The ERICA series:

12. THE RISK-RETURN PARADOX AFTER IFRS ADOPTION BY EUROPEAN LISTED GROUPS

ERICA (European Records of IFRS Consolidated Accounts) WG
European Committee of Central Balance Sheet Data Offices (ECCBSO)

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IMPORTANT INFORMATION ABOUT THE SOURCE USED (ERICA[1] DATABASE)

The data used in this analysis are obtained from publicly available financial statements of European non-financial listed groups, having been treated manually, by CBSO statistics and accounting specialists, to be fitted on to a standard European format (ERICA format). In some cases, this manual treatment involves interpretation of the original data, a constraint that readers of this document should bear in mind.

The database does not represent the total population of European non-financial groups; nevertheless, the coverage attained with ERICA (in the whole dataset of around 1,000 groups, as well as in ERICA+, a subset of around 200 groups with extra accounting details) of the listed European groups is well-attuned to the situation and national composition of the stock markets.

The opinions of the authors of this paper do not necessarily reflect those of the national central banks to which they belong or those of the ECCBSO.

The "ERICA series" complement the annual report prepared on the ERICA database, with additional pieces of information and/or analyses on specific issues, using the full ERICA database or its subset ERICA+. Owing to their interest and/or the speciality of the themes treated, these short studies are published separately from the annual report on the ECCBSO webpage (www.eccbso.org).

[1] ERICA (European Records of IFRS Consolidated Accounts) is a database of the European Committee of Central Balance Sheet Data Offices.

THE ERICA SERIES:

12. The risk-return paradox after IFRS adoption by European listed groups

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ERICA (European Records of IFRS Consolidated Accounts) WG

European Committee of Central Balance Sheet Data Offices (ECCBSO)

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THE RISK-RETURN PARADOX AFTER IFRS ADOPTION BY EUROPEAN LISTED GROUPS

I. INTRODUCTION

This analysis tests the existence of the risk-return paradox in European listed non-financial groups after adoption of the IFRS and addresses its drivers using an up-to-date approach. The risk-return paradox implies a negative association between corporate returns and risk. This relationship is inconsistent with the trade-off between returns and risk that is well documented in finance literature, for instance in the work of Markowitz (1952, 1959), where he showed how one can mitigate specific risk through portfolio diversification. However, this view is not consistent with the dynamics found to be at play in companies' operational environments. Bowman (1980) found a negative association between corporate returns and corporate risk. This finding contradicted the positive risk-return relationship that is incorporated into finance models. The dynamics between returns and risk differ depending on whether one looks at equity markets or at a company's operational activities. A firm with lower risks and higher operating returns may have its equity priced relatively higher on stock markets, thus lowering its return to investors who buy the company's shares (Bowman, 1980). Hence it is conceivable to have different perspectives on the relationship between returns and risk depending on whether one looks from a finance standpoint at equity markets or from a management viewpoint at a group's operational activities.

Markowitz (1952, 1959) showed that one can diversify specific risk. In the following decades, a number of asset pricing models were built on Markowitz's portfolio theory (Treynor, 1961; Sharpe, 1964; Lintner, 1965; Mossin, 1966). All this research led to what is known as the Capital Asset Pricing Model (CAPM). In these models, returns are expected to be positively correlated with a measure of systematic risk. Betis (1983) has shown that managers are actually quite concerned about handling unsystematic risk. In fact, many researchers criticised the use of the CAPM beta as a proxy for risk in strategic management (Bromiley, 1990; Ruefli, Collins and Lacugna, 1999; Chatterjee, Lubatkin, Lyon and Schulze, 1999). This is another important difference between the finance view and the management perspective.

There are three theories that shed light on the risk-return paradox, namely the prospect theory (Kahneman and Tversky, 1979), the behavioural theory of the firm (Gyert and March, 1963) and the agency theory (Jensen and Meckling, 1976).

The prospect theory emerged after Kahneman and Tversky (1979) had shown through experimental studies that people measure outcomes relative to a reference point. The reference point is typically the current wealth level. In addition, they evaluate probabilistic choices using a value function that is convex below the reference point and concave above. In other words, economic agents that are currently below their reference point tend to be risk seekers, while economic agents who find themselves above their reference point are risk avoiders. Hence, low-performing companies might be risk seekers, whereas firms that are performing well might be risk avoiders. Low-performing companies would seek risk because they regard their current outcome as undesirable and high-performing firms would avoid risk because they perceive their current outcome as being above a given reference point (Bowman, 1982; Fiegenbaum and Thomas, 1990; Jegers, 1991; Kliger and Tsur, 2011). In addition, risk seeking and risk

aversion increase as the company moves away from the reference point (Lehner, 2000). The result will be a negative correlation between performance and risk.

