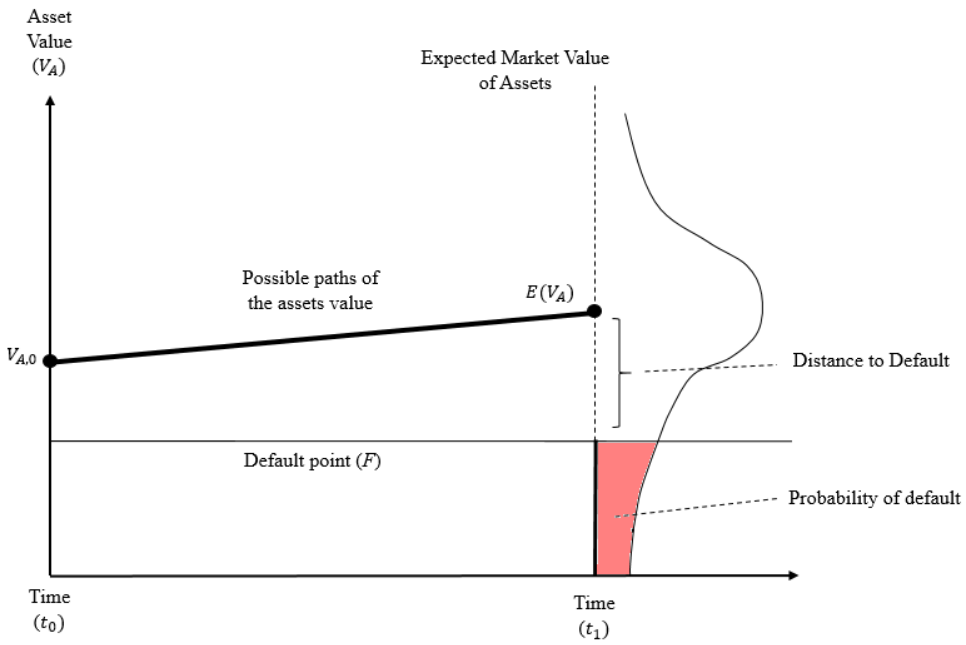

Figure 4: Description of the Merton (1974) model

The figure presents a summary of the logic behind the Merton (1974) model. Assets value is assumed to grow at the speed of the risk-free rate r_f as proposed by the risk-neutral DD framework. At the chosen time horizon t_1 , assets have grown at the rate of r_f and the distance-to-default represents the standard deviations the expected asset value $E(V_A)$ is from the default point F. Around the expected assets value $E(V_A)$ at t_1 a cumulative standard normal distribution is assumed. The point below the default barrier represents the probability of firm's default.

Appendix C – Variables definitions

Dependent Variable

Change in acquirer's Distance-to-Default *(CHANGE_IN_DD_Q)*	Total change in acquirer DD measured by the average DD for + 3 days and + 252 days minus the average DD - 280 days and -31days (winsorized at 1%)

Explanatory Variables

Distressed deal classification *DUMMY_DA*	Dummy variable that equals one if the target in the deal is distressed
Target's level of distress *(DUMMY_PER)*	Dummy variable that equals one if the distressed target in the deal is permanently distressed
Financing method *(DUMMY_EQUITY)*	Dummy variable that equals one if equity financing was used in the transaction
Financing method of cash offers *(DUMMY_DEBT)*	Dummy variable that equals one if the acquirer used debt financing for the cash offer

Control Variables

Industry relatedness *(DUMMY_IND)*	Dummy variable that equals one if acquirer and target are in the same macro industry
Acquirer financial debt *(A_DEBT_ASSETS)*	Acquirer financial debt (total of all short-term debt, straight debt and convertible debt of the acquirer) to total assets as of the date of the most current financial information available prior to the announcement of the transaction
Acquirer EBIT *(A_EBIT_ASSETS)*	Acquirer EBIT (for the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction) to total assets
Acquirer EPS *(A_EPS)*	Acquirer earnings per share for the 12 months ending on the date of the most current financial information prior to the announcement of the transaction
Acquirer Net Income *(A_NETINCOME_ASSETS)*	Net Income (of acquiring company for the last 12 months) to total assets

