Bankruptcy Risk Levels and their Main Determinants of Acquired Listed Companies in Cyprus

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Abstract

The objective of this study is to explore the course of the bankruptcy risk levels of acquired companies listed in Cyprus Stock Exchange. Mergers and acquisitions increase in number and value in contemporary global economy, yet with uncertain outcomes as the risk of realizing loses out of these agreements is often. Past research confirms that the level of performance following mergers and acquisitions is often lower than before. The originality of this study is that it explores the levels of bankruptcy risk following acquisitions rather than just the performance of acquired companies, and in that this is the first study in the marker of Cyprus. Altman's Z score is used as a method to evaluate the levels of bankruptcy risk for a five years post-acquisition period. In addition, this study explores the level of influence of current ratio (CR), debt ratio (DR) and net profit analysis (NPA) to the course of the Z score values, using both Pearson correlations and holistic approach. The findings suggest that the levels of bankruptcy risk of the acquired companies increase in the period examined, and that this increase is mainly the result of changes to the current ratio (85%) and to the debt ratio (69%), rather than to profitability. Moreover, there are strong indications that the current is the main influence upon the levels of risk at the start of the post-acquisition period, gradually losing its lead to debt ratio.

Keywords: risk of failure, financial performance, listed companies, Altman's Z score, current ratio, debt ratio, net profit analysis

Introduction

The paper explores the course of the risk levels of acquired listed companies in Cyprus for a period of five years after the acquisition event. Globally, Mergers & Acquisitions (M&A) increase in number and value as companies try to expand to new

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markers, differentiate their activities, or expand vertically to their supply chain. Kovela and Skok[2] estimate the transactions of M & A at $2.4 trillion, $2.5 trillion, $2.6 trillion, $2.3 trillion and $3.5 trillion for the years 2010, 2011, 2012 2013 and 2014 respectively[3]; values that highlight the importance of M&A in global economy.

Mergers and acquisitions, however, have uncertain outcomes and carry risks of failure. Findings from previous research suggest the rates of failure are very high. Extensive studies in various geographic areas such as EU, America, Great Britain and India[4] provide evidence that the risk of negative results in M&A is over 50%.

As such, although the overall aim of M&A is to add value to companies, the result is often disappointing and realized with losses. Research on the outcomes of M&A usually tries to study the performance of the companies based on accounting and financial ratios, such as profitability ratios, liquidity ratios, or solvency ratios[5]. Thus, successful M&A are the ones that increase their levels of, for example, profitability, and unsuccessful those that those whose performance ratios decrease. How-

[2] Kovela, S., & Skok, W., Mergers and Acquisitions in Banking: A Framework for Effective IT Integration, International Journal of Business and Management; Vol. 10, No. 3 (2015), pp 279-294.

[3] Thomson Reuters, Mergers and Acquisitions in 2014.

[4] De Wit, B., & Meyer, R., Strategy – Process, Content, Context, 2nd Edition, (1998). KPMG, Unlocking Shareholders Value: Mergers and Acquisitions- The Key to Success, A Global Research Report, (1999). Carleton, JR., & Lineberry, C., Achieving Post-Merger Success, A Stakeholder's Guide to Cultural Due Diligence, Assessment, and Integration, Published by Pfeiffer, (2004). Cartwright, S., & Schoenberg, R., 30 Years of Mergers and Acquisitions Research: Recent Advances and Future Opportunities, British Journal of Management, Volume 17 Issue S1 (2006), pp 1-5. Papadakis, V., & Thanos, I., Measuring the Performance of Acquisitions: An Empirical Investigation Using Multiple Criteria, British Journal of Management, Vol. 21, (2010), pp 859–873. Sinha, N., Kauslik, K., & Chaudhary, T., Measuring Post Merger and Acquisition Performance: An investigation of Select Financial Sector organizations in India, International Journal of Economics and Finance, Vol. 2, Issue 4, (2010), pp 36-45. Jayesh, C., (2012), Why do Mergers and Acquisitions quite often Fail? Advances in Management, Vol 5(5) May (2012), pp. 21-28. Paulone, S., Mergers and Acquisitions: Examining Managerial Strategy Connection to Post Transaction Accounting Measures, School of Business and Technology Management, (2013). Kosonen, M., & Blomqvist, K., Knowledge Transfer in Service-Business Acquisitions, Journal of Knowledge Management, Economics and Information Technology, Scientific Paper, Issue 2 (2013).

[5] Rani N., Yadav S., and Jain P., Impact of corporate governance score on abnormal returns and financial performance of mergers and acquisitions, Indian Institute of Management Decision Vol. 41, Issue 4 (2014), pp 371–398; Soni B., A Study on Pre Merger and Post Merger/ Acquisition Selected financial Parameters for Selected Cement Companies in India, Journal of Management, Vol. 10, Issue 2 (2014), pp 79-86; Lin C., and Lee H., The Bigger the Better? Merger and Acquisition Performance of Financial Holding Corporations, Emerging Markets Finance & Trade / January–February 2010, Vol. 46, Issue 1 (2010), pp. 96–107; Leepsa, N., and Mishra, C., Theory and Practice of Mergers and Acquisitions: Empirical Evidence from Indian Cases, Journal of Management Science, Vol. 7, No. 2 (2016), pp- 179-194.

ever, to the best of our knowledge, past research has not tried to study directly the risk associated with bankruptcy in M&A. In Cyprus there have been 56acquisitions from 2000 on listed companies[6]; a rather large number considering the size of the market. However, despite the significant increase in the value and number of deals commenced during the last two decadesthere, so far there is no attempt to evaluate the outcomes of the acquisitions.

This study applies Altman's Z Score Model in order to assess the risk of failure (possibility of bankruptcy) of Acquired Listed Companies in Cyprus. Nowadays bankruptcy is very common among nations, companies and individuals. Consequently, a critical question is: how to detect the risk of failure and or bankruptcy? The Altman model has been developed by Eduard Altman since 1968 and has been lastly revised in 2000by the author in order to be more accurate in predicting bankruptcy. Mohammed & Kim-Soon[7] stated that studies carried out by Altman 2003 using Z score were able to predict bankruptcyby94% one year before, and by 72% two years before its actual occurrence. Several studies confirm the aforementioned high predictability rates of the risk of failure and validity of the model[8].

[6] Cyprus Stock Exchange, (2015), http://www.cse.com.cy

[7] Mohammed A., and KimSoon, N., Using Altman's Model and Current Ratio to Assess the Financial Status of Companies Quoted in the Malaysian Stock Exchange, International Journal of Scientific and Research Publications, Vol. 2, Issue 7 (2012).