The way in which the behavioural theory of the firm justifies the risk-return paradox is in fact similar to the prospect theory. The behavioural theory of the firm assumes that firms have an aspiration in terms of performance (similar to the reference point in the prospect theory). If performance exceeds aspirations, the company continues to operate as usual. If the firm does not meet its aspirations, it looks for ways to improve. The difference between aspiration and actual performance is described as 'attainment discrepancy' (Lant, 1992). For instance, corporations whose performance is below that of their competitors will aspire to improve (Bromiley, 1991). Companies that desire to improve will take action. Taking action involves assuming risks. Risk taking will increase as firms find themselves further away from their aspirations.

The agency theory postulates that managers may adopt strategies that are consistent with their own risk preferences. Jensen and Meckling (1976) demonstrated that the value of a firm financed through equity and debt is lower than the value it would have if the manager were its sole owner. Executive compensation in the form of stock ownership and stock option pay affect the propensity for companies to engage in acquisitions or sales of business units (Sanders, 2001). Insider ownership is associated with higher investment performance (Gugler, Mueller and Yurtoglu, 2008) and CEO ownership is correlated with higher efficiency (Lilienfeld-Toal and Ruenzi, 2014). Overall, managers' decisions structurally affect corporate strategies. Their decisions will depend on their abilities and their commitment. A company's level of operational efficiency provides an insight into the managers' skills and commitment.

Regarding methodology, the approach applied in this analysis is significantly different from approaches applied in the past, since it relies on a clustering analysis to segment groups into different categories. This then enables us to check whether the segmentation of companies is consistent with the risk-return paradox. If there is a negative correlation between returns and risk, then the firms with higher performance and low risk will be in one cluster and those with low performance and higher risk will be in another. All firms would of course prefer to be in the cluster that has the highest return and the lowest risk. This study tries to explain the drivers of high-performing groups (with lower risk).

The purpose of financial reporting is to provide useful information about companies' financial performance and position. Corporate performance and risk are usually assessed by examining accounting data. As the accounting framework of European groups has changed since 2005, it is appropriate to assess the paradox after the adoption of the IFRS. This analysis has added significance since most of the studies on this subject have so far focused on US corporations.

Section 2 provides a description of the dataset used. Section 3 describes the methodology. The results are presented in Section 4. Section 5 sets out the main conclusions.

II. DESCRIPTION OF THE DATASET

This analysis uses consolidated annual data available in the ERICA database for the years 2005 - 2018, i.e. 14 years of data. The ERICA database contains data for non-financial listed groups in European countries, namely Austria, Belgium, France, Italy, Germany, Greece, Portugal and Spain. Turkey also appears in the database from last year. As the ERICA database coverage in terms of total revenue is above 90% for all countries, it provides a highly relevant sample for carrying out an analysis at European level[3]. Since 2005, European listed groups have mandatorily provided IFRS-compliant consolidated financial information. All countries follow the same format when uploading data into the ERICA database, thus enhancing the comparability of the data. Table 1 shows the number of observations per country and year.

TABLE 1 NUMBER OF OBSERVATIONS BY COUNTRY AND YEAR

Country	Nº obs.	Country	Nº obs.
Austria	660	**Italy**	2509
Belgium	753	**Portugal**	499
France	5527	**Spain**	1030
Germany	3632	**Turkey**	73
Greece	509	***Total***	***15192***
Year	**Nº obs.**	**Year**	**Nº obs.**
2005	759	**2012**	1148
2006	1002	**2013**	1142
2007	1046	**2014**	1145
2008	1045	**2015**	1191
2009	1048	**2016**	1204
2010	1113	**2017**	1072
2011	1280	**2018**	997

Source: ERICA 2018 database (own calculations).

The countries with the highest number of observations are France (5,527), Germany (3,632) and Italy (2,509), i.e. the ones with large equity markets. On the other hand, Greece (509) and Portugal (499) have a smaller number of observations. Turkey presents the smallest number of observations (73) because the entry of Turkish groups into the database only began in 2018. The number of observations per year lies at around 1,000 observations. Overall, the database includes more than 15,000 observations.

[3] The ERICA WG annual report provides further details regarding the ERICA database coverage: (https://www.eccbso.org/wba/pubblica/pubblicazioni/file/ERICA/ERICA2018_AnnualReport_F.pdf).

