

A Work Project, presented as part of the requirements for the Award of a Master Degree in
Management from the NOVA – School of Business and Economics

The Practice of Valuation for M&As and the Role of Advisors

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A Project carried out on the Master in Management Programme, under the supervision of:
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December 2017

Abstract

This study explores the valuation accuracy of three of the most commonly used models in valuation by financial advisors in a takeover context: the discounted cash flow (DCF), the method of comparable companies and the method of comparable transactions. The motivation for this work is the lack of literature on the topic which motivated an exploratory approach to the issue.

The thesis investigates the answer the following research questions: (1) How accurate are the valuation methods? (2) Which valuations method is more reliable? (3) Does the valuation reveals biasness in the valuation taken into consideration the commissioner to whom the financial advisor is reporting to?

The hypotheses are tested using a sample of 110 deals that took place in the United States of America and were reported to the Securities Exchange Commission of the same country. The results demonstrate that the expertise advocated by financial advisors is crucial to shrink the range of the valuations. Moreover, the evidence suggests that there seems to be a trade-off between valuation accuracy and range, where DCF method has the largest standard deviation and provides the closest valuation to the acquisition price.

Key words:

Mergers and acquisitions, financial advisors, valuation accuracy

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List of Abbreviations

AP – Acquisition Price

BV – Book Value

CAAR – Cumulative Average Abnormal Returns

CAPM – Capital Asset Pricing Model

DCF – Discounted Cash Flows

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciations and Amortizations

EBT – Earnings Before Taxes

EPS – Earnings per share

EV – Enterprise Value

EV/EBITDA – Enterprise Value to Earnings Before Interest, Taxes, Depreciation and Amortization

FY – Fiscal Year

IPO – Initial Public Offer

LTM – Last Twelve Months

P/B – Price to Book Value ratio

P/E – Price to Earnings ratio

S.E.C. – U. S. Securities and Exchange Commission

U.K. – United Kingdom

U.S. – United States

V – Valuation

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1. Introduction

The topic of mergers and acquisitions is widely discussed and subject of several research papers in the fields of finance and economics. The global mergers and acquisition waves and heights has attracted the attention of several authors who attempt to study this phenomena in order to better understand the wealth creation process for investors. Most of the studies are focused on the capital market reactions, waves and price adjustments to the announcement and the aftermath of mergers and acquisitions.

Though the value creation process on a merger or acquisition is based on the negotiations between the parties involved in the transaction. The value of the deal is backed by valuations of the acquirer, the target, or both. Literature on takeovers advocates that the main reason why there may be destruction of value for an investor is an improper valuation of the parties involved in the deal. Thus, it is on the subject of valuation of the companies that I focus my thesis on. Driven by the lack of literature on this topic, this thesis pursues to study the performance of the most commonly used valuation methods and the performance of latter on pricing the acquirer and target firms.

The underlying hypothesis tested in this thesis are to test whether certain valuation methods can better yield the acquisition price, focusing on three most commonly used valuation methods: (1) discounted cash flows, (2) comparable transactions, and (3) comparable companies. Firstly, the analysis is done focusing on the latter valuation methods (comparable transactions and comparable companies) in order to study the performance of the multiples selected. Secondly, I look into the role of the financial advisor on the transaction. Therefore, I take into consideration to whom the financial adviser is reporting to (acquirer or target), in an effort to evidence and test if there is a relationship of purchase power, or negotiation power, and choice of financial advisors. Moreover, the analysis is extended into the tailoring of valuations done by financial advisors (adjustment of multiples on comparable transactions and

comparable companies of the acquirer and target) to test the universe of comparable companies and transactions selected. Thirdly, the analysis is done according to the industry of the parties involved, to understand if there is a valuation method that performs better compared to the other valuation methods.

Due to the lack of theoretical work on the determinants of the choice of model of valuation, this thesis is more of an exploratory nature.

Such analysis is done using a hand-collected data from the S-4 files submitted to SEC in the United States of America in the year of 2013, and it is by analysing the reported valuation methods that I considered 110 deals that took place throughout the period mentioned before to test the following research questions: (1) How accurate are the valuation methods? (2) Which valuations method is more reliable? (3) Does the valuation reveals biasness in the valuation taken into consideration the commissioner to whom the financial advisor is reporting to?

In order to study these hypothesis, the compile data was analysed relative to the acquisition price. In other words, the valuation (V) implied by the multiples was divided the acquisition price (AP) in a V/AP ratio. The greater the number is from one, the higher was the valuation from the acquisition price and vice-versa.

The first finding on this thesis revealed a seeming trade-off between accuracy and range of the valuation according to the model selected. From the three previously mentioned valuation models, the discounted cash flows method proves to be more accurate than the comparable transaction and the comparable companies.

The second finding is that the claimed expertise of financial advisors proves to be crucial to shrink the valuation range in the comparable valuation method. In most S-4 files, to each universe of selected companies and transactions considered to be comparable, the interval of multiples reported is larger than the one considered for the valuation by the financial advisors. The adjustment made to the valuation ranges by the financial advisors is mainly

supported by non-direct comparison between the company valued and the comparable companies, and the expertise of the financial advisors.

From the previous finding, urges another significant finding. The choice of comparable companies and transactions by the financial advisors is questionable as, when controlled for outliers, the difference in performance of the valuation methods is statistically significant, raising doubts concerning the choice of the comparable companies and transactions.

Furthermore, I also tested whether any biases could be detected according to the side that the financial advisor took part in the deals and the company valued. On both valuations (of the acquirer and the target), there was no evidence of significant discrepancies from financial advisors, regardless of its side on the deal, with the exception of the discounted cash flow method used to value the target company.

2. Literature Review

As outlined in the introduction, I intend to address the topic of valuation of both the acquirer and target firms involved in mergers and acquisitions, with emphasis on the role played by the financial advisors to the transactions. In this chapter, I review previous literature published on the topic that address not only the performance of valuation methods but also the role of financial advisors, summarising the conclusions reached by other authors. Firstly, I address the literature on the purposes of companies' valuation, the most commonly used methods to evaluate a company and the use of multiples. This section is followed by a brief literature on performance of companies that undergo a merger or acquisition. Furthermore, literature on other related topics and found relevant for this study were also included, such as method of payment and its implications, and the managerial hubris – the influence of the management on a firm's acquisition plans. The next section presents literature on the methods used and the for valuation and the use of multiples, and its accuracy. The following section includes literature related to the interference and the role of financial advisors in the context of mergers and acquisitions. I conclude the chapter summarizing the existent literature and the contribution of this study to the existent literature.

Efthimios, Norman and Walker (2004) studied the valuation methods most commonly used by financial analysts. The thesis presented by the authors consisted on a study of 104 analysts' reports from international investment banks for 26 large U.K. listed companies. The authors concluded that the most commonly used valuation methods are based on a P/E multiple or an explicit multi period DCF valuation model. Furthermore, it is a common practice to use comparable companies in order to value a company. Despite the use of intrinsic and fundamental driven techniques to value a company, analysts still prefer a comparative valuation model.

The previous study supports the argument of Damodoran (2002) which stresses that almost 90 percent of equity research valuations and half of the acquisition valuations use a combination of comparable companies and multiples, stressing the persistent and commonly used relative valuation method.

Travlos (1987) found that the payment method is related to knowledge level that the management firm has concerning the long-term forecasts of the market. Overvalued companies are preferably acquired with stock, whereas undervalued companies are purchased in cash. Moreover, the author evidences that companies that are acquired with cash experience positive long-run abnormal returns and companies acquired with stock experience the opposite.

Other authors supporting these findings and coming to similar conclusions are Loughran and Vijh (1997), and Rau and Vermaelen (1998). The first pair of authors find that on the following five years to an acquisition, acquisitions which were made in cash return significant positive abnormal returns while companies acquired with stock return significant negative abnormal returns. Rau and Vermaelen (1998) add the feature of controlling for size and market-to-book ratio, and came to the same conclusions of Loughran and Vijh (1997). More interestingly, the both pairs of authors advocate that investors reaction to the news of mergers and acquisitions create mispricing around the date of announcement of the event.

Rhodes-Kropf and Viswanathan (2004) add to the previous literature the managerial hubris. The authors consider that the management of target companies have in consideration the current value of the company's stock in the valuation of the company. Therefore, in moments where the management perceives an overvaluation of the stock, the transaction uses stock as a mean of payment whereas in the opposite scenario, where the management of the target company perceives the stock to be undervalued, the transaction uses cash only as a mean of payment. In the valuation, the overvaluation is mainly attribute to potential synergies that urge from the deals.

A year later, and together with another author, Rhodes-Kropf, Robinson and Viswanathan (2005) apply their model to over four thousand mergers and acquisitions and conclude that acquisitions tend to occur when industries are overvalued, and reinforce the previous stated argument of the preferred method of payment in an overvaluation scenario: include stock as a mean of payments in the transactions.