[8] Bemmann, M., Improving the Comparability of Insolvency Predictions, Dresden Economics Discussion Paper Series No. 08/05 (2005); Kannadhasan, M., Measuring Financial Health of a Public Limited Company Using Z Score: A Case Study (2007); Hayes, S., Hodge. K., and Hughes, L., A Study of the Efficacy of Altman's Z To Predict Bankruptcy of Specialty Retail Firms Doing Business in Contemporary Times, Economics & Business Journal: Inquiries& Perspectives, Vol. 3, Issue 1 (2010), pp122-134; Muthukumar, G., and Sekar, M., Fiscal Fitness of Select Automobile Companies in India: Application of Z Score and Springate Models, Journal of Management, Vol.11(2) (2014), pp 19-34; Anjum, S., Business bankruptcy prediction models: A significant study of the Altman's Z-score model, Asian Journal of Management Research, Volume 3 Issue 1 (2012), pp 212-219; Kasilingam R., and Jayabal, G., Profitability and Solvency Analysis of A Manufacturing Company using Dupont and Altman Model, Management Edge, Vol.5, No.2 (2012),pp 53-64; Gunathilaka, C., Financial distress prediction: A comparative study of Solvency Test and Z Score Models with reference to Sri Lanka, Journal of Financial Risk Management, IUP Publications, 3 (2014), pp 39-51; Pradhan, R., Z Score Estimation for Indian Banking Sector, International Journal of Trade, Economics and Finance, Vol. 5, Issue 6 (2014), pp 516-520; Thai, S., Goh, H., HengTec, B., Wong, J., and Ong, T., A Revisited of Altman Z Score Model for Companies Listed in Bursa Malaysia, International Journal of Business and Social Science, Vol 5, Issue 12 (2014), pp 197-207; Meeampol, S., Lerskullawat, P., Wongsorntham, A., Srinammuang, P., Rodpetch, V., Noonoi, R. Applying Emerging Market Z Score Model To Predict Bankruptcy: A Case Study Of Listed Companies In The Stock Exchange Of Thailand, 25-27 June, Protoroz, Slovenia, International Conference (2014), pp 1227-1237; Kumar K., and Kavita K., An Analysis of the Financial Performance of Indian Commercial Banks, The IUP Journal of Bank Management, Vol.

Altman Z-score model weights in a certain way profitability, liquidity and leverage ratios in order to extract the probability of bankruptcy. However, this study attempts more than measuring the likelihood of bankruptcy of acquired companies based on the Z Score, by exploring the level of effect of Current Ratio (CR), Debt Ratio (DR) and Net Profit Analysis (NPA) in relation to the Altman Z Score in order to study which factors mostly influence the increase or decrease of Z Score and, as such, the bankruptcy probabilities. The analyses carried out cover the year of acquisition plus a five years post acquisition period.

The study contributes to research in the following ways: First, because it is the first study exploring the course of the bankruptcy risk levels in the post-acquisition period. Second, since there is not any similar study on the risk performance of acquired companies in Cyprus. Third, because the study explores which factors/variables among CR, DR and NPA mostly affect the Altman Z Score. Finally, because it may help professionals to identify the likelihood of bankruptcy in the early stages with a view to take corrective actions on time.

The paper proceeds as follows: The next section provides the literature review regarding the Altman Z Score and its interconnection with Current Ratio, Debt Ratio and Profitability analysis. Next, the methodology and methods are presented, followed by the findings of the study. The final part of the paper entails the discussion on the findings and its conclusion.

Literature Review

Introduction

Mergers and Acquisitions (M&A) remain an important strategic vehicle of corporate strategy that aids companies to expand their operations and furthermore to gain a competitive advantage. Scholars suggest that firms may benefit from acquisition strategies from the efficient utilisation of resources within the firm to obtain economies of scope, but also on shareholders' values; economies of scope derived from the sharing of tangible and intangible resources may result in overall lower costs and this should have a positive impact on shareholders' value[9].

XVI, No.1 (2017), pp7-26; Madhushani, I., and Kawshala, B., (2018), The Impact of the Financial Distress on Financial Performance, Special Reference to Listed Non-Banking Financial Institutions in Sri Lanka, International Journal of Scientific and Research Publications, Vol. 8, Issue 2 (2018), pp 393-405.

[9] Bailey, E., Friendler, A., Market structure and multiproduct industries, Journal of Economic Literature 20 (3) (1982), pp 1024-1048; Montgomery, C., Corporate Diversification, Journal of Economic Per-

However, theoretical arguments suggest that M&A can also have negative effects to shareholders value. Previous studies indicated that M&A efforts in many cases were unsuccessful due to (a) high acquisition premiums and (b) failure of synergies across strategic business units[10]. An example of such case is the case of Novel. Novel acquired WordPerfect for $1.7 billion in stock in 1994, but the combination never generated enough profits and competitive advantage[11].

De Wit and Meyer[12] state that evidence for M&A between 1993 and 1995 prove that shareholders of acquiring firms lost an average of 10 percent of their investment on announcement. The research history of M&A suggests that they failed to add value to shareholders, in several cases record the rates of failure to offer value to shareholders to be between 50% to 83%[13].

Itisalreadymentionedthatresearchhasnottriedtostudydirectlythebankruptcyrisks involved in M&A. This is important because it is another thing to say that an investment may not perform as expected, which may lead to some loss of money, and a different that it carries the risk of overall failure. Radwan& Al-Oshaibatl[14] review several studies that develop and propose different models for failure prediction, such as those of Beaver[15],

spectives 8 (3) (1994), pp 163-178; Porter M., Competitive Strategy, Techniques for Analyzing Industries and Competitors, with new Introduction (1998); Palich, L., Cardinal, L., Miller, C., Curvilinearity in the diversification-performance linkage: an examination of over three decades of research, Strategic Management Journal 21 (2) (2000), pp 155-174.

[10] De Wit and Meyer (No 3)

[11] Thomson and Strickland, 2001, Crafting and Executing Strategy, Twelfth Edition.

[12] De Wit and Meyer (No 3)

[13] De Wit & Meyer (No 3); KPMG, World Class Transactions, Insights into creating Shareholders Value through Mergers and Acquisitions. The Academy of Management Perspectives 2014, Vol. 28, No. 2 (2001), 147–163; KPMG 1999 (No 4); Carleton & Lineberry (No 5); Cartwright & Schoenberg (No 6); Papadakis & Thanos (No 7); Sinha et al. (No 8); Otieno, O. & Kemunto, S., Effect of Mergers and Acquisitions on the Financial Performance of Commercial Banks in Kenya, Research Journal of Finance and Accounting, Vol. 8, Issue 14 (2017); Jallow, M., Masazing, M., and Basit, A., The Effects of Mergers & Acquisitions on Financial Performance: Case Study of UK Companies, International Journal of Accounting & Business Management, Vol. 5 No.1 (2017), pp 74-92.

[14] Radwan, S, &Al Oshaiba, S., Validity of Altman Z-Score Model to Predict Financial Failure: Evidence From Jordan, International Journal of Economics and Finance; Vol. 10, Issue 8 (2018), pp 181-189.

[15] Beaver W. H., Financial ratios as predictors of failure, Journal of Accounting Research Studies 1 (4) (1966), pp 71-111.

Altman[16], Kida[17], and Olson[18]. Comparing Altman and Keda models Radwan& Al-Oshaibatl[19] find out the average result in giving early warning of bankruptcy of Altman was 93.8% comparing to 69% of Kida, Chouhan et al[20] state that the model of Beaver is developed using a univariate discriminant analysis compared to the Altman's Z Score model that makes use of multivariate discriminant analysis to select the five most significant variables for measuring the financial distress of firms. Furthermore, they note that Ohlson's O-Score model adopts a logit analysis to generate a one-year prediction model compared to the Altman's Z-Score model, for which the prediction analysis of failure orientates to up to five years. Thus, based to the above this research uses the Altman model.

Meeapol et al[21] notes that in1993 Altman revised his model to incorporate a "four variable Z-Score" prediction model. Altman felt that this revised model significantly improves the predictive ability of the model and make sit simpler to incorporate. According to Apostolou[22], the Altman model had been developing for the past three decades, while recent studies confirm that it still has predictive ability. The model has been developed in two forms: the specialist, which applies to listed manufacturing enterprises, and the generalized, which applies to all enterprises. In this study was selected the generalized model, which applies to all businesses/sectors, since the study includes enterprises of diverse industries (Investment, Insurance, Construction, Entertainment, Trade, Media, Hospitality and Banking). The specialized model is based on five ratios, weighted by coefficients aggregated between them giving the performance to the company. The generalized model is based on four ratios which are weighted by coefficients that are aggregated between them and give the risk performance for the enterprise. The financial soundness of an enterprise for both mod-

[16] Altman E., Financial; Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, Journal of Finance 23 (1968), pp 589-609.