III. METHODOLOGY

The main contribution of this study is the computation of a cluster analysis to assess the risk-return paradox. Cluster analysis is an exploratory method designed to discover structures in datasets without prior knowledge about relationships between the observations in these datasets. The formation of clusters follows two main principles: observations in a given cluster should show a high similarity in certain characteristics with other observations in the same cluster (homogeneity within the same cluster). Observations in one cluster should differ as far as possible from observations in the other clusters (heterogeneity among different clusters).

In this study, the main areas of interest are return and risk. The most important measure of risk in this analysis is the equity ratio, which is calculated as equity divided by assets. This indicates the extent to which a group depends on external financing and its cumulative profitability over time. Similar ratios have long been used in the literature to assess the likelihood of default (Beaver, 1967; Deakin, 1972; Altman, 1983). It is also a measure of risk that is completely independent of the common proxies for risk that are used in the literature on the risk-return paradox. The most usual proxies tend to be measures of the volatility of a return indicator, such as the return on assets. This analysis considers additional indicators of risk. The cash ratio shows cash and cash equivalents in relation to assets. Financial costs correspond to financing costs scaled by total liabilities. The leverage ratio is obtained by dividing interest-bearing liabilities by total liabilities. The cash flow from financing activities (CFF) and trade payables are both scaled by assets. Revenue is also included as a proxy for size. In the ERICA format, revenue is consistent with the usual concept of sales or turnover.

In order to measure returns, three proxies for performance are considered. Return on equity (ROE) is the ratio of net income to equity. Return on assets (ROA) is the ratio of profit from operating activities to assets. Cash flow from operating activities (CFO) is scaled by assets.

Additional variables are included to capture groups' operational efficiency and investment intensity. The revenue-to-assets ratio corresponds to revenue divided by assets. Operating margin refers to the ratio of profit from operating activities to revenue. Cash flow from investment activities (CFI) is scaled by assets.

Before computing the ratios, observations that met certain criteria were excluded. These criteria refer to observations in which assets, equity, revenue or profit from operating activities equal zero. In addition, observations for which the denominator of one of the ratios equals zero were left out. Group-years that correspond to doubles were also excluded. Doubles refers to groups which belong within the consolidation perimeter of other groups that also belong to the sample. Clustering methods, especially those which apply the mean for cluster detection, are very sensitive to outliers. The dataset therefore needs to be cleaned of outliers before the clustering procedure is performed. Outliers are defined as observations that lie above the 95% percentile or below the 5% percentile of each variable. Outlier detection is performed at the year level.

Where there is a broad range of variables, it can be helpful to reduce redundant information and condense the variables related to main factors. If the dataset is very large because it contains many observations and/or many variables, then a reduction in dimensionality simplifies the analysis and

reduces calculation time. Principal component analysis is a common method for reducing the dimensionality of large datasets. Principal component analysis summarises the original large set of variables with a smaller set that explains most of the variability in the original data and therefore helps to reduce complexity. Before applying the principal components analysis, the variables have to be standardised. After standardisation all variables follow a normal distribution which is important in order to ensure the comparability of the variables. Both the standardisation and the principal components analysis were applied separately for each year. For all years, the number of principal components retrieved equals the minimum number of principal components needed to reach 95% of explained variance[4].

The next step is to choose an appropriate clustering technique. The clusters identified by different algorithms have different properties. These properties can be subsumed under four aspects.

I. The first question concerns the full allocation of observations to the clusters. If the algorithm assigns each observation to one or more clusters, the result is a complete clustering. If some of the observations are not attributable to any group, the clustering is only partial. This analysis relies on a complete clustering.

II. The second aspect is whether one observation can be assigned to two or more clusters with an aggregated probability greater than one (overlapping). The need for a certain degree of exclusiveness of assignment to a single cluster can be derived from the core principle of heterogeneity. Heterogeneity among clusters should therefore be maximised; completely exclusive clusters serve this purpose. In this study, an exclusive approach is applied.

III. The third question relates to the use of hierarchical or partitioning clustering. Hierarchical clustering methods identify clusters gradually. Agglomerative hierarchical methods start by assigning every observation to an individual cluster and merge the small clusters stepwise into larger clusters until there is finally just one cluster containing every observation. Divisive methods start with one cluster and divide until every observation is in its own cluster. The main advantage of hierarchical methods is that they enable us to observe the stepwise aggregation of clusters to the full extent in which one cluster contains every observation in the sample. It is therefore not necessary to determine the optimal number of clusters in advance. This study uses the hierarchical approach.