Target size *(T_ASSETS_Q)*	Target total assets (total balance sheet assets including current assets, long-term investments and funds, net fixed assets, intangible assets and deferred charges as of the date of the most current financial information prior to the announcement of the transaction (winsorized at 1%)
Target cash *(T_CASH_ASSETS)*	Target cash and equivalents to total assets on the deal announcement date
Target financial debt *(T_DEBT_ASSETS_Q)*	Target financial debt (total of all short-term debt, straight debt and convertible debt of the acquirer) to total as of the date of the most current financial information available prior to the announcement of the transaction (winsorized at 1%)
Target EPS *(T_EPS)*	Target earnings per share for the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction[37]
Target Net Income *T_NETINCOME_ASSETS*	Target Net Income (for the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction) to total assets
Relative target size *(REL_SIZE)*	Target total assets divided by acquirer total assets on the date of the most current financial information prior to the announcement of the transaction
Percentage of shares acquired *(PERC_SHARE_ACQ)*	Number of common shares acquired in the transaction divided by the total number of shares outstanding
Acquisition premium *(PREMIUM_1_DAY_Q)*	Premium of offer price to target closing stock price 1 day prior to the original announcement date[38]
Acquisition premium *(PREMIUM_1_WEEK_Q)*	Premium of offer price to target closing stock price 1 week prior to the original announcement date
Acquisition premium *(PREMIUM_4_WEEKS_Q)*	Premium of offer price to target closing stock price 4 weeks prior to the original announcement date

Note: (Source – Thomson Reuters Datastream)

[37] Earnings are adjusted based on the conversion of all convertible securities at the beginning of the year

[38] Expressed as percentage (Share Price Paid by Acquirer for Target Shares – Target Share Price 1 Day Prior to Announcement / Target Share Price 1 Day Prior to Announcement * 100)

Appendix D - Diagnostics tests

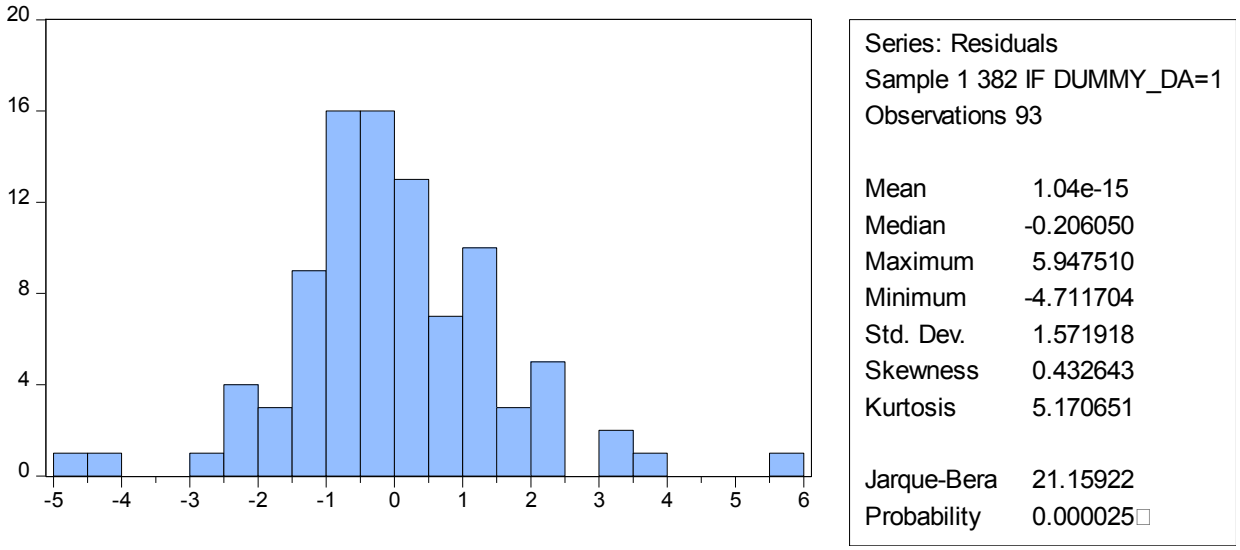

Figure 5: Test for normality

Ramsey RESET test

Table 15 Ramsey test

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	2.52	65.00	0.01
F-statistic	6.37	(1, 65)	0.01
Likelihood ratio	8.70	1.00	0.00