[17] Kida, C. Y., Financial ratios as predictors of bankruptcy in Japan: An empirical research. Journal of Finance, 123 (19980, pp 589–610.

[18] Ohlson, J., Financial Ratios and the Probabilistic Prediction of Bankruptcy, Journal of Accounting Research 18 (1) (1980), pp 109-131.

[19] Radwan & Al-Oshaibatl (No 46)

[20] Chouhan, V., Chandra, B., Goswami, S., Predicting financial stability of select BSE companies revisiting Altman Z score, International Letters of Social and Humanistic Sciences, Vol. 26 (2014), pp 92(105).

[21] Meeapol et al (No 27)

[22] Apostolou A., Analysis of Accounting Financial Statements, Association of Greek Academic Libraries, National Metsovio Technical University of Athens, Healink, 2007-2013, (2015).

els depends on the price range of the company's performance. Table 1 presents the framework of the generalized model:

Table 1: Altman Model Z Score

General Model of Altman's Z-score			
Metric component	**(Pure ratio × coefficient)**	**Pure ratio mean values of Altman's sampled companies**	
		bank-ruptcy	**non-bankruptcy**
X1.liquidity metric	**(Working Capital/Total Assets)*6,5** Frequently found in studies of corporate problems, is a measure of the net liquid assets of the firm relative to the total capitalization.	**-0,06**	**0,41**
X2.historical profitability metric	**(Retained Earnings / Total Assets)*3,26** This measure of cumulative profitability over time was cited earlier as one of the "new" ratios.	**-0,63**	**0,35**
X3.current profitability metric	**(EBIT / Total Assets)* 6,72** In essence, it is a measure of the true productivity of the firm's assets, abstracting from any tax or leverage factors.	**-0,32**	**0,15**
X4. solvency metric	**(Market Value / Total Liabilities)*0,6** The measure shows how much the firm's assets can decline in value (measured by market value of equity plus debt) before the liabilities exceed the assets and the firm becomes insolvent.	**0,4**	**2,48**

The value of Z-score is the sum of the four ratios multiplied by the corresponding coefficient, that is, the sum of the values in the second column. The critical values that are compared to the value of Z-score are:

score	**likehood of failure**	**MeanZ-score**	
.....<1,80	very high	**bankruptcy**	**1,62**
1,81>...<2,67	high	**non bankruptcy**	**4,45**
2,68>...<2,99	possible		
3,00>...	low		

The final Z Score value is the aggregate of the following formula: **Z Score = X1 + X2 + X3 + X4** (Apostolou[23])

[23] Apostolou (No 54)

According to Chouchan et al.[24]the Altman Z Score model has been applied in multiple settings, such as manufacturing[25], strategic planning[26], investment planning[27], capital structure[28], homeowner risk[29] and going concern business[30].Table 2 presents previous results of the application of Altman Z Score in regard to its effectiveness of failure prediction (Chouchan et al., 2014).

Table 2: Application of Altman Model Z Score

Author	Sample/Country	Efficiency & type of ratio
Ingbar[31]	Israel's Private companies data from the 1980s	93% accuracy in forecasting bankruptcy one year prior to collapse and 73% two years prior to it
Heine [32]	Predicting Financial Distress of Companies: Revisiting The Z-Score and Zeta ® Models	Prediction of bankruptcy is very high at 94% regarding the prediction of failure one year prior to collapse

[24] Chouchan et al (No 52)

[25] Grice, J.S. and Ingram, R.W., Tests of the Generalizability of Altman's Bankruptcy Prediction Model. Journal of Business Research, 54 (2001), pp 53-61; Christopoulos A., Vergos K., How Stock prices react to managerial decisions and other profit signaling events in the Greek mobile telecom market?, 3rd International Conference on Applied Financial Economics, Samos Island, (2006).

[26] Calandro, J., Considering the utility of Altman's Z-score as a strategic assessment and performance management tool, Strategy & Leadership, Vol. 35 No. 5 (2007), pp. 37-43.

[27] Sudarsanam, S., and Lai, J., Corporate Financial Distress and Turnaround Strategies: An Empirical Analysis, British Journal of Management, Volume 12, Issue 3 (2001), pp 183-199; Lawson, R., Measuring company quality, Journal of Investing 17(4) (2008), pp 38-55.

[28] Allayannis, G., Brown, G. W., & Klapper, L. F,. (2003), Capital structure and financial risk: Evidence from foreign debt use in East Asia. Journal of Finance, (2003), pp 2667–2709; Molina, C. A., Are firms underleveraged? An examination of the effect of leverage on default probabilities. Journal of Finance, 60(3) (2005), pp 1427–1459.

[29] Kao, D. L., Estimating and pricing credit risk: An overview. Financial Analysts Journal, 56(4) (2000), pp 50-66; Jayadev, M., Predictive power of financial risk factors: An empirical analysis of default companies. The Journal for Decision Makers, 31(3) (2006), pp 45-56.

[30] Citron, D., and Taffler, R., The Comparative Impact of an Audit Report Standard and an Audit Going-Concern Standard on Going-Concern Disclosure Rates. Auditing: A Journal of Practice & Theory: September 2004, Vol. 23, No. 2 (2004), pp. 119-130; Tafler, R.J., Lu, J., Kausar, A., In Denial? Stock Market Under reaction to Going-Concern Audit Report Disclosures Journal of Accounting & Economics 38(1-3) (2004), Nos 1-3.

[31] Ingbar Y., Analysis of financial statement Israel Institute of Productivity, (1994) (Chapter 13).

[32] Heine, M., Predicting Financial Distress of Companies: Revisiting The Z-Score and Zeta® Models, (2000).

Lifschutz & Jacobi[33]	Publicly traded companies in Israel between 2000 and 2007	95% accuracy rate one year prior to bankruptcy and with 85% accuracy rate two years prior to bankruptcy
Wang & Campbell [34]	China publicly listed companies	The accuracy is above 95% which confirms that delisting is a predictable event.
Alkhatib[35]	Jordanian companies during the five years preceding the bankruptcy	Bankruptcy incident high rates of 75% for the fifth year, 94% for the fourth year and 100% for each of the third, the second and the first.
Odipo & Itati[36]	10 failed firms of Kenyan market	90% successful prediction of the model.

Source: Chouchan et al[37]

Recently, Altman et al[38] conducted a survey to evaluate the prediction of economic distress, confirming that the Z-score model performs well in an international context. Moreover, they argue that the four variables model works consistently well internationally and is easy to apply and interpreted. Thus, this type of accounting-based model can be used by all interested parties, especially active international banks or other financial institutions, not only to predict failure or distress but also for other managerial purposes such as provisioning and economic capital calculation.

Further to the application of Altman Z Score, various studies use additional parameters/indicators in correlation with the Altman Z Score in order to identify which indicators affect the decrease and or increase of the Z score values. This is discussed in the next subsection.

[33] Lifschutz, S., and Jacobi, A., Predicting Bankruptcy: Evidence from Israel, International Journal of Business and Management, Vol. 5, No. 4 (2010), pp 133-141.

[34] Wang, Y., and Campbell, M., Financial Ratios and the Prediction of Bankruptcy: The Ohlson Model Applied to Chinese Publicly Traded Companies, Volume 17 Number 1 (2010), pp 334-338.