IV. To merge the observations and clusters the analyst needs to choose between different approaches to measuring the similarity between the clusters, namely linkage comparison (single, complete, average) or variance-based methods (Ward's method). Single and complete linkage are based on the distance between pairs of observations. The average method uses the centre of a cluster for cluster assignment. The Ward method is a variance-based method for hierarchical agglomerative clustering since it minimises the within-cluster variance. In this study, the Ward method is applied. The main advantage of the Ward method over other types of linkage is that it is more consistent with the definition of what a cluster actually should be. This probably leads to more homogenous clusters as compared to alternative linkage types.

[4] For most years, the number of components retained in order to attain the 95% threshold is around 10. The variables with highest loadings in the first components are the measures of performance, followed by the equity ratio and the measures of efficiency.

IV. RESULTS

IV.1 *PERSISTENT RISK-RETURN PARADOX AFTER IFRS ADOPTION*

The standard tests applied in order to assess the risk-return paradox correspond to the computation of the correlation between average returns and risk. Risk in this context is given by the standard deviation of these returns. To make sure that the results are not proxy-specific, two measures of performance are considered, namely return on equity and return on assets. Hence, for a specific period, one needs to calculate the average and the standard deviation of returns for each firm. It is then possible to compute the correlation between the groups' average returns and the standard deviation of groups' returns. To ensure that the results are not driven by specific years and time-specific dynamics, the tests are applied not only to the whole sample (2005-2018) but also to certain windows. Specifically, the correlation between return and risk is calculated for the periods running from 2005 to 2010, 2011 to 2014 and 2015 to 2018. The results are disclosed in Table 2. Considering the whole sample, the correlation between return and risk works out at -0.39 when return on equity is used to measure performance, and -0.23 when return on assets is applied. These correlations are statistically significant at the 99% confidence level. These results evidence the existence of a persistent risk-return paradox after the adoption of IFRS by European listed groups. Even when considering specific periods, the tests always indicate negative and statistically significant associations between return and risk. The results also show that the risk-return paradox was more pronounced during the period running from 2011 to 2014, when the correlation between return and risk corresponded to -0.42 (return on equity) and -0.33 (return on assets).

TABLE 2 PEARSON'S CORRELATIONS BETWEEN THE AVERAGE AND THE STANDARD DEVIATION OF RETURNS

	Return on equity	Return on assets
2005-2018	-0.39***	-0.23***
2005-2010	-0.36***	-0.22***
2011-2014	-0.42***	-0.33***
2015-2018	-0.26***	-0.22***

*** indicates statistical significance at the 99% confidence level.

Source: ERICA 2018 database (own calculations).

IV.2 *CLUSTERS ARE WELL DIFFERENTIATED IN TERMS OF RISK AND RETURNS*

A cluster analysis was applied in order to assess the existence of the risk-return paradox. For each year, two clusters were computed. The clusters are independent between each year. Thus, a group may change cluster throughout time. Statistical tests were applied to each variable within each year to compare the mean values of the two clusters. The tests provide t-statistics that enable us to determine objectively whether the two clusters are indeed different, and also to assess the extent of these differences[5]. Each t-statistic has an associated p-value. Table 3 describes the p-values of the tests by

[5] The t-tests may be biased if, for a given variable, the variance of two clusters is not similar. Hence, the Wilcoxon test was also applied as a robustness check. The results are not meaningfully different from those obtained using the t-test.

year for the equity ratio, return on equity and return on assets[6]. The presentation of p-values instead of the t-statistics facilitates the interpretation of the results. A p-value smaller than 0.10, 0.05 or 0.01 indicates that, for a specific variable and a given year, the two clusters are different, with a confidence level of at least 90%, 95% or 99%, respectively. For instance, for the year 2005 and the variable equity ratio, a p-value of 0.00 was obtained. Different equity ratios characterise the two clusters computed for that year. This difference is significant at the 99% confidence level. Table 3 shows that the two clusters obtained for each different year tend to be quite different. All tests, except the equity ratio in 2015, have a p-value smaller than 0.10, which allows us to conclude that almost all variables present different values for each of the clusters.

TABLE 3 P-VALUES OF T-TESTS THAT COMPARE THE MEAN OF THE VARIABLES OF THE TWO CLUSTERS

	2005	2006	2007	2008	2009	2010	2011
Equity Ratio	0.00	0.00	0.00	0.00	0.01	0.00	0.00
ROE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Equity Ratio	0.00	0.00	0.00	0.38	0.00	0.00	0.00
ROE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROA	0.00	0.00	0.00	0.00	0.03	0.00	0.00

Source: ERICA 2018 database (own calculations).