Despite the findings of previous authors, one must consider the implications of these findings and query the momentum and research methods used. Martynova and Renneboog (2008) support this argument on their study in which they reveal that the impact of mergers and acquisitions on firms is related to the estimation method applied to calculate returns. As a result, one can find different authors coming to different conclusions. Supporting the previous statement, on the one hand, Chatterjee (2000) using as a preferred method of estimation the capital asset pricing model (CAPM) uncovers inconsistent cumulative average abnormal returns (CAARs) in the performance of acquirers in the period following the mergers or acquisitions. On the other hand, Frank & Harris (1989) using the market model as a preferred method to analyse the performance of acquirers, unveil a significantly negative CAARs up to three years after the completion of the merger or acquisition.

Even though the performance of the acquirers or merged companies is not the focus of my thesis, the arguments that the authors present for the long-term performance support the motivations to pursue this topic. The reviewed literature sets a background and presents some of the motivations for companies to do mergers and acquisitions and more importantly, expose the mispricing of companies in moments of mergers and acquisitions. To further complement the performance of companies and the method of valuation employed, in the next section of this literature review, I uncover some of the literature on valuation accuracy and multiples literature.

In this section, I incorporate literature related to the use of multiples in the context of mergers and acquisitions and firms' valuation, and the findings on the accuracy of multiples and valuation methods. As previously presented, this section ends with a discussion on the findings and influencing factors to the valuation methods applied and its accuracy.

Liu, Nissim and Thomas (2002) did an extensive study on valuation drivers that covered several approaches, such as forward-looking assumptions and earnings, intrinsic value, cash flows, book value and accrual flows. This study evaluated the valuation accuracy of valuation drivers for 26,613 different U.S. firms between the years of 1982 and 1999. The authors find that multiples based on historical drivers are less accurate than forward-looking multiples. Moreover, the longer the estimation period is for the multiples, the more accurate tend the valuations to be. The argument presented by the authors for this was that forward-looking multiples incorporated value-relevant information that it is not perceived by historical multiples, stating that for valuation purposes, forecasted earnings should be used. The last pointed feature is particularly true for the earning per share (EPS) multiple. Revenue related multiples were the ones with the most dispersion. Liu et. Al (2002) concluded that equity multiples performed better when compared to entity value multiples, although the authors did not developed any arguments on these findings. More recently, and in a new study Liu, Nissim and Thomas (2007) compared the valuation accuracy of operating cash flow and dividends multiples to earnings multiples and found that the latter have higher valuation accuracy irrespective forward-looking or historical based multiples. Furthermore, these findings were also consistent across industries.

In the context of mergers and acquisitions, Kaplan and Ruback (1995) compare the valuation accuracy of different valuation methods. The valuation methods that the authors decided to analyse were the discounted cash flow method (DCF), and three comparable-based valuations: the comparable transaction, comparable industry transaction and comparable

company methods. The period selected was between the years of 1983 and 1989 for a total of 51 transactions. The authors conclude that the accuracy of DCF valuations was relatively good, as they evidence a strong relationship between this valuation method and the transaction value. Moreover, the authors stressed the similarity of accuracy between the DCF valuation and the multiple of enterprise value to earnings before interest, taxes, depreciation and amortization (EV/EBITDA). Concerning the comparable method, the findings on the 51 transactions were that the comparable industry transactions were the most accurate, followed by the comparable transactions method and lastly the comparable company method. With a percentage of absolute valuation errors under or equal to 15 percent of 57.9 percent, and a median (mean) valuation error of -0.1 (-0.7) percent, the comparable industry method was considered by the authors as the most accurate. Despite its accuracy, this comparable valuation method also had the highest standard deviation which was supported by the difficulty of matching appropriate industry transaction to the merger or acquisition.

Finnerty and Emery (2004) adjusted the results of Kaplan and Ruback (1995) by using a median industry control premium and a “rule of thumb” of 25 percent control premium, inputting into the model a variable that accounted for control premium, which the previous authors did not include, for the comparable company valuation. The conclusion was a trade-off between accuracy and deviation as the latter method proved to be more efficient. When accounting for the value of control premium, the comparable company method estimates proved to be closer to the transaction values than both the comparable transactions and the comparable industry transactions.

Additionally, the performance and valuation methods of firms are subject to strategic and operational decisions that vary from firm to firm, as well as the management and perception of the market situation. Moreover, one must consider also the market momentum. Some of the previous literature refers to periods before two major financial crises: the dotcom bubble and

the financial crisis of 2008. These were periods of great expansion and rapid growth of firms which can have implications on the valuation of firms. Either by the valuation of its fundamentals or through comparable companies, valuations are based on assumptions, and these assumptions are supported by predictions. Such predictions are based on the perception of the future economic and financial environment. Therefore, one could argue that the performance of companies in both the short and the long term are subject to several constraints that make each transaction a different and specific mergers or acquisitions. Furthermore, the macroeconomic environment must not be discarded as well, as companies are subject to different fiscal policies that influence their easiness to access credit and the financial markets. Such restrictions also influence the acquisition methods and assumptions to which companies are valued. Schreiner and Spremann (2007), support the argument of economic momentum, where they observe an accuracy decline of valuations on the years prior to the dotcom crisis, whereas in the following years, the valuation accuracy increased. Liu et. Al (2002) further presented the lack of suitability of their findings on low to medium market capitalisation companies, as such information access to these companies is more restricted.

Even though the mentioned literature presents plausible arguments for the relations between the performance of stocks, the method of payment and the most commonly used multiples and methods for the valuations of firms, the previous arguments should also be considered.

In order to complement the existent literature, I address in this thesis the accuracy of the most used valuation models by financial advisors. Moreover, I extend the analysis by segregating the valuation outputs according to whom the financial advisor is providing the valuation to, and which company is being valued (either the target or the acquirer), in an attempt to find evidence biasness in the opinion of the financial advisor according to whom the service is being provided.

3. Data and Methodology

3.1. Data

To conduct the analysis, a database was built to comprise all the information. Hence, the necessary and relevant information collect from the data sources focused on the merger and acquisitions details and the information disclosed by the financial advisors chosen by the parties of the deals.

The most relevant criteria was that the parties involved in the merger or acquisition submitted a S-4 form to the U.S. Securities and Exchange Commission (henceforth SEC), which included the relevant information on the deal as it is mentioned afterwards.

Furthermore, all the information found in the S-4 forms was complemented with information necessary to conduct the analysis that was retrieved from the company's announcements, news, events and presentations; articles and news published by the media; and other relevant sources mentioning details and information considered crucial for the analysis conducted. On the latter, the relevant sources of information were MarketWire, Bloomberg News, Bloomberg First World, PR Newswire, GlobeNewswire, Bloomberg Intelligence.

The data was collect within a period of ten months, comprising mergers and acquisitions done from March to December of the year of 2013. Were part of this study only the deals that fulfilled minimum criteria to be considered relevant: information on the acquisition price, method of payment, methods of valuation used by the financial advisors and values for those metrics, shares outstanding, options, convertible bonds and other instruments that influenced the number of common shares outstanding that were used to calculate the price per share of the acquisition, as well as fundamental data of the company were critical to make the analysis and to be part of the database built. The deal value for a merger or acquisition

Overall, were part of this thesis 110 different S-4 files, corresponding to the same amount of deals, that comprised an overall of 1714 valuations. Such valuations include 355

discounted cash flow valuations, 592 comparable companies' valuation and 999 comparable transactions. The remaining valuations are the tailored intervals that the financial advisors reported as more accurate valuation intervals for the multiples used in both comparable transactions and companies, where 142 were comparable transactions and 497 comparable companies. The valuations were performed by 56 different financial advisors, that were represented as financial advisor for the acquirer 56 times and as financial advisor for the target company 146 times. This difference urges as not all the deals reported a valuation of the acquirer and in other deals more than one financial advisor was hired and reported valuations on the targets. Moreover, I also retrieved the latest financial information disclosed prior to the completion of the deals and restricted the sample to positive values of fundamental data (such as book value of equity, and earning) as well as positive multiples used in the valuations. Furthermore, I trimmed the data in order to test for the inclusion of outliers. The information reported previously is summarized in the tables 1, 2, 3 and 4.

3.2. Methodology

As previously mentioned, one of the motivation to write about performance of the valuation methods used in mergers and acquisitions was the lack of literature on the topic. Therefore, the approach and discussion of the topic is not based on any theory but rather it is based on a personal approach.

In order to perform the analysis, I built a database by collecting several deals of the year 2013. The information collected was retrieved from the SEC database, EDGAR.

The required documents used were the SEC forms S-4, 10-K and 10-Q.

The form S-4 was the focus of the data collection as it contains the majority of the information needed. It was from this document that I retrieved the information regarding the valuation methods used by the financial advisors of the deal.

Despite the extent and detailed information reported on the S-4, not all the information was available. When complementary information was needed, or a topic was not clear (such as number of outstanding options in-the-money and at-the-money), other sources were used to complement the analysis (for instance, the latest 10-K or 10-Q forms filed).