F-test summary:

	Sum of Sq,	df	Mean Squares
Test SSR	20.30	1.00	20.30
Restricted SSR	227.33	66.00	3.44
Unrestricted SSR	207.03	65.00	3.19

LR test summary:

	Value
Restricted LogL	-173.52
Unrestricted LogL	-169.17

Table 16. Correlation matrix

	CHANGE_IN_DD_Q	*DUMMY_PER*	*A_ASSETS*	*A_DEBT_ASSETS*	*A_EBIT_ASSETS*	*A_EPS*	*A_NETINCOME_ASSETS*	*T_ASSETS_Q*	*T_CASH_ASSETS*	*T_DEBT_ASSETS_Q*	*T_EBIT_ASSETS*	*T_EPS*	*T_NETINCOME_ASSETS*	*REL_SIZE*	*PERC_SHARE_ACQ*	*DUMMY_IND*	*PREMIUM_1_DAY_Q*	*PREMIUM_1_WEEK_Q*
CHANGE_IN_DD_Q	1.00																	
DUMMY_PER	0.05	1.00																
A_ASSETS	0.05	0.02	1.00															
A_DEBT_ASSETS	-0.12	0.01	-0.24	1.00														
A_EBIT_ASSETS	0.00	-0.25	0.12	-0.08	1.00													
A_EPS	-0.29	0.07	0.23	-0.03	0.10	1.00												
A_NETINCOME_ASSETS	-0.01	-0.18	0.11	-0.08	**0.92**	0.21	1.00											
T_ASSETS_Q	0.00	-0.08	0.32	0.20	0.06	0.04	0.06	1.00										
T_CASH_ASSETS	0.01	0.08	-0.01	-0.14	0.05	-0.01	0.05	-0.15	1.00									
T_DEBT_ASSETS_Q	0.02	0.15	0.02	0.11	0.02	0.04	0.01	0.25	-0.13	1.00								
T_EBIT_ASSETS	-0.06	-0.41	0.04	0.08	0.31	0.04	0.25	0.10	0.01	-0.07	1.00							
T_EPS	-0.08	-0.15	0.07	0.04	0.03	0.04	0.01	0.17	-0.03	-0.10	0.15	1.00						
T_NETINCOME_ASSETS	-0.04	-0.28	0.04	0.06	0.19	0.02	0.24	0.09	0.02	-0.21	0.62	0.23	1.00					
REL_SIZE	-0.13	0.00	-0.26	**0.93**	-0.13	-0.05	-0.15	0.23	-0.14	0.12	0.06	0.01	0.01	1.00				
PERC_SHARE_ACQ	-0.03	-0.13	-0.06	0.11	0.02	0.03	0.02	-0.06	0.01	-0.03	0.08	0.02	0.03	0.07	1.00			
DUMMY_IND	-0.01	0.10	-0.02	0.06	-0.04	-0.07	-0.02	0.10	0.07	0.10	-0.10	-0.05	-0.08	0.09	-0.01	1.00		
PREMIUM_1_DAY_Q	-0.21	0.04	-0.01	-0.11	0.15	-0.01	0.12	-0.10	0.05	-0.06	0.02	-0.10	0.02	-0.13	0.19	-0.04	1.00	
PREMIUM_1_WEEK_Q	-0.21	0.05	0.00	-0.09	0.14	-0.01	0.11	-0.10	0.04	-0.07	0.03	-0.09	0.02	-0.12	0.20	-0.03	**0.96**	1.00

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