The equity ratio is of primary importance because it is a straightforward measure of risk. A principal components analysis was applied before computation of the clusters. The measure of risk with the highest loadings in the first principal components is the equity ratio and this outcome is stable across most of the years. The equity ratio is also used for cluster reference. The cluster with a lower equity ratio is called the higher-risk cluster, whereas the cluster with a higher equity ratio is referred as the lower-risk cluster. This is possible because the p-value of the tests that compare the average equity ratio of the two clusters is usually statistically significant at the 99% confidence level, the only exception being 2015. The clusters thus differ strongly in terms of risk. Similarly, across all years the p-value of tests that compare the return on equity of the two clusters is 0.00. Hence, the clusters differ not only in terms of risk but also in terms of returns. What then needs to be determined is whether, for each year, the lower-risk cluster is also the cluster with higher returns. Since a complete batch of variables is applied, it is possible to check what other characteristics the better performing groups tend to display. In addition, one can identify how the differences between the two clusters has changed over the years.

[6] Table 3 only describes the p-values for these three variables. However, these tests are applied for each year and for every variable. The p-values of all tests are displayed in Table 4, which is shown in the annex.

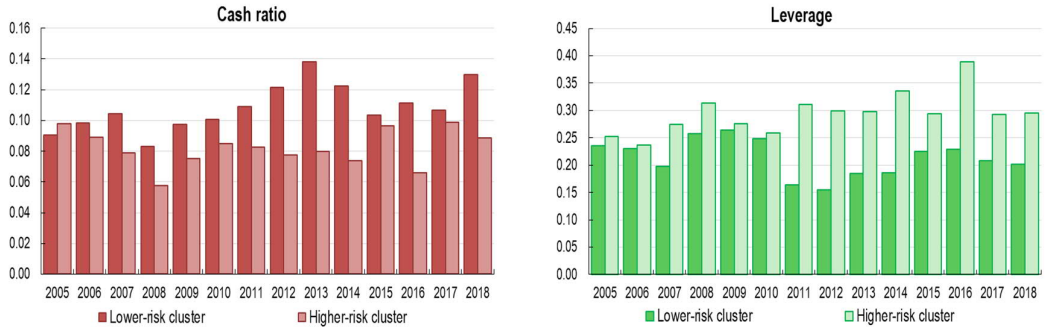
IV.3 *AFTER 2010, HIGHER-RISK GROUPS HAVE HIGHER DEBT AND FINANCIAL COSTS*

Tables 5 to 9 show the mean and coefficient of variation of each variable, within each year for each of the clusters[7]. The equity ratio is used to differentiate the two clusters. Revenue is a proxy for a group's size. The results show that for some years, the lower-risk cluster concentrates the groups with higher revenue but there are also years when the opposite happens. In 2005, the higher-risk cluster contains smaller groups whereas the opposite is the case in 2006. It is therefore not possible to correlate the paradox with group size. A similar dynamic is found for trade payables and cash flow from financing activities. The weight of trade payables in groups' total assets is higher in the higher-risk cluster for some of the years and lower in others. A pattern for these variables is not easily identifiable.

Throughout the years, one can identify two different situations for the cash ratio. In some years, the cash ratios do not differ essentially between the two clusters (Table 4 - 2005, 2006, 2015 and 2017). In all other years, the cash ratios are higher for the lower-risk cluster.

Both financial costs and financial debt show a very interesting pattern. Before 2010, the two clusters do not tend to present different levels of financial debt or financial costs. For instance, between 2005 and 2010, the differences in terms of financial debt between the two clusters are only statistically different in 2007 and 2008. In other words, before 2010 it is not possible for some years to differentiate the higher-risk cluster from the lower-risk cluster on the basis of indebtedness and financial costs. This pattern changes after 2010. From that year onwards, the p-value of the tests that compare the mean values of the variables between the two clusters equals 0.00 in all years. For all of those years, the groups from the higher-risk cluster always have higher financial debt and financial costs.

CHART 1 CASH RATIO (CASH AND CASH EQUIVALENTS DIVIDED BY ASSETS) AND LEVERAGE (INTEREST-BEARING BORROWINGS DIVIDED BY ASSETS)



Source: ERICA 2018 database (own calculations).