Such approach leads to one of the assumptions undertaken in order to perform the analysis. The time lag between the filling of the S-4 form to the SEC and the completion of the deal implies that there may be differences between the assumed transaction value at the time of the valuation performed by the financial advisor and the completion date of the deal. Such difference is translated into different transaction values (the actual transaction value and the assumed transaction value at the time of the valuation) that have an impact on the assumptions for the following items.

3.2.1. Transaction value and purchase price

The valuations reported by the financial advisors are disclosed, in most of the cases, as an approximation of the total value of the transaction and then the corresponding price per share. The former, it is a more accurate measure of valuation of the deal and was therefore used as the preferred method for comparison in the analysis. Moreover, some deals do not report a total value for the consideration but only the corresponding price per share.

It is more common to see price per share values rather than the actual amount paid for the company. Even when this amount is disclosed, it is usually an approximation and therefore it is better to use the per share amount. Although there are exceptions. Some private companies do not have issued shares and are owned by quotas and therefore the total amounts are used (rare exceptions).

The S-4 files are compiled and filled to the SEC for a company to register material information as result of an acquisition or a merger¹, such as deals that include shares as part, or exclusive, method of payment for the target company.

Several scenarios were faced when collecting the data and one of the most common was a range for the valuation of the companies. Financial advisors reported the value at which the companies agreed the terms to the final price and then present the support for such pricing. As some deals include shares as a form of payment, the final consideration was an exchange ratio that takes in consideration not only the price of the company to be acquired or merged, but also the buyer.

The various scenarios faced, presented several valuation techniques and considerations as purchasing methods that required a tailored approach to obtain a consistent database that fairly represented the information reported by financial advisors in their models and valuation on the SEC form S-4.

As an example, in deals which the final consideration was an exchange ratio, which in turn depends on the price of the stock at the time of the completion of the deal, further information was retrieved on the deals to complement the valuation and reach an acquisition price.

3.2.2. Options and convertibles

Targets and buyers, in some of the deals, had options outstanding as reported in their filings. In order to be consistent with the assumptions made by the financial advisors, in the deals where companies had outstanding options in-the-money and at-the-money, they were assumed to be exercised if such assumption is also mentioned by the financial advisors and as described in the form S-4. The number of options exercised may vary according to the price of

¹ S-4 files are also filled when companies undergo an exchange offer.

the consideration on an assumed date. This consideration is especially relevant for deals which transaction value was dependent upon the completion date to have the actual transaction value. According to the considered transaction value by the financial advisors and the actual transaction value, the number of shares differed in the cases of companies with treched weighted average values for its options. The extreme case is that of companies that report one weighted average exercise price. In case the assumption on the purchase price of the financial advisor is below the exercise price, no options were considered to be exercised. If the purchase price at completion is higher than the weighted average exercise price, those options are included in the shares outstanding relevant to determine the acquisition price per share. The considerations were mainly based on fully diluted basis, if not mentioned otherwise.

Concerning convertible instruments, such as convertible bonds, preferred stock, and others were treated according to the same methodology applied to the options.

4. Empirical Results

A first analysis to the valuation methods most commonly used, I considered the discounted cash flow methods, the comparable companies method and the comparable transactions method.

As previously mentioned, the first finding on this thesis revealed a seeming trade-off between accuracy and range of the valuation according to the model selected. From the three previously mentioned valuation models, the discounted cash flows method proves to be more accurate than the other two, although it is also the model with the biggest interval of valuations with a standard deviation of approximately 31 percent, when controlled for outliers.

On the one hand, the ratio V/AP for the discounted cash flow has a mean value of 1,03, whereas the comparable companies had a mean ratio of 1,24 for the universe of comparable companies and a mean ratio of 0,92, when adjusted by the financial advisors. The comparable transactions V/AP ratio has an average of 1,08 for the universe of comparable transactions and 0,90 when adjusted by the financial advisors.

On the other hand, and analysing the dispersion of the valuations through the standard deviation of this analysis, the discounted cash flow is the valuation model with the biggest interval of valuations with a standard deviation of approximately 31 percent, when controlled for outliers. Furthermore, the data collected from both comparable valuation methods (companies and transactions) demonstrated a lower interval in the valuation with a standard deviation of 23 percent and 29 percent, respectively.

Furthermore, the data collected from both comparable valuation methods (companies and transactions) demonstrated a lower interval in the valuation with a standard deviation of 23 percent and 29 percent, respectively.

The second finding is that the claimed expertise of financial advisors proves to be crucial to shrink the valuation range in the comparable valuation method. In most S-4 forms

analysed, to each universe of selected companies and transactions considered to be comparable, the interval of multiples reported is larger than the one considered for the valuation by the financial advisors, leading to wider intervals in the valuation. The shorter interval consideration by the financial advisors is mainly supported by non-direct comparison between the company valued and the comparable companies, and the expertise of the financial advisors. According to the multiples of the universe of comparable companies reported, the valuation of the target company has a standard deviation of the valuations of 43 percent. After appealing for the two clauses, financial advisors shrink the range of multiples considered, as demonstrated by the smaller standard deviation of 23.1 percent. This phenomenon is illustrated in figure 7 in the appendix, where one can observe the distribution of both, the reported values for the valuation of comparable companies and the narrower interval used by financial advisors. Moreover, the performance of the V/AP ratio decreases by 0.4 percent although when tested for the difference of means, the result is not statistically significant.

According to the multiples of the universe of comparable companies reported, the valuation of the target company has a standard deviation of the valuations of 43 percent. After appealing for the two clauses, financial advisors shrink the range of multiples considered, as demonstrated by the smaller standard deviation of 23.1 percent. Moreover, the performance of the V/AP ratio decreases by 0.004 which, when tested for the difference of means, the result is not statistically significant.

The evidence found in the comparable transactions, suggests another reasoning. Despite finding similar statistical effects, where the standard deviation decreases from 47.7 percent to 29 percent, the decrease in the mean ratio from 0.928 to 87 is alarming as the difference of means is statistically different from zero (at a 10% level of confidence).

From the previous finding, urges another significant finding. The choice of comparable companies and transactions by the financial advisors is questionable as, when controlled for

outliers, the difference in performance of the valuation methods is statistically significant, raising doubts concerning the choice of the comparable companies and transactions. Thus, the evidence from the data collected suggests that the claimed expertise and non-direct comparability between the transactions and companies used and the companies being evaluated is non-significant although the selection process of transactions and comparable companies evidences an upward deviation that translates into a higher valuation of the companies.

Extending the analysis and the role of the financial advisor in the deals, the party of the transaction to whom the financial advisor was assigned was also considered. With no distinction made between the party of the deal being valued, the analysis evidenced that the financial advisors on the buy side, do a more accurate valuation of the companies, using the discounted cash flow methods and the comparable transactions method. The sell side, more accurately evaluated companies with the comparable company's method. Table 2 evidences these findings. A further step into the analysis revealed that the majority of the valuations performed are focused on the target. The valuation of the buyer is less common. Continuing the analysis on the valuation of the buyers, as stressed on table 3, financial advisors more accurately valued the buyer with the discounted cash flow method. The low level of recorded comparable transactions used to perform a valuation on the buyer, did not allow to find significant results, whereas the comparable company method evidenced a more accurate valuation of the buyer performed by the financial advisors that reported to the seller.

Analysing the valuations performed by the financial advisors of the target company, the evidence collected suggests that the on the buy side, financial advisors' most accurate method is the discounted cash flow, followed by the comparable transaction method and ultimately the comparable company's method. On the sell side, the order changes as the comparable transactions seems to be more accurate, although the differences are not statically significant. The constant finding throughout the different analysis is the broader valuation range of the

discounted cash flow method in comparison to the other two valuation methods, represented by a larger standard deviation.

On both valuations (of the acquirer and the target), there was no evidence of significant discrepancies from financial advisors, regardless of its side on the deal, with the exception of the discounted cash flow method used to value the target company. Financial advisors reporting to the target, reported significant differences on the valuation of the buyer and the target, where when reporting to the valuation of the company to be acquired, the evidence suggests that financial advisor undervalued the company to be acquired and the valuation of the buyer was overvalued.

A similar analysis was performed on the database according to the industry of the companies involved in the deals, and the multiples used by the financial advisors. The purpose was to extend the analysis and study more scenarios. Although, due to the size of the sample, no relevant findings were possible to extract from the sample.

5. Conclusion

In the introduction, I stressed the motivations and objectives of this thesis, and the main question that I sought to answer with the analysis of the database built. The referred literature motivated this work and helped building the founding questions of this thesis.

In terms of valuation accuracy, the discounted cash flow method evidenced to be the most accurate valuation method, followed by the comparable transactions and the comparable companies, respectively. Although, the more accurate was also the valuation method with the most disperse valuation range, evidencing the trade-off between accuracy and standard deviation of the valuation method.

The arguments invoked by the financial advisors to adjust the valuation evidenced a less widen valuation range. The role of the financial advisor is therefore advocated to be crucial to abridge the valuation ranges, without compromising significantly the accuracy of the valuation, with the exception of the comparable transactions, where the difference in means of the ratio V/AP is significant at a 10% level of confidence.