[35] Alkhatib, K., and Al Bzour, A., Predicting Corporate Bankruptcy of Jordanian Listed Companies: Using Altman and Kida Models, International Journal of Business and Management, Vol. 6, No. 3 (2011), pp 208-215.

[36] Odipo B.K., Itati, A.S., Evaluation of Applicability of Altman's Revised Model in Prediction of Financial Distress: A Case of Companies Quoted in the Nairobi Stock Exchange (2011), pp1-39.

[37] Chouchan et al. (No 52)

[38] Altman, E., Iwanicz, Drozdowska, M., Laitinen, E., Suvas, A., Financial Distress Prediction in an International Context: A Review and Empirical Analysis of Altman's Z(Score Model, Journal of International Financial Management & AccountingVol.28,Issue 2 (2017), pp 131-170.

Relation of the Altman Z Score Model with other parameters

Meeapol et al[39], effectively demonstrate that all four factors (variables) of the Z score must have a positive rate for the most part to avoid the risk of failure. Altman[40], though, argues that the use of model is not limited to failure prediction, but can be used as a diagnostic management tool as well: "Those applied by company's board of directors that are at risk to assess strengths and weaknesses, in some cases may help and lead in a successful economic recovery". Under such perspective, it is interesting to study which factors mostly lead the Z-score and, consequently, the risk of failure.

There is previous work on this issue, although not in M&A. Madhushani & Kawsvala[41] in a study on public companies in Sri Lanka for2012-2016, demonstrate that the Z score values have a significant impact on ROA and ROE. Range et al[42] in their research of the bankruptcy score in Kenya show that the debt ratio is the main indicator of the potential bankruptcy. Thai et al[43] in their study on public companies on the Malaysian stock exchange conclude that the most important indicator is the working capital ratio. Meeampol et al[44] in their research of public companies in Thailand find the main source of anticipation of failure/bankruptcy is the liquidity ratio, and Mohamed & Kim-Soon[45] in their research of public companies on the Malaysian stock exchange shows that eight companies out of ten were weak in the liquidity index (current ratio). Table 3 provides a comprehensive list on how previous research examined the Z score model with other variables.

[39] Meeapol et al. (No 27)

[40] Altman, E., Applications of Distress Prediction Models: What Have We Learned After 50 Years from the Z Score Models? International Journal of Financial Studies, 6, 70 (2018), pp 1-15.

[41] Madhushani & Kawsvala (No 29)

[42] Range, M., Njeru, A., and Waititu, G., Using Altman's Z Score (Book Value of Equity/Total Liabilities) Ratio Model in Assessing Likelihood of Bankruptcy for Sugar Companies in Kenya, Human Resource Management Academic Research Society, Vol 8, Issue 6 (2018), pp 578(601).

[43] Thai et al (No 26)

[44] Meeapol et al. (No 27)

[45] Mohamed & Kim-Soon (No 17)

Table 3 Combination of Altman Model and Accounting Ratios

Author	Research Journal Article	Parameter A- Z Score	Parameter B, Other Model / Criteria		Findings
Kasilingam & Jaybal[46]	Profitability and Solvency Analysis of a Manufacturing Company Using DuPont and Altman Model	Z Score Model	**DuPont** X1=Net Profit Margin (Net Income/Sales) X2=Total Asset Turnover (Sales/Average Assets) X3=Equity Multiplier (Total Assets/Equity) X4=ROE (Net profit/ Equity)	Performance	Only two variables are having significant impact on Z score: sales/total assets and market value/book value of equity
Mohamed & Kim-Soon[47]	Using Altman's Model and Current Ratio to Assess the Financial Status of Companies Quoted In the Malaysian Stock Exchange	Z Score Model	Liquidity Current Ratio	Performance Liquidity	A significant positive correlation was found to exist between Altman Z-Score Y1 and Altman Z score Y2 as well as with Current ratio.
Muminović[48]	Revaluation and Altman`s Z-score –the Case of the Serbian Capital Market	Z Score Model	Implications of Revaluation to the Accounting Ratios of: ROE/ROA ROE (Return on Equity) ROA (Return on Assets)	Performance Profitability	The degree of relationship between changes in Z score due to the revaluation share in total asset was 84.47%, which shows a high positive correlation.
Muthukumar & Sekar[49]	Fiscal Fitness of Select Automobile Companies in India: Application of Z-score and Springate Models*	Z Score Model	**Springate Model** X1= Working capital /Total assets. X2=Earnings before interest and Taxes / Total assets. X3= Net Sales / Total assets X4= Earnings before taxes/ Total liabilities.	Performance	Both models are helpful to predict the company's financial performance. The relationship of the Z Score model has not been examined in relation with other variables.

[46] Kasilingam & Jaybal (No 23)

[47] Mohamed & Kim-Soon (No 17)

[48] Muminović, S., Revaluation and Altman`s Z-score –the Case of the Serbian Capital Market, International Journal of Finance and Accounting, 2(1) (2013), pp 13-18.

[49] Muthukumar & Sekar (No 21)

Meeampol et al.[50]	Applying Emerging Market Z-Score Model To Predict Bankruptcy: A Case Study Of Listed Companies In The Stock Exchange Of Thailand	Z Score Model	EM Score Model	Liquidity Profitability	There is correlation between liquidity and profitability. Liquidity affects the profitability. The Z-Score model achieved prediction of failure at 89.66% (2010) and 80.77% (2011)
Thai et al.[51]	A Revisited of Altman Z Score Model for Companies Listed in Bursa Malaysia	Z Score Model	Liquidity	Working capital ratio	The working capital ratio affects the Z Score.
Awais et al.[52]	Do Z-Score and Current Ratio have Ability to Predict Bankruptcy?	Z Score Model	Liquidity Current Ratio	Performance Liquidity	There is significant positive correlation between Altman Z-Score and Current Ratio in all given years
Rajkumar[53]	Using Altman's Model and Current Ratio to Assess the Financial Distress of Listed Companies in the Default board of Colombo Stock Exchange	Z Score Model	Liquidity Current Ratio	Performance Liquidity	There is significant positive correlation between Altman Z-Score and Current Ratio.
Madhushani & Kawshala	The Impact of Financial Distress on Financial Performance (Special Reference to Listed Non - Banking Financial Institutions in Sri Lanka	Z Score Model	**Accounting Ratio Analysis** ROE ROA	Performance Profitability	Z score has a significant impact on ROA. Z sore and Leverage ratio has a significant impact to the ROE.

Although the previous researchers used the Altman model in combination with other factors/parameters, they didn't examine comparing and analyzing which fac-

[50] Meeampol et al (No 27)

[51] Thai et al (No 26)

[52] Awais, M., Hayat, F., Mehar, N., Hassan, W., Do Z-Score and Current Ratio have Ability to Predict Bankruptcy? Developing Country Studies, Vol.5, No.13 (2015), pp 30-36.

[53] Rajkuma P., Using Altman's Model and Current Ratio to Assess the Financial Distress of Listed Companies in the Default board of Colombo Stock Exchange, Scientific Research Journal (SCIRJ), Volume III, Issue XII (2015), pp 1-5.

tor(s) among CR, DR or NPA lead negatively or positively the Altman Z Score. For example, Muthukumar & Sekar[54]stated that Altman Z Score and Springate model provide different results, but both models are helpful to predict the company's financial performance. Specifically, there searchers have examined and concluded that the Altman model is workable and reliable in the majority, but they didn't have examined which component metric of the model among liquidity, leverage and profitability mostly affects and drives the Z Score index either positively or negatively. This is important because different industries or research settings may have different sensitivities to the Z score's component metrics. This study explores which of the following three factors, CR (represent liquidity area), DR (represent solvency area) and NPA (represent the profitability area) mostly leads the Z Score positively or negatively in the post-acquisition period. The next section presents the methodology and methods employed.