A similar pattern shapes financial costs. The trigger for these changes may have been the financial crisis. For instance, the Basel III standards were issued in 2010. After that year, a clear difference between the two clusters in terms of leverage is noticeable. As a result, the cluster with a higher level of debt pays more interest due to higher risk. This dynamic is not apparent before the financial crisis. In 2007, the p-value of the tests that compare the two clusters show a value of 0.00 for financial debt and

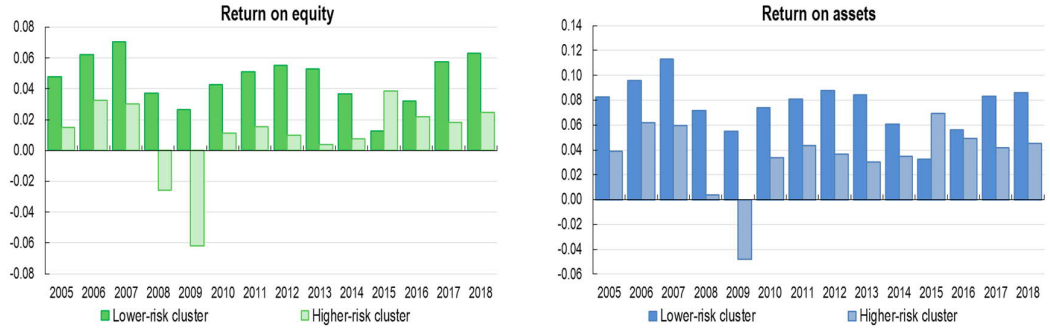
[7] Owing to the large size of these tables, they have been placed in the annex.

a value of 0.82 for financial costs. Specifically, the higher-risk cluster has an average equity ratio of 0.36 and a leverage ratio of 0.27, whereas the lower-risk cluster has an average equity ratio of 0.47 and a leverage ratio of 0.20. Financial costs averaged 0.03 for both clusters. From a statistical standpoint, this means that the clusters have different equity and leverage ratios but similar financial costs. From an economic point of view, this implies that although the two clusters have different levels of risk, they have, by contrast, similar financial costs, which is consistent with the cost of capital not being risk-adjusted.

IV.4 *CLUSTERS CONFIRM THE RISK-RETURN PARADOX*

The main purpose of this analysis is to assess the existence of the risk-return paradox. The study includes three measures of performance, namely the cash flow from operating activities, the return on assets and the return on equity. The differences in these variables between the two clusters is statistically significant in all years. Thus, the clusters differ significantly in terms of returns. To put it simply, the higher-risk cluster is usually the cluster with lower levels of performance. The lower-risk cluster has higher operating cash flows and shows higher returns, regardless of whether one looks at the return on equity or the return on assets.

CHART 2 RETURN ON EQUITY (NET INCOME DIVIDED BY EQUITY) AND RETURN ON ASSETS (PROFIT FROM OPERATING ACTIVITIES DIVIDED BY ASSETS)



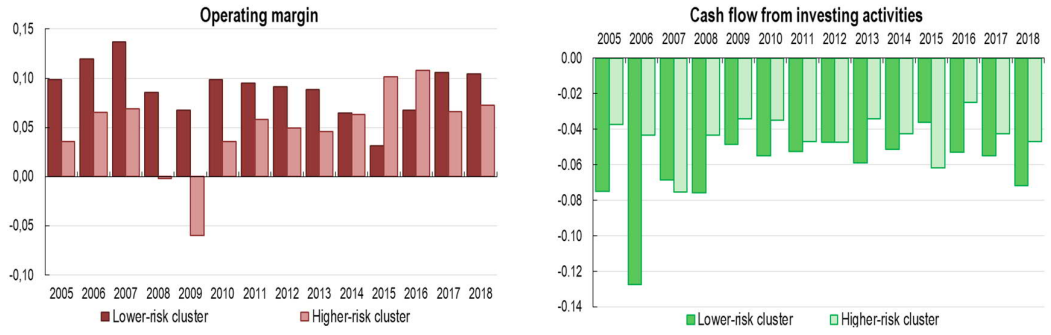
Source: ERICA 2018 database (own calculations).

This is evidence of the existence of the risk-return paradox. The only exception to the paradox appears in 2015. This is also the only year in which the difference between the two clusters in terms of equity ratios is not statistically significant. The higher-risk cluster has an average equity ratio of 0.40 while the lower-risk cluster has an average equity ratio of 0.42. It is also possible that this outcome is influenced by macroeconomic conditions. The year 2015 saw an economic rebound and the rate of GDP growth that year exceeded all growth rates since 2007. In general, the groups under analysis performed well in 2015, so the dynamic of the paradox may have petered out in that year.