There was no evidence of significant discrepancies from financial advisors, regardless of its side on the deal, with the exception of the discounted cash flow method used to value the target company.

6. Limitations

In the course of designing the research, and building a database, several challenges were faced and questions surfaced, requiring a consistent approach to these questions to maintain a coherent analysis throughout the different deals.

Finding the relevant information for the analysis of this thesis was challenging as the information available is spread across multiple files and no database (to which I had access to) had the information summarized, I was required to build one. Along the process, some adjustments and refinement of the database were done.

The database was built, as mentioned before, based on documents submitted to the SEC in the US. Therefore, the analysis is restricted to one region, the US market involving mostly American companies. The applicability to other markets and generalisation of the results may be non-applicable, lacking the evidence necessary from other regions and markets.

The SEC form S-4 is submitted to the SEC by publicly traded companies. Therefore, the sample is composed by, either acquirers or targets, or both, which are publicly traded companies. Thus, the sample is limited to public companies. Information on private deals and companies is restricted and was not be included in this thesis. Moreover, publicly traded companies are of such size, that restricts the sample to medium to large sized companies.

Regarding deals specifics and information disclosed on the SEC forms S-4, some adjustments were made which include the inclusion of positive multiples only. Considering only positive values for multiples, biases the sample.

Concerning the information on the value of the transactions are subject to adjustments, such as, options and warrants outstanding which requires strike prices in order to accurately consider the number of shares in each deal. In some deals, such information was not disclosed on the files, requiring other approaches to overcome this obstacle for the deal to be considered eligible for the sample. Either by collecting the information from past and most recent filings

of the companies, to average weighted number of option and strike price of such options, this were some of the approaches considered. These adjustments also bias the sample.

Deals include as a form of payment stock, and the value of stock is subject to market reactions and deviation along time, especially before the announcement date and between the announcement date and the completion date of the deal. Therefore, and as disclosed by most of the financial advisors, the date of the valuation is divulged along with statements of limited liabilities stating that the presented valuations are subject to all the information available at the time. The longer the period between the valuation date and the completion date of the deal, the more subject to changes is the deal.

Related to the completion date of the deals and the price of stock, is the exchange ratio. As stock is a commonly used form of payment in the deals that are submitted to the SEC, exchange ratios are also disclosed in the SEC form S-4. These are most commonly reported as a range and its actual exchange rate is subject to the price of the stock of both target and acquirer at completion date.

7. Directions for future research

The work developed in this thesis can be summarized as a first introduction to the activity of mergers and acquisitions and the role of financial advisors. Throughout the development of this thesis, future research topics are important to complete, either by confirming or challenging the findings on this thesis.

Future research could consider other time periods, or larger time horizons in order to test whether the findings are contemporary or not. Along with the increased period, different regions and cross border transactions could be studied, considering the country of origin of the acquirer and target.

Other valuation methods could be included in the analysis in an effort to analyse the accuracy of other models used by financial advisors, testing and trying to explain the reasons for preferred methods over other methods. The focus on specific industries could also be analysed and extended.

Private deals could also be analysed in order to broaden the extent of the analysis in terms of private versus public deals, as well as, to take into consideration the size of the companies.

Other and more payment methods could be included in order to examine the relationship between the method of payment and the initially agreed price, and the length of a deal takes to be completed.

Future research could exploit the relation between including a financial advisor in a deal or not in an effort to examine the market reactions and accuracy of the prices, by analysing the returns for shareholders on the both sides of a deal. Moreover, if the choice of any particular financial advisor, or multiple financial advisors leads to a more accurate valuation. The market reaction to the chosen financial advisor can also be studied to try to find if it is perceived as an

advantage or disadvantage. Moreover, it could include a research on the adjustments made by financial advisors, pointing out the drivers and reasons for such adjustments.

The payment options for the financial advisors could also be considered in order to study the relationship between a flat fee and a percentage fee on a deal, and the price of a merger or acquisition.

Focusing on the financial advisor role could be considered by focusing on financial advisors, studying their methodologies and approaches according to the side of the deal that they are taking part. Moreover, this analysis could also be done according to the preferred method of payment, studying a relationship between the method of payment and valuation methods used. Furthermore, the analysis of the post deal period could also be examined to study the relationship of inclusion of financial advisors and, additionally, evidence for the relationship between the financial advisor selected and returns after the deals take place.

Moreover, the inclusion of management compensations on deals could also be scrutinised, finding evidence on the relationship between this consideration as an example of studying the relationship between the motivations for mergers and acquisitions of companies, the success of a deal and the returns for stockholders.

The inclusion of synergies would be interesting to study as most of the deals included did not reference the potential for future synergies and respective valuation.

Stratification could add more detailed findings. This could include type of deal (company takeover, private equity, asset sale, tender offer, merger, acquisition), deal size, nature of the deal (friendly, unsolicited, unsolicited to friendly, unsolicited to hostile, hostile to friendly, hostile).

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Appendix

Table 1 – Valuation models' accuracy. All companies considered

Model	Min	1st Quartile	Median	Average	3rd Quartile	Maximum	St Dev	Skew	Kurt	N
With outliers										
DCF	0,070	0,735	0,921	1,034	1,180	4,908	0,631	3,408	16,223	355
Transactions										
--Observed	0,010	0,617	0,910	1,083	1,308	11,675	0,920	4,846	40,467	592
--Used	0,302	0,684	0,859	0,901	1,087	2,599	0,362	1,573	5,030	145
Companies										
--Observed	0,010	0,576	0,824	1,243	1,220	16,861	1,695	4,971	30,284	999
--Used	0,220	0,667	0,837	0,922	1,015	6,472	0,553	5,313	38,589	523
Without outliers										
DCF	0,079	0,719	0,900	0,917	1,120	1,830	0,312	0,080	0,136	334
Transactions										
--Observed	0,006	0,597	0,879	0,928	1,225	2,347	0,477	0,531	0,085	560
--Used	0,302	0,679	0,847	0,870	1,078	1,676	0,290	0,364	0,104	142
Companies										
--Observed	0,010	0,546	0,775	0,834	1,063	2,151	0,430	0,634	0,214	905
--Used	0,220	0,648	0,825	0,830	0,972	1,507	0,231	0,201	-0,133	497

Table 2 – Valuation models' accuracy. All companies considered according to the financial advisor's side

Model	Min	1st Quartile	Median	Average	3rd Quartile	Maximum	St Dev	Skew	Kurt	N
Buy Side										
DCF	0,184	0,779	0,945	1,018	1,209	3,616	0,439	2,255	10,569	140
Transactions										
--Observed	0,006	0,589	0,908	1,035	1,319	6,261	0,786	3,654	20,890	178
--Used	0,367	0,800	0,897	0,919	1,122	1,653	0,290	0,031	-0,007	46
Companies										
--Observed	0,010	0,580	0,819	1,124	1,175	11,527	1,195	4,530	29,225	348
--Used	0,220	0,644	0,838	0,837	0,995	1,794	0,256	0,272	0,484	262
Sell Side										
DCF	0,067	0,684	0,900	1,044	1,136	4,908	0,730	3,305	13,591	215
Transactions										
--Observed	0,018	0,621	0,906	1,097	1,303	11,675	0,966	5,131	43,849	413
--Used	0,302	0,669	0,783	0,893	1,066	2,599	0,392	1,856	5,472	99
Companies										
--Observed	0,012	0,585	0,852	1,333	1,272	16,861	1,883	4,625	25,424	693
--Used	0,438	0,648	0,816	0,872	0,981	4,035	0,382	4,252	28,689	214

Table 3 – Valuation models' accuracy. Buyers considered according to the financial advisor's side

Model	Min	1st Quartile	Median	Average	3rd Quartile	Maximum	St Dev	Skew	Kurt	N
Buy Side										
DCF	0,184	0,772	0,941	1,080	1,282	3,616	0,581	2,309	8,302	48
Transactions										
--Observed	0,206	0,619	0,897	1,413	1,566	6,261	1,492	2,782	7,527	26
--Used	0,546	0,629	0,712	0,712	0,795	0,877	0,234	#DIV/0!	#DIV/0!	2
Companies										
--Observed	0,121	0,705	0,940	1,305	1,263	10,554	1,382	3,613	17,525	123
--Used	0,311	0,690	0,839	0,833	0,966	1,794	0,244	0,626	2,271	78
Sell Side										
DCF	0,079	0,836	1,102	1,494	1,501	4,908	1,201	1,766	2,487	56
Transactions										
--Observed	0,138	0,493	0,859	1,216	1,366	11,675	1,435	5,292	36,806	78
--Used	0,412	0,678	0,744	0,837	1,055	1,237	0,308	0,304	-0,921	7
Companies										
--Observed	0,067	0,647	0,931	1,629	1,414	16,861	2,376	3,872	16,740	325
--Used	0,601	0,718	0,819	0,858	0,933	1,678	0,212	1,989	5,151	42