Research Methodology

Sample Selection

The sample of this study includes firms listed on Cyprus Stock Exchange (CSE), and includes companies of different sectors such as Investment, Insurance, Construction, Entertainment, Trade, Media, Hospitality and Banking. The present research study sets out a statistical table of sample data from acquisitions. The sample is therefore analyzed as follows: the total sample of public proposals for takeover of companies was carried out in a total of 56 implemented acquisitions. The Table 4 presents the number and the percentage of the selected sample by year.

Table 4: Sample Selection for Analysis based to the Altman Z Score for the Years of Y0-Y5

	Y0	Y1	Y2	Y3	Y4	Y5
Sample in No.	46	40	46	30	31	31
Sample in %	82%	71%	82%	54%	55%	55%

Source: Authors Analysis

Data Collection

This study basically depends on secondary data from the companies' published financial statements. Thus, the data once gathered, were analyzed by preparing descriptive statistics presented in Tables and Charts, and Themes were generated based on the data collected. The sampling in this case rangesbetween55% to 82%

[54] Muthukumar & Sekar (No 21)

out of 100% within the 1999 and 2016period. Data were collected from the Companies' financial statements (Statement of Financial Position and Income Statement) for the years of 1999 to 2016 and were analyzed using the IBM SPSS statistics v.23 program (statistical package of social sciences). The sample consisted of 31 to 46 companies for a period of 6 years (year of acquisition plus five years post acquisition period).The variation in sample year by year is due to the availability of reliable data from the published financial statements. Consequently, this study highlights the financial position of the companies' included and specifically whether the firms are in a distress or non-distress position.

Methods

This study makes use of Altman's Z score to evaluate the risk levels of corporate failure. In addition, two methods (Pearson Correlation and Holistic Approach) were applied to demonstrate the degree of influence of CR, DR and NPA in relation to the Altman Z Score. In other words, which factor among the CR, DR and NPA mostly drives positively or negatively the Z Score of the acquired companies

The Z scores of the companies included in the sample were calculated in order to explore the course of the levels of risk for a five years post-acquisition period. It is already discussed in the previous section that the model is proved valid and reliable for assessing the bankruptcy risks.

The Pearson correlation analysis examines the relationship between two variables. Here, a stable variable is the Altman Z score index, which is associated with each variable of liquidity ratio (CR), debt ratio (DR) and net profitability analysis (NPA) to explore the relationship in each year; this analysis examines the relationship and interdependence but not at an absolute level (specific percentage) of interdependence but through a scale such as zero relationship, slight relationship, moderate relationship, strong relationship and very strong relationship.

Cyprus is a small market in size and although the sample used in the paper represents a significant percentage of the acquired companies it is still small in number. For this reason, the Pearson analysis is complemented with holistic analysis. The holistic approach results in an absolute rate (percentage) by the end of the fifth year on the interdependence of a stable variable, which is the Altman Z Score, in relation to the other three variables of CR, DR and NPA. While Pearson correlation analysis examines these relationships for each year, the holistic approach treats the five-year period as a whole, thus enabling a larger number of observations. The advantage of

a holistic approach versus single approach is to highlight the importance of having a broader view[55]. Additionally, Scott[56] argues that adopting the holistic approach you can evaluate the whole picture. The holistic approach is used here to identify which of the Altman component metric among Liquidity/CR, Solvency/DR and Profitability/ NPA affect and drives the Altman Z Score either positively or negatively.

Therefore, the above two above applications (Pearson correlation and holistic approach) complement each other because they aim to demonstrate the influence of Altman Z Score Index but with different statistical application and from different optical views. The following section presents the findings of the study.

Findings

Z Score Analysis

Table 5 presents' statistical data for mean, median, std. deviation, minimum and maximum for the year of acquisition until five years of post-acquisition period:

Table 5: Altman's Z-score Analysis, Y0 (Year of Acquisition) to Y5 (Fifth year post-acquisition)

		Y0	Y1	Y2	Y3	Y4	Y5
N	Valid	46	40	46	30	31	31
	Missing	0	6	0	16	15	15
Mean		37.82	29.14	(25.12)	5.12	(48.94)	(50.83)
Median		3.42	4.52	2.02	2.68	1.57	1.48
Std. Deviation		123.43	61.38	268.11	12.19	324.56	323.28
Minimum		(22.19)	(4.52)	(1785.19)	(11.08)	(1785.19)	(1785.19)
Maximum		775.80	230.93	162.69	62.88	205.21	158.53

Source: Author's analysis, Y0=Year of Acquisition, **Y**1=1stPost-acquisition, **Y**2, **Y**3, **Y**4, **Y**5 = 2nd, 3rd, 4th, 5thPost-acquisition

As it is obvious from the above table the standard deviation for most of the years is very high, which results in asymmetries between the average and the median. When such an asymmetry is observed the median is closer to reality. Therefore, the following analysis reports on the median.

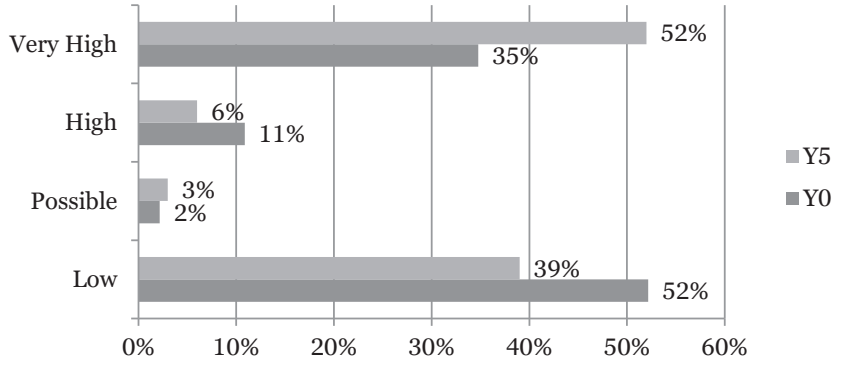
The median indicator in the essential time of acquisition Y0 was at 3.42 indicating a low risk of bankruptcy. This was also the case for Y1 where the risk levels of the acquired companies actually improved (4.52). However, for the second year up to the

[55] Andersen, J., A Holistic Approach to Acquisition of Strategic Resources, Journal of European Industrial Training, Vol. 31, Issue 8 (2007), pp 660-677.

[56] Scott, D., Mixed Methods: A Holistic Approach, Proceedings of the 3rd European Conference on Informatics, E. Ammeenwerth and M. Rigby (Eds), IOS Press, (2016).

fifth year, the recorded indicators suggest high risk of bankruptcy and especially in the fourth and fifth years where the scores were 1.57 and 1.48 respectively. According to the level of safety an index of less than 1.80 suggests a very high risk of bankruptcy. In this case, the median indicator is below 1.80, recording that most companies carried a very high risk of bankruptcy. Hence the results are depicted in the graph below:

Figure 1: Comparison between Y0 and Y5



Source: Author's analysis

Table 6 presents the numerical analysis of sample based to the four categories regarding the Altman Z score. In statistical numbers below, the image of the selected companies is presented, regarding the probability of failure/bankruptcy:

Table 6: Probability of failure based to the Altman Model Z Score

Year	Low Risk Zone ...>3,00	Possible Risk Zone 2,68>..<2,99	High Risk Zone 1,81>...<2,67	Very High-Risk Zone ...<1,80
0	52%	2%	11%	35%
1	60%	0%	5%	35%
2	41%	2%	9%	48%
3	50%	0%	7%	43%
4	35%	0%	10%	55%
5	39%	3%	6%	52%

Source: Authors analysis

According to the findings a)The comparative results between the acquisition year and the fifth year following the acquisition indicate the deterioration of the Z

Score indicator, where it is presented effectively in the above graph, b)The percentage of the acquired companies' Z Score in the low risk zone in the Y0 was at 52% while the fifth year fell to 39%, and c)The percentage of the acquired companies' Z Score in the high and very high zone in the Y0 was at 46 % while in the fifth year it increased to 58%. Table 7presents companies' information which have been collected from the official website of the Registrar of Companies (Cyprus Government Authority), showing the companies that failed to survive in correlation to the Altman Z score index.