IV.5 *BETTER-PERFORMING GROUPS SHOW GREATER OPERATING MARGINS AND INVEST MORE*

The set of variables considered in this study includes measures that provide an insight into the influence of the management on groups' operations. Operating margin and the revenue-to-assets ratio are indicators of a group's operational efficiency. The cash flow from investing activities reflects the groups' investment intensity, which depends on the strategies applied by the management. For most of the years examined, the higher-risk cluster with lower returns is also the cluster with lower operating margins. The only exception is the period running from 2014 to 2016. However, 2015 is also the only year in which the clusters do not differ statistically in terms of risk. The results suggest that the groups with less risk and higher returns tend to be more operationally efficient. For instance, in 2018 the average operating margin in the higher-risk cluster works out at 0.07, compared with 0.10 for the lower-risk and better-performing cluster. When it comes to the revenue-to-assets ratio, we can observe two distinct patterns. Until 2010, the groups from the higher-risk cluster achieved higher revenue per unit of assets. This changed after 2010, when the revenue-to-assets ratio in the higher-risk cluster declined. It is noteworthy that although the groups in this cluster were able to generate more revenue with same amount of assets before 2010, they were not able to do so as efficiently – i.e. with the same margin – as the groups in the high-performing cluster did. These results are consistent with a scenario where the groups from the higher-risk cluster are searching for growth, even at the cost of lower margins, operating cash flows and returns. This is in line with both the prospect theory (Kahneman and Tversky, 1979) and the behavioural theory of the firm (Gyert and March, 1963). However, this has changed following the financial crisis. A possible explanation is that these groups were not able to finance their activities as easily after the crisis, limiting their ability to pursue riskier, growth-oriented strategies.

CHART 3 OPERATING MARGIN (PROFIT FROM OPERATING ACTIVITIES DIVIDED BY REVENUE) AND CASH FLOW FROM INVESTING ACTIVITIES (SCALED BY ASSETS)



Source: ERICA 2018 database (own calculations).

Investment intensity also appears to differ significantly between the two clusters. Apart from 2015, cash flow from investing activities is higher (usually less negative) for the groups in the higher-risk cluster. The groups in the lower-risk and better-performing cluster invested more. The behavioral theory of the firm (Gyert and March, 1963) would suggest that the worst-performing groups would invest more, in an effort to catch up with the high-performing groups. Nevertheless, it can also be pointed out that when groups are trying to catch up, they might bet on growth and market share strategies that focus on

increasing revenue, consistent with the pre-2010 higher revenue-to-assets ratio. High-performing groups invest more, focusing on innovation or efficiency.

V. CONCLUSIONS

The main purpose of this study is to assess the existence of the risk-return paradox using an up-to-date approach: cluster analysis. For each year, two clusters have been computed. The results reveal that the higher-risk cluster tends to perform worse, while the lower-risk cluster performs better. This provides corroborating evidence for the risk-return paradox documented by Bowman (1980). The results obtained, which are independent for each year, are consistent with the risk-return paradox throughout the entire period under analysis, except for 2015.

Before the financial crisis, higher-risk groups appear to have pursued a more aggressive sales strategy, reflected in a higher revenue-to-assets ratio. This is consistent with both the prospect theory (Kahneman and Tversky, 1979) and the behavioural theory of the firm (Gyert and March, 1963). However, this pattern dissipates after the financial crisis. It may be hypothesised that the financial crisis generated financial constraints which limited growth-seeking strategies that sacrifice operating margins.

The results suggest that managers may have a non-trivial influence on the paradox. The groups in the lower-risk and high-performing cluster achieve greater operating margins, which indicates that these groups tend to be more efficient. Besides, even though these groups are performing better, they invest more. This may enable them to be more efficient, innovative and resilient. Although this study shows that the risk-return paradox is associated with efficiency and investment intensity, one can only hypothesise about a causal relationship between these characteristics. Future research might usefully examine these associations in greater detail.

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ANNEX

TABLE 4 P-VALUES OF T-TESTS THAT COMPARE THE MEAN OF THE VARIABLES OF THE TWO CLUSTERS

	2005	2006	2007	2008	2009	2010	2011
Equity Ratio	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Cash Ratio	0.31	0.24	0.00	0.00	0.00	0.01	0.00
Financial costs	0.14	0.02	0.82	0.00	0.02	0.62	0.00
Leverage	0.22	0.66	0.00	0.00	0.43	0.40	0.00
CFF	0.86	0.00	0.00	0.15	0.00	0.00	0.00
Trade Payables	0.00	0.00	0.00	0.00	0.28	0.00	0.00
Revenue	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CFO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Revenue to assets	0.00	0.00	0.63	0.00	0.14	0.01	0.02
Operating margin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CFI	0.00	0.00	0.20	0.00	0.00	0.00	0.09
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Equity Ratio	0.00	0.00	0.00	0.38	0.00	0.00	0.00
Cash Ratio	0.00	0.00	0.00	0.21	0.00	0.19	0.00
Financial costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leverage	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CFF	0.00	0.06	0.23	0.50	0.00	0.00	0.13
Trade Payables	0.04	0.75	0.00	0.00	0.00	0.00	0.12
Revenue	0.00	0.00	0.00	0.00	0.13	0.00	0.00
ROE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROA	0.00	0.00	0.00	0.00	0.03	0.00	0.00
CFO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Revenue to assets	0.00	0.00	0.00	0.00	0.00	0.73	0.00
Operating margin	0.00	0.00	0.80	0.00	0.00	0.00	0.00
CFI	1.00	0.00	0.01	0.00	0.00	0.00	0.00