Table 4 – Valuation models' accuracy. Targets considered according to the financial advisor's side

Model	Min	1st Quartile	Median	Average	3rd Quartile	Maximum	St Dev	Skew	Kurt	N
Buy Side										
DCF	0,212	0,781	0,947	0,986	1,188	2,310	0,341	1,063	3,819	92
Transactions										
--Observed	0,006	0,575	0,914	0,971	1,242	4,202	0,572	1,527	5,918	152
--Used	0,367	0,800	0,915	0,929	1,130	1,653	0,291	-0,018	0,032	44
Companies										
--Observed	0,010	0,534	0,771	1,025	1,124	11,527	1,069	5,416	43,895	225
--Used	0,220	0,630	0,836	0,838	0,999	1,538	0,262	0,152	-0,033	184
Sell Side										
DCF	0,067	0,673	0,828	0,886	1,059	2,454	0,351	1,205	3,189	159
Transactions										
--Observed	0,018	0,658	0,928	1,070	1,273	7,988	0,819	3,737	23,941	335
--Used	0,302	0,670	0,792	0,897	1,058	2,599	0,399	1,880	5,433	92
Companies										
--Observed	0,012	0,535	0,778	1,071	1,194	10,614	1,248	4,817	28,554	368
--Used	0,438	0,638	0,816	0,875	1,012	4,035	0,413	4,107	25,697	172

Figure 1– Discounted Cash Flow Accuracy. All companies considered

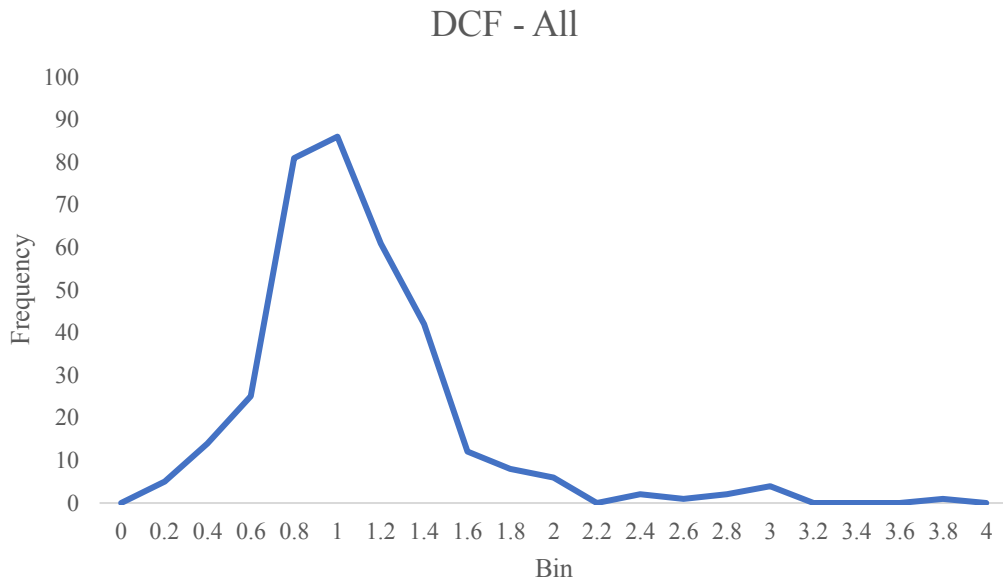


Figure 2 – Discounted Cash Flow Accuracy, done by financial advisors on the sell side to all companies

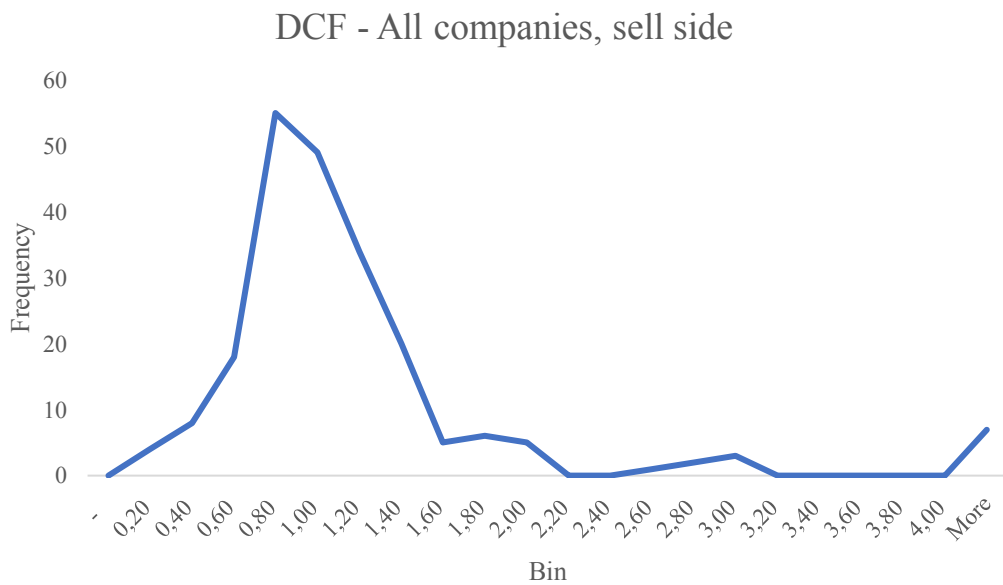


Figure 3- Discounted Cash Flow Accuracy, done by financial advisors on the buy side to all companies

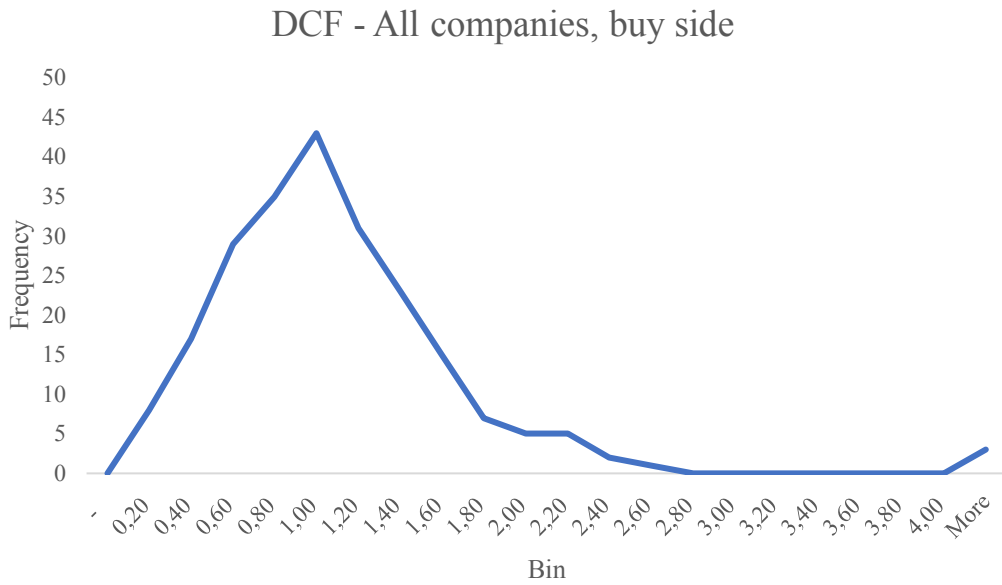


Figure 4 – Comparable Transactions, all companies considered

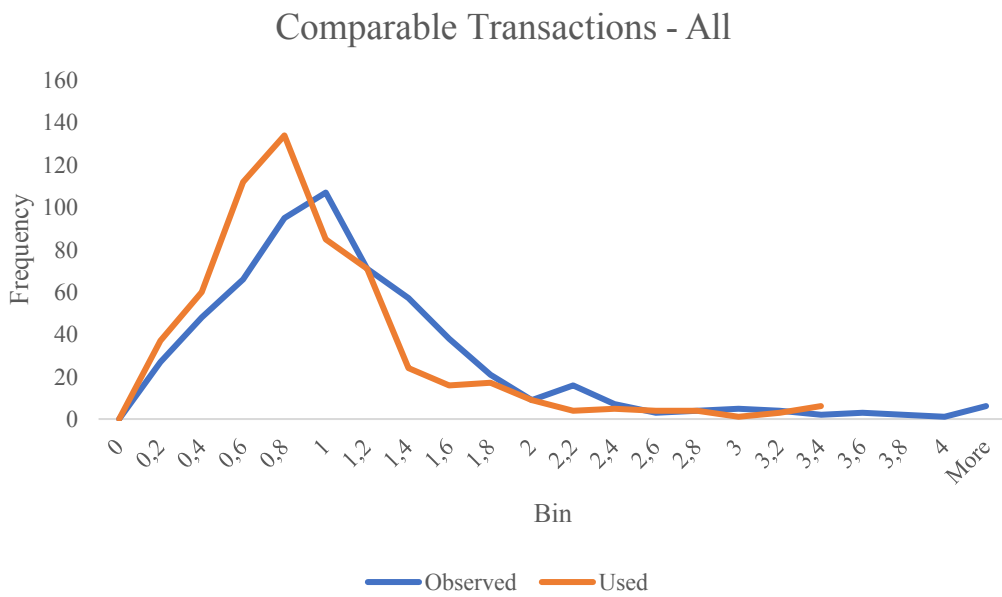


Figure 5 – Comparable Transaction Accuracy, done by financial advisors on the sell side to all companies