Table 7: Date from the Registrar of Companies (Cyprus Government Authority)

A/A	Acquirer	Acquired Company	Registrar of Companies Information	Altman ZScoreY5
1	Libra Holidays Group	Droushia Heights Hotel Co Ltd	Under Liquidation (21/2/2017)	0,23 Very High
2	Droushia Heights Hotel Co Ltd	Astarti Development PLC	Under Receivership/Under Liquidation (10/1/2014)	3,13 Low
3	Leptos Kalypso Hotels Ltd	Astarti Development PLC	Under Receivership/Under Liquidation (10/1/2014)	3,13 Low
4	Avacom Computer Services Ltd	Ceifloor Public Company Ltd	Winding up by the Court (17/10/2016)	0,02 Very High
5	A.L. Prochoice Financial Services Ltd	Cyprus Pipes Industry Ltd	Under Receivership (25/10/2017)	1,04 Very High
6	Sharelink Financial Services Ltd	Kyknos Investment Company	Dissolved	N/A
7	CLR Capital Public Ltd	Confine Investment Public Ltd (Finikas)	Winding up by the Court	(2,97) Very High
8	Lumier TV Public Company Ltd	Multichoice (Cyprus) Public Co Ltd	Dissolved	(22,19) Very High
9	Aspis Group	MFS Holding Public Co Ltd	Under Receivership	N/A
10	HNS LTD	Spidernet Services Public Ltd	Dissolved due to Merge	0,22 Very High
11	SFS Group Public Co Ltd	Athena Cyprus Public Company Ltd	Dissolved due to Merge	N/A
12	Vivartia A.B.E.E.	Christies Dairies Public Ltd	Dissolved due to Merge	N/A
13	Aspis Holding Public Co Ltd	Athos Diamond Center Public Ltd	Under Liquidation	(0,42) Very High

14	Giannis Panayi	Aqua Sol Hotels Public Co Ltd	Under Receivership (13/10/2014)	N/A
15	AspisHolding Public Co. Ltd	Leda Investment Public Company Ltd	Winding up by the Court	1,21 (Y2) Very High
16	Astro Bank	USB Bank PLC	Dissolved due to Merge	0,56 Very High
17	Cyprus Cement Co. Ltd	CCC Laundries Ltd	Dissolved	N/A

Source: Cyprus Registrar of Companies – Author analysis

According to the above information, seventeen companies were placed under the receivership, dissolution or liquidation and nine out of eleven (9 out of 11) companies that were placed under receivership, dissolution or liquidation or dissolution, brought a high failure indicator and only two brought a low failure indicator. A prediction rate of the Z Score model is verified by 82%. Regarding the remaining six companies (N/A), there was not information for their corporate status.

Correlation of Altman Z Score and CR, DR and NPA

The statistical Sample consisted of 27 companies that provide full comparable results (among the 56 acquisitions) according to the statistical presentation of the Altman Z Score in correlation with Current ratio (CR), Debt ratio (DR) and Net Profit/(Losses) Analysis (NPA/NLA). The full comparative analysis of 27 companies for a period of six years from the sample of 56 companies, i.e. a percentage of 48%, is considered satisfactory to draw conclusions, which increases the accuracy of the results

Table 8 presents the analysis of trends in each company for the time of acquisition until the fifth year after the acquisition/post acquisition (Y0-Y5) in correlation with the Z Score. The results are listed below:

Table 8: Correlation of Altman Z Score and CR, DR and NPA

CR<...<ZS and CR>...>ZS	**CR<...>ZS and CR>...<ZS**	**DR>...>ZS and DR<...<SC**	**DR<...>ZS and DR>...<ZS**	**NP>...<ZS and NL<...>ZS**	**NP>...>ZS and <NL...<ZS**
118	21	41	92	67	76
139 or86%		133 or82%		143or88%	
85%	15%	31%	69%	47%	53%

Source: Author analysis

In table 8 the parameters are: a) ZS: Z Score, b) CR: Current Ratio, c) DR: Debt Ratio, d) NP/NL: Net Profits/Net Losses), e) >: above the ratio of safety for CR which is 2:1 (the higher the better) and DR which the ratio of safety is equal or below the 40% (the lower the better), f) <: below the level of safety for the ratios of CR and DR.

The explanation of the sample is as follows: a) The holistic sample for each category is 6 years by 27 companies, i.e. 162 as a maximum sample, b) The sample of current ratio (CR) is: (139 **X** 100) / 162 = 86% implemented, c) The sample of debt ratio (DR) is: (133 X 100) / 162 = 82% implemented, and d)The sample of Net Profit analysis (NPA) is: (147 X 100) / 162 = 88% implemented.

The findings of the analysis are divided into six categories with the following explanation:

- **CR<…<Z SCORE και CR>… >Z SCORE:** Decrease of liquidity ratio (CR/Current Ratio) leads to a decrease of Z Score (higher levels of risk) and an increase of CR leads to an increase of Z Score (lower levels of risk). The statistical result provided a percentage of 85% in this category/parameter. Specifically, 118 cases out of 136 (table 8) justify this category. For example, when the company index was below the security limit of 2:1 or 2.00, the Z Score was led below the 3.0 security limit with a probability of bankruptcy (risk), and on the other hand when the current ratio was above, then the safety limit led the Z Score above the 3.0 security limit with low probability of bankruptcy (low risk). The following example illustrates the logic for the above parameter:

Royale Highgate Ltd			
	Year	**Z' Score**	**CR**
7	Y0	6,52	3,51
	Y1	7,48	3,67
	Y2	1,24	1,89
	Y3	1,85	1,73
	Y4	N/A	1,33
	Y5	1,24	1,61

  - In years Y0 and Y1 the CR ratio is above the 2:1 security limit in 3,51:1 and 3,67:1 respectively, where the Z Score indicator is above the 3.0 security limit, specifically, 6.52 and 7.48 respectively. Therefore, when CR indicator is above the safety limit, it means that it is leading Z score above the safety limit

(desired result). Moreover, in three out of the four years that both scores could be calculated, there was a parallel trend on the direction of change.

- In years Y2, Y3 and Y5, the CR was recorded below the safety limit of 2:1. In Y2: 1,89:1, Y3: 1,73:1 and Y5: 1,61:1, and the Z Score records indicators below the 3.0 security limit and specifically Y2: 1,24 , Y3:1,85 and Y5: 1,24. Therefore, when a CR is below the safety limit of 2:1 leads a Z score below the safety limit of 3.0 (desired result).