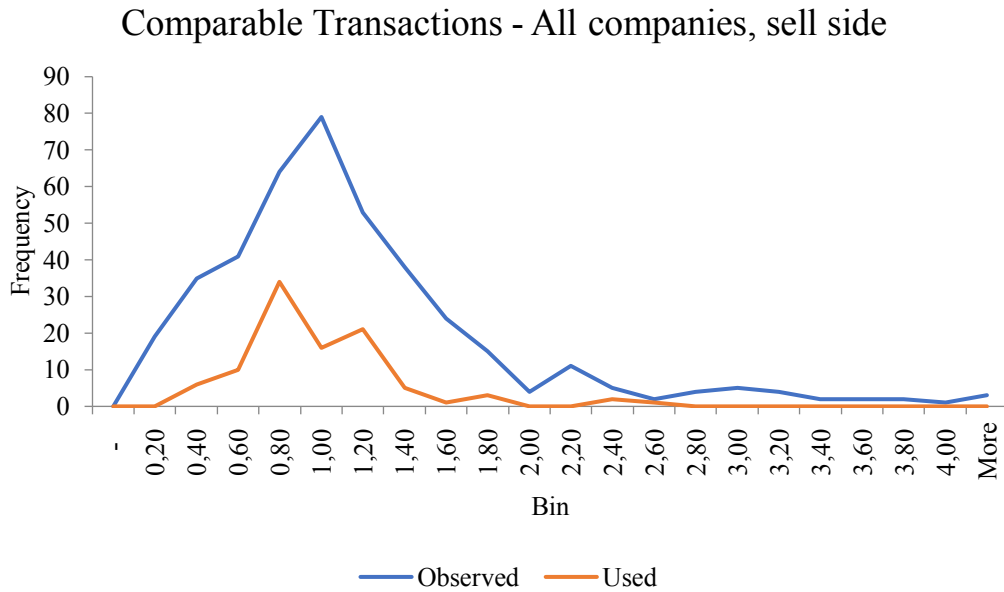


Figure 6 – Comparable Transaction Accuracy, done by financial advisors on the buy side to all companies

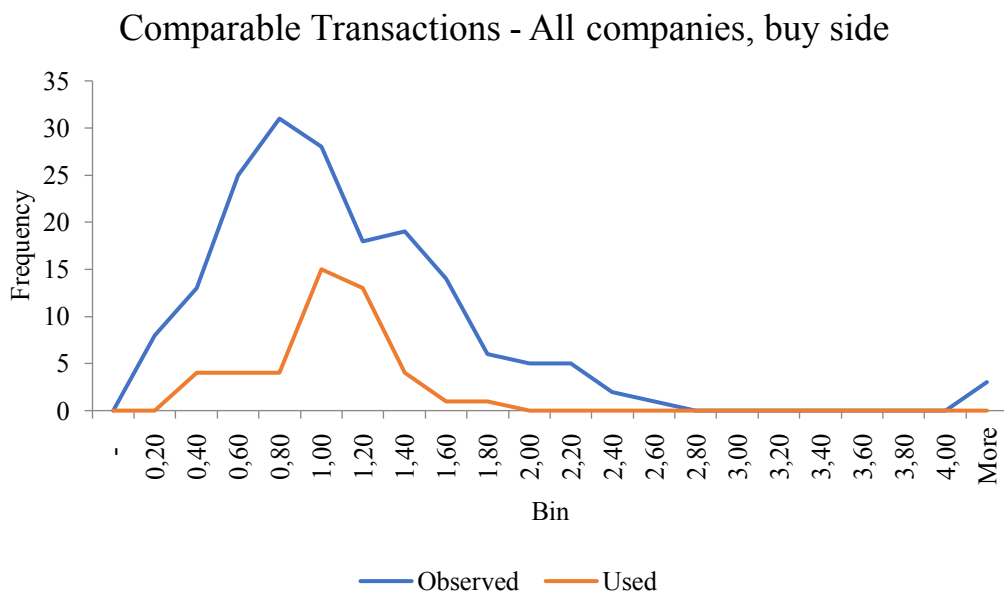


Figure 7 – Comparable Companies Accuracy, all companies considered

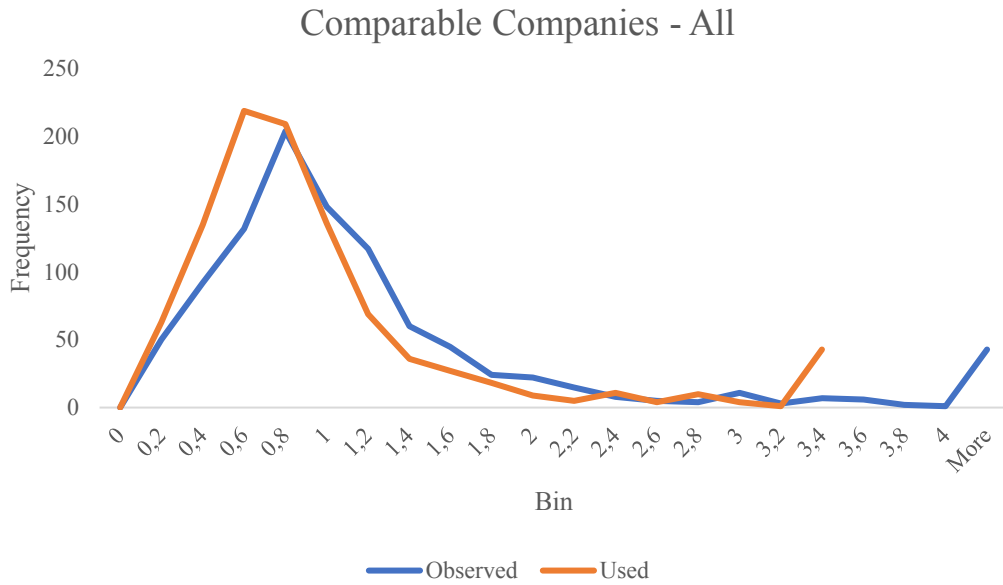


Figure 8 - Comparable Companies Accuracy done by financial advisors on the sell side to all companies

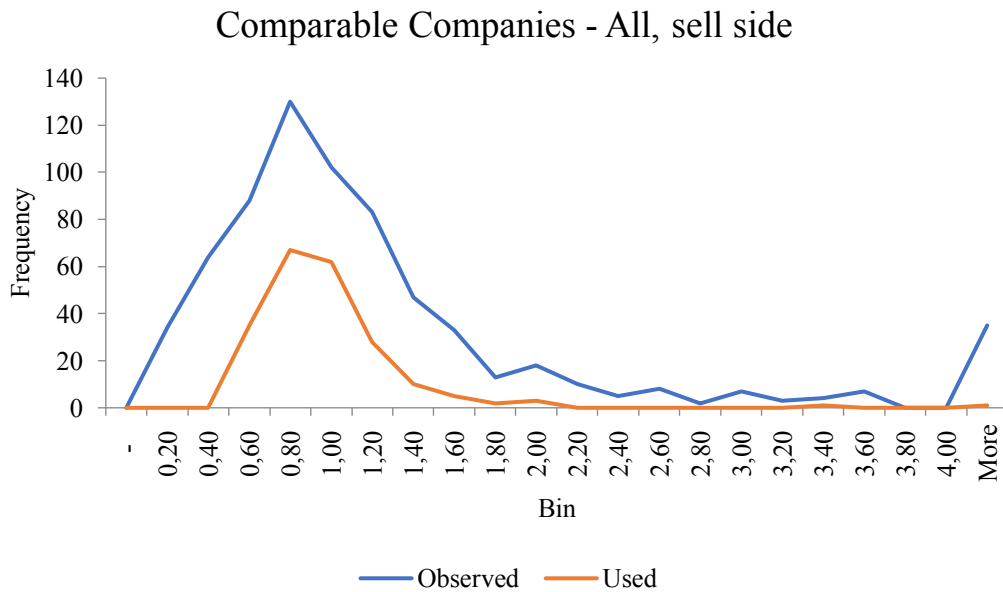


Figure 9 - Comparable Companies Accuracy done by financial advisors on the buy side to all companies

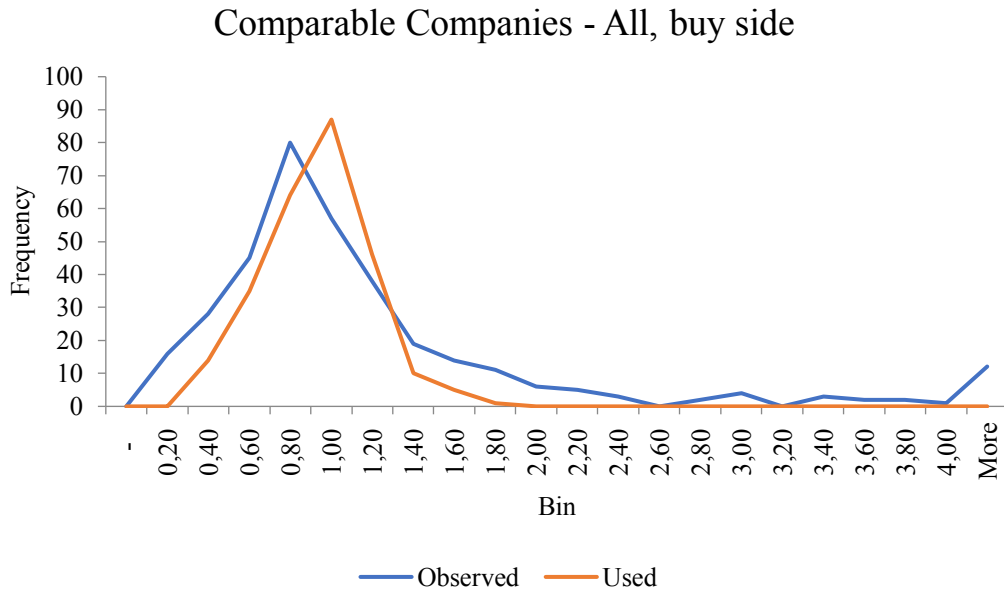


Figure 10 – Discounted Cash Flow Accuracy done by the financial advisor on the buy side to the buyer

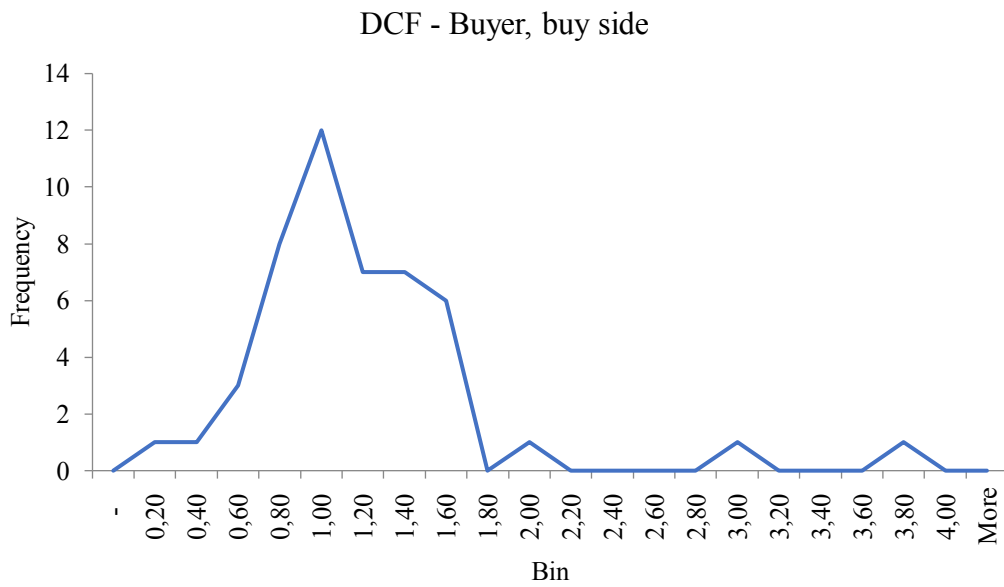


Figure 11 – Discounted Cash Flow Accuracy done by the financial advisor on the sell side to the buyer

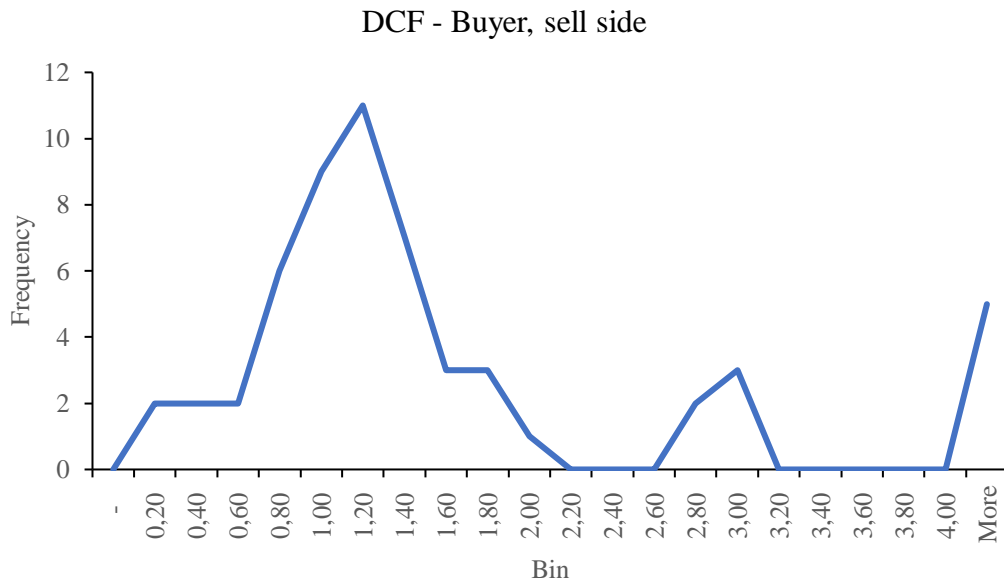


Figure 12 – Comparable Transactions Accuracy done by the financial advisor on the buy side to the buyer

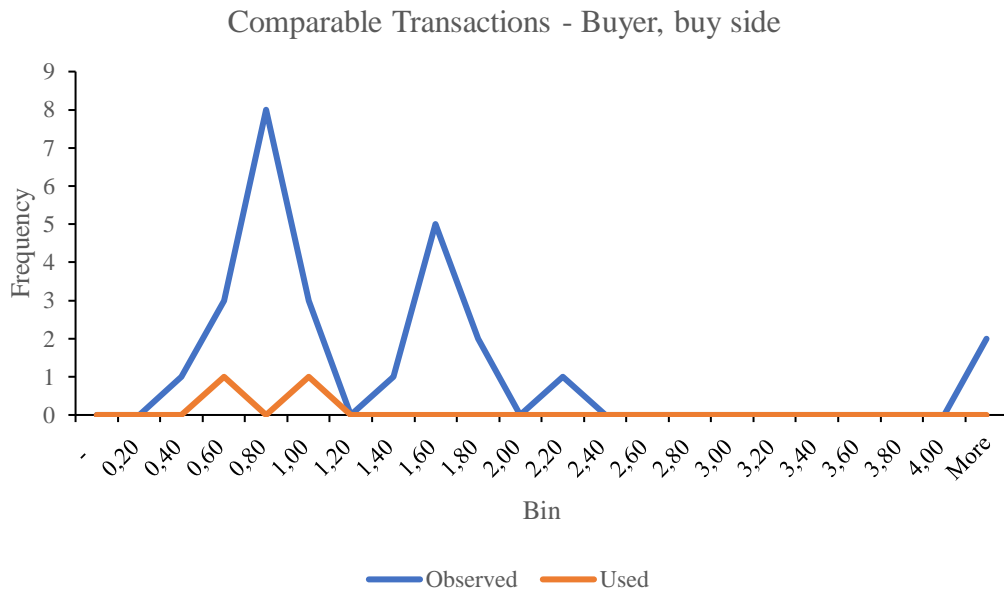


Figure 13 – Comparable Companies Accuracy done by the financial advisor on the buy side to the buyer

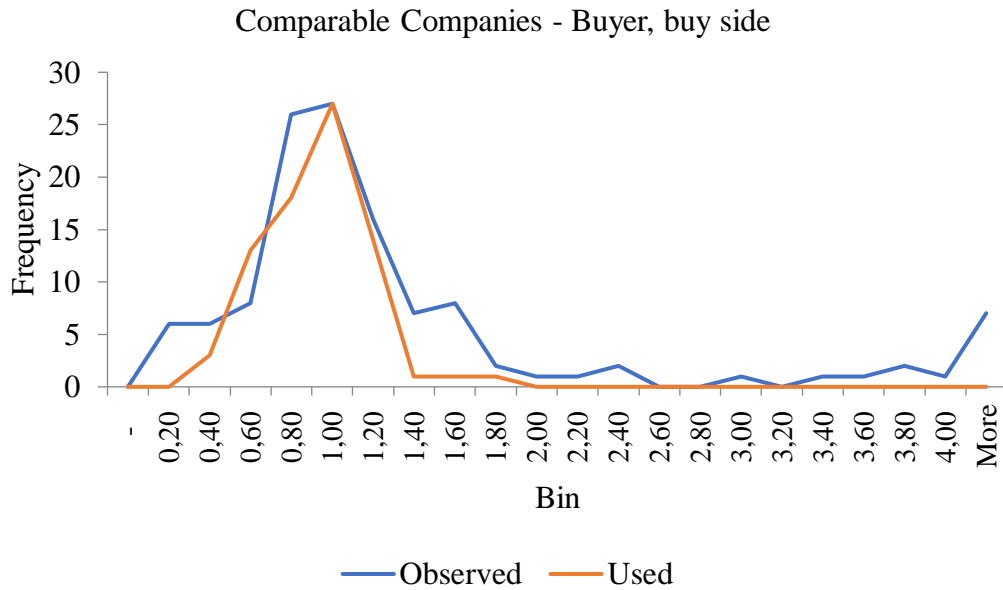


Figure 14 – Comparable Transactions Accuracy done by the financial advisor on the sell side to the buyer