- **CR<...>ZS και CR>...<ZS:** decrease of CR leads to an increase of Z Score. The statistical result showed a 15% rate in this category/parameter. Contradictory results are presented here where CR is below the safety limit, while the Z Score indicator showed trends above the 3.0 threshold.
- **DR<...>Z SCORE και DR>...<Z SCORE:** decrease of debt ratio leads to an increase of Z Score (lower levels of risk) and an increase of debt ratio leads to decrease of Z Score (higher levels of risk). The statistical result provided percentage of 69% in this category/parameter. Specifically, 92 cases out of 133 (table 8) justify this category. The following example illustrates the logic of the above parameter:

Cy venture Capital Public CO Ltd		
Year	**Z' Score**	**DR**
Y0	13,38	2%
Y1	16,74	2%
Y2	7,94	3%
Y3	N/A	10%
Y4	5,89	12%
Y5	7,94	11%

- In regard to the company Cyventure Capital Public Co. Ltd the DR is below the safety limits of 40%, in all years. Hence the Z Score indicator is in all the corresponding years above the score of 3.0. Therefore DR <...> Z SCORE (logical result). Moreover, increase in debt ration gradually leads the Z score in lower levels.

- **DR>...>ZS και DR<...<SC:** Increase in debt ratio leads to an increase of Z Score and a decrease of debt ratio leads to a decrease of Z score index (inconsistent result). The statistical result showed a 31% rate in this category/parameter.

Specifically, the findings shows that in 41 cases out of 133 (table 8) justify this category/percentage.

- **NP>...<ZS and NL<...>ZS:** Positive sign in the net profit (achievement of profits/NP) leads to a decrease of Z Score (higher levels of risk) and a negative sign in net profits (achievement of losses/NL), leads to an increase of Z Score indicator (lower levels of risk),a fact that shows contradictory results. The statistical result showed a percentage of 47% in this category/parameter. The following example sufficiently shows the logic of the above parameter:

Toxotis Investment Ltd		
Year	**Z' Score**	**NP/(NL)**
Y0	1,91	(729.539)
Y1	1,91	(28.087)
Y2	(2,27)	(25.267)
Y3	(1,37)	13.463
Y4	(1,22)	(191.110)
Y5	(2,27)	(212.118)

Europrofit Capital Investors Ltd		
Year	**Z' Score**	**NP/(NL)**
Y0	(3,48)	(6.095.941)
Y1	(4,52)	(5.307.974)
Y2	3,04	(4.519.435)
Y3	0,13	169.392
Y4	2,11	(1.064.876)
Y5	3,04	332.410

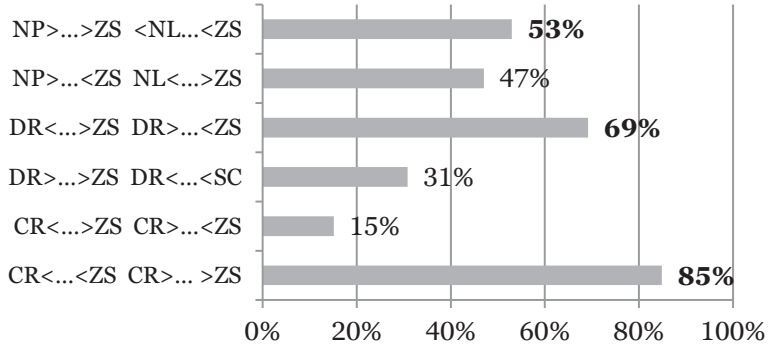
- In the aforementioned company Toxotis Investment Ltd, during all years the Z Score is under the security index of 3.0. In years Y2, Y3, Y4 and Y5 the Z Score shows negative results. On the contrary, the company achieved profits and losses but the Z Score was in all years below the security limit of 3.0-. Consequently, the fluctuation in profits and losses led the Z Score indicator below the security limit (<). Therefore, increase/decrease in net profits lead to a decrease of Z Score: >NP<... < Z Score, contradictory/inconsistent result.

- Similar fact is recorded in the company Europrofit Capital Investors Ltd where in the year Y2 the company made significant losses amounting to €4,519,435-, on the other hand the Z Score was above the security limit recording 3.04-. Therefore, decrease in net profits (losses) lead to an increase of Z Score: NP<....>Z Score, contradictory/inconsistent result.

- **NP>...>ZS and NL<...<ZS:** Achievement of net profits leads to an increase in the Z Score index and a decrease in net profits (net losses) leads to a decrease in the Z Score index. The statistical result showed a 53% rate in this category/parameter. Specifically, the findings show that in 76 cases out of 143 (table 8) justify this category.

Consequently, based on the above analysis of effect degree of CR, DR and NPA to the Z score, the chart below effectively indicates the relevant interconnection.

Figure2: Effect of CR, DR and NP on the Altman Z Score Model



Source: Author analysis

The above results suggest that the main factors driving the levels of risk in acquired companies are liquidity (85%) and debt ratio (69%). On the contrary, the results for profitability are almost equal (53% and 47%), which indicates that changes in profitability do not have a decisive impact on the levels of risk.

Pearson Correlation of Altman Z Score Current Ratio, Debt Ratio and NPA (Net Profit/(Losses) Analysis

The Z score of the companies was measured and correlated by each parameter/variable of CR, DR and NPA in order to examine the degree of their relationship. Two variables are related if they behave in such a way that they appear connected. For example, when changes in the value of one variable tend to coincide with changes

in the values of the other variable (Evangelos; 2013). The range that the Pearson (r) can take is from -1 (minus one) and + 1 (plus one). The first size (-1) shows a perfect negative relationship as opposed to the second size (+ 1) where it shows a positive relationship between the two variables (Emvalotis et al., 2006). Between the two limits (-1 to + 1) several classifications have been recorded. This study uses the following (Emvaliotis et al, 2006):

0.00 – 0.20	Zero relationship
0.21 – 0.40	Slight relationship
0.41 – 0.60	Moderate relationship
0.61 – 0.80	Strong relationship
>0.81	Extremely strong relationship

Table 9 summarizes the correlation results of the Z Score relative to the CR for the period of Y0-Y5:

Table 9: Correlation of Altman Z Score and Current Ratio for the period of Y0-Y5

	Y0	Y1	Y2	Y3	Y4	Y 5
Pearson Correlation	**.851****	**.769****	.022	**.867****	.104	.038
Sig. (2-tailed)	.000	.000	.918	.000	.636	.865
N	24	23	24	23	23	22
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: SPSS, Authors' Analysis

Explanation:

Pearson correlation: Correlation coefficient r

Sig. (2-tailed – Test of significance) observed probability value P =. 000-, because probability equal to zero does not exist, the above probability is simply less than 1 per 1000 (1/000).

The findings of Pearson correlation in relation to CR for each year are the following: a) Y0:Pearson Correlation .851,>0.81, consequently *extremely strong relationship,*b)Y1:Pearson Correlation .769,>0.61-0.80, consequently *strong relationship,* c) Y2: Pearson Correlation .022,>0.21-0.40, consequently slight relationship, d) Y3: Pearson Correlation .867,>0.81, consequently *extremely strong relation-*

ship, e) Y4: Pearson Correlation .104,>0.00-0.20, consequently zero relationship, f) Y5: Pearson Correlation .038,>0.00-0.20, consequently zero relationship

Table 10 presents the correlation results of the Z Score relative to the DR for the period of Y0-Y5:

Table10: Correlations of Altman Z Score and Debt Ratio for the period of Y0-Y5

	Y0	**Y1**	**Y2**	**Y3**	**Y4**	**Y 5**
Pearson Correlation	**-.381**	**-.112**	-.344	**-.505***	-.999**	-.905**
Sig. (2-tailed)	.080	.619	.092	.014	.000	0
N	22	22	25	23	22	17

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS, Authors' Analysis

The findings of Pearson correlation in relation to DR are the following: In the years Y0, Y1 and Y2, Pearson Correlation the r index is negative demonstrating slight negative correlation. In the years Y3, Y4 and Y5 the Pearson correlations are negative and demonstrate modest 0.41-0.60 for Y4and an extremely strong negative relationship >0.81 for the last two years. However, in relation to the DR, the positive correlation is achieved with negative statistical significance, because when the Z Score increases the debt ratio is reduced and vice versa.