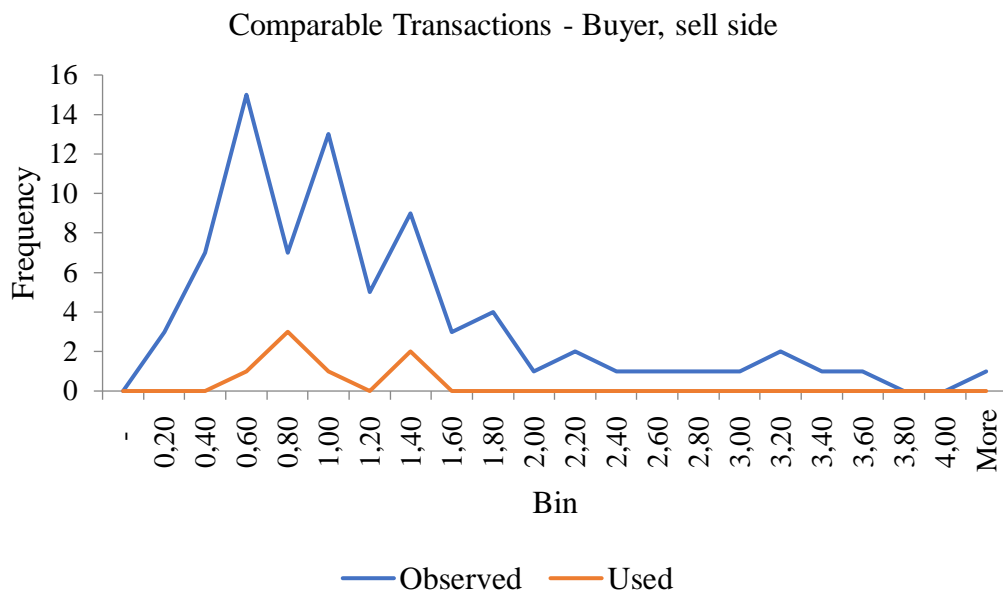


Figure 15 – Comparable Transactions Accuracy done by the financial advisor on the sell side to the buyer

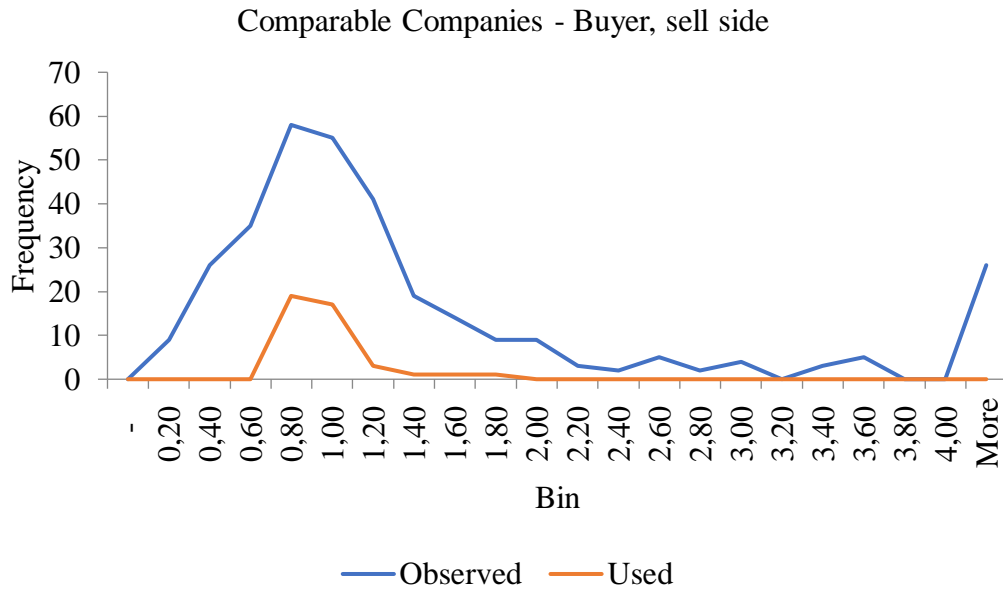


Figure 16 – Comparable Transactions Accuracy done by the financial advisor on the sell side to the buyer

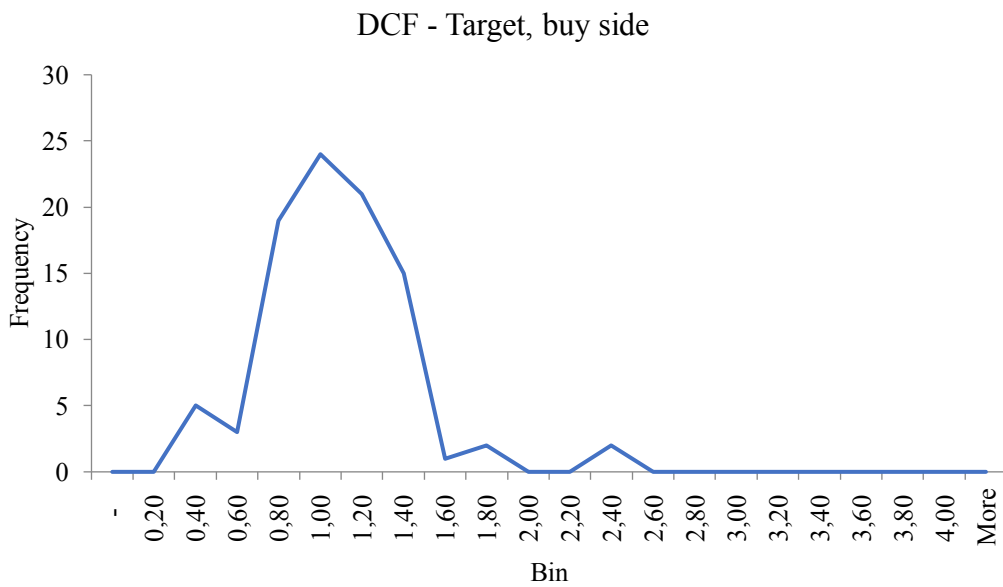


Figure 17 – Comparable Transactions Accuracy done by the financial advisor on the buy side to the target

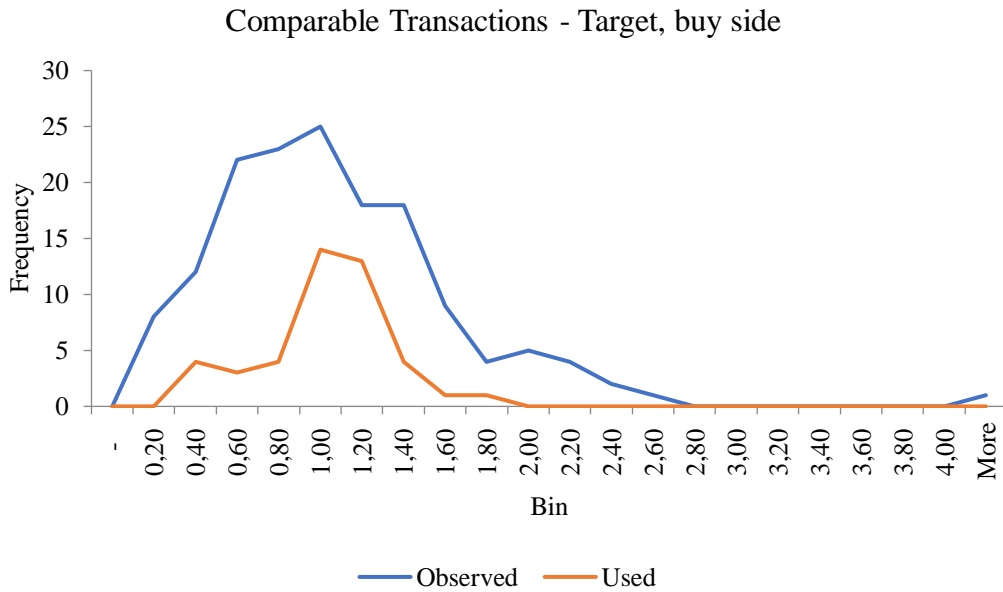


Figure 18 – Comparable Companies Accuracy done by the financial advisor on the buy side to the target