Table 11 presents the correlation results of the Z Score relative to the NPA for the period of Y0-Y5:

Table 11: Correlations of Altman Z Score and NPA for the period of Y0-Y5

	NPA Y0	**NPA Y1**	**NPA Y2**	**NPA Y3**	**NPA Y4**	**NPA Y5**
Pearson Correlation	**-.084**	**-.094**	.034	**.041**	.073	-.094
Sig. (2-tailed)	.677	.642	.869	.847	.734	.711
N ((Sample)	27	27	27	25	24	18

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS

The r index varies between the scale of 0.00-0,20- for all the years examined, which means that there is no relationship between the variables. Therefore, it is evi-

dent that the Altman Z Score indicator is driven and/or influenced by other factors/ parameters, such as CR and DR.

Discussion

This study applied the Z score model in order to explore the course of bankruptcy risk in acquired companies in Cyprus for five years after the acquisition period and also explored the a number of factors that could lead the course of the Z score. It was found that the levels of bankruptcy risk increased in the period examined, and that the bankruptcy risks are main driven by the course of liquidity and debt. These issues are discussed next.

The results of the Z score analysis conducted above, indicate that an initial improvement of the bankruptcy risks levels of acquired companies at the first post-acquisition year was followed by a significant reduction of the Z score values from the second year (Y2) up to the fifth year (Y5) of the post-acquisition period, which suggests that the risk of bankruptcy significantly increases. It was recorded that he the percentage of acquired companies in the safe zone atthe acquisition year (Y0) was at 52% while at the fifth year (Y5) it fell to 39%. Moreover, seventeen companies have been placed under management, liquidation or receivership arrangements. The prediction rate of the Z Score model in this study (82%) confirm the findings of previous research on the high predictability results on the risk of failure of the method[57].Moreover, the findings here are in agreement with previous research that records high rates of failure in M&A[58]. Although previous studies evaluate the above on the basis of lower levels of performance, this study adds that the levels of bankruptcy risk not only do have a tendency to increase, but also that bankruptcy is often realized.

Based on the holistic approach analysis it can is argued that the main factor leading the course of the Z score at the post-acquisition period is liquidity, for at the 85% of the observations a parallel movement was observed. Lower, still important, influence was observed with the levels of debt since for the 69% of the observations increase at the levels of debt led to increases of bankruptcy risks. On the contrary profitability does not seem to have a decisive influence on the improvement or the

[57] Meeapol et al (No 27); Chouchan et al (No 52); Muthukumar & Sekar (No21); Kumar &Cavita (No 28); Maddhushani & Kawsvala (No 29).

[58] DeWit& Meyer (No 3); KPMG (No 4); KPMG (No38); Carleton &Lineberry (No 5); Cartwright & Schoenberg (No 6); Papadakis & Thanos (No 7); Sinha et al (No 8); Jayesh (No 9); Paulone (No 10); Kosonen & Blomqvist (No 11).

worsening of the bankruptcy risk levels because in only 50% of the observations profitability changes were observed with parallel changes at the levels of risk (e.g. increase in profitability and decrease at the level of risk and the vice versa).This is not to argue that profitability is not important to enterprises, for it obviously is. It rather suggests profitability changes are less decisive on influencing the levels of risk than the other factors examined. The findings of this research confirm that past evidence on the importance of liquidity[59] and debt[60] on the levels of risk are also valid for the case of acquired companies.

The Pearson correlation analysis fully confirms the low influence levels of profitability since it provided no relationship among profitability and the levels for risk to any the years examined. The Z score and liquidity relationship is confirmed as strong in Y1 and Y3 and slight for the in-between year Y2, while no significant relationship was detected during the last two years. The relation between Z score and debt is recorded negative in all years, i.e. increases in debt lead to decrease of the Z score values and, as such, increase the risk of bankruptcy. However, the relation is recorded as insignificant for the first year, gradually strengthening in Y2, and Y3 to result to extremely strong relationship for the last two years.

Therefore, liquidity is the main factor leading the levels of risk for the first years after the acquisition, while the debt levels take their turn in importance from the third year on.Yet, the sample in this study is small, although statistically sufficient for the whole market, simply because the market of Cyprus is small. As such, it is argued that the data provide indications for the above-mentioned relations that need to be studied to larger samples to be confirmed. Moreover, the generalization of the above finding outside the M&A field has to be treated with caution because other conditions may apply. The small sample was the reason that led the authors to complement the Pearson correlation analysis, which fragments the analysis to each year, with the holistic approach that treats the five years period as a whole thus enabling a larger number of observations. Therefore, the authors are more confident with the results of the holistic approach, i.e. that the main factor affecting changes on the levels of risk of acquired companies is liquidity, followed by the levels of debt, while profitability has no decisive impact on risk. Pearson correlation analyses fully confirm the latter, while the risk-debt relation is confirmed for Y3-Y5 and the risk-liquidity relation for Y1-Y3.

[59] Mohamed & Kim-Soon (No 82); Awais et al (No 89); Rajkumar (No 90).

[60] Range et al (No 79)

This study has a number of limitations. The sample contained only acquired companies. As such, no generalization on mergers can be made. The small size of the market unavoidably results in a small sample available for analysis. As mentioned before, this study applied the holistic approach in parallel with Pearson correlation to overcome this limitation. Nevertheless, the findings of the study should be tested in larger samples. Another limitation stern from the choice to use the Atman Z score for the evaluation of bankruptcy risk. The advantages of this choice have been discussed already. However, the model is based on accounting ratios, which means that uses the historical cost and accrual accounting as its base. An approach closer to the principles of finance that would use future cost and cash-flow estimations may provide additional insights. Moreover, the analyses here are based only on accounting data and did not consider other factors/parameters such as corporate culture, corporate governance, staff and performance motivation systems, staff relations, product lifecycle, competition, infrastructure, and clientele that could influence the outcomes of acquisitions. Again, those issues could be the focus of future research.

It has been argued that risk is rather a subjective perception than an objective condition[61] [62]. Although this may be indeed the case, bankruptcy incidents are real. Not only the findings of this study support this, but also business history is full of such facts. The approach of this paper is based on objectified data and models that, arguably, may assists subjects, i.e. those managing the acquired companies to get through the difficult, as realized by the findings of this study, post-acquisition period. The Z score analysis provides visibility on risk levels and on certain factors that lead them, thus creating possibilities for managerial corrective action. Although a takeover may appear as a solution for a company to empower its financial position it often has the opposite results. In Cyprus, not only a number of acquisitions resulted in forms of bankruptcy (have been placed under management, liquidation or receivership arrangements), but also the levels of bankruptcy risk increased for most of the companies examined. Perhaps a more conservatory approach should be followed when such important decisions that significantly affect the wellbeing of numerous and oftentimes small shareholders, because those negative results una-

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voidable spread to the local economy and society. This also signals to policy-makers the need for a stricter control framework for acquisitions, at least at the local market.

In, conclusion this is a pioneer study for the post-merging levels of bankruptcy risk, the main factors that lead them, as well as for its research setting of Cyprus. The findings support that the bankruptcy risk levels increase during the five years of post-acquisition period examined. The main factors that lead the course of risk were found to be debt and liquidity. Less secure, and in need of future testing, is the finding that liquidity is the main factor affecting the levels of risk at the first years following the acquisition, while debt takes its turn in lead after the third year on.

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