Source: ERICA 2018 database (own calculations).

TABLE 5 DESCRIPTIVE STATISTICS FOR BOTH CLUSTERS (2005 – 2007)

Year	Variable	Lower-risk cluster		Higher-risk cluster	
		Mean	Coef. var	Mean	Coef. var
2005	Equity ratio	0.41	0.30	0.35	0.38
2005	Cash ratio	0.09	0.77	0.10	0.66
2005	Financial costs	0.02	0.53	0.02	0.51
2005	Leverage	0.24	0.51	0.25	0.49
2005	CFF	0.00	18.60	0.00	18.44
2005	Trade payables	0.12	0.48	0.17	0.45
2005	Revenue	1,715,730.41	1.61	471,056.20	1.57
2005	ROE	0.05	0.59	0.02	2.51
2005	ROA	0.08	0.44	0.04	1.07
2005	CFO	0.08	0.59	0.04	1.22
2005	Revenue to assets	0.92	0.38	1.12	0.32
2005	Operating margin	0.10	0.48	0.04	1.19
2005	CFI	-0.07	-0.64	-0.04	-0.92
2006	Equity ratio	0.45	0.28	0.37	0.33
2006	Cash ratio	0.10	0.69	0.09	0.72
2006	Financial costs	0.02	0.55	0.02	0.47
2006	Leverage	0.23	0.54	0.24	0.51
2006	CFF	0.06	1.45	-0.01	-5.20
2006	Trade payables	0.10	0.59	0.16	0.47
2006	Revenue	818,505.96	1.73	1,581,984.76	1.78
2006	ROE	0.06	0.55	0.03	1.01
2006	ROA	0.10	0.47	0.06	0.69
2006	CFO	0.08	0.55	0.06	0.79
2006	Revenue to assets	0.90	0.40	1.05	0.36
2006	Operating margin	0.12	0.51	0.07	0.78
2006	CFI	-0.13	-0.43	-0.04	-0.77
2007	Equity ratio	0.47	0.24	0.36	0.31
2007	Cash ratio	0.10	0.74	0.08	0.75
2007	Financial costs	0.03	0.48	0.03	0.46
2007	Leverage	0.20	0.55	0.27	0.45
2007	CFF	-0.01	-5.68	0.02	2.87
2007	Trade payables	0.11	0.54	0.15	0.51
2007	Revenue	1,051,356.18	1.58	1,744,523.15	1.81
2007	ROE	0.07	0.36	0.03	0.93
2007	ROA	0.11	0.30	0.06	0.61
2007	CFO	0.10	0.40	0.05	0.89
2007	Revenue to assets	1.00	0.41	0.98	0.39
2007	Operating margin	0.14	0.53	0.07	0.76
2007	CFI	-0.07	-0.67	-0.08	-0.80

Source: ERICA 2018 database (own calculations).

TABLE 6 DESCRIPTIVE STATISTICS FOR BOTH CLUSTERS (2008 – 2010)

Year	Variable	Lower-risk cluster		Higher-risk cluster	
		Mean	Coef. var	Mean	Coef. var
2008	Equity ratio	0.40	0.31	0.31	0.36
2008	Cash ratio	0.08	0.76	0.06	0.68
2008	Financial costs	0.03	0.47	0.03	0.32
2008	Leverage	0.26	0.51	0.31	0.36
2008	CFF	0.01	9.01	0.00	-28.68
2008	Trade payables	0.12	0.56	0.16	0.45
2008	Revenue	1,719,122.07	1.76	691,342.59	1.79
2008	ROE	0.04	0.81	-0.03	-1.77
2008	ROA	0.07	0.52	0.00	12.40
2008	CFO	0.07	0.74	0.03	1.50
2008	Revenue to assets	0.95	0.38	1.13	0.38
2008	Operating margin	0.09	0.62	0.00	-25.07
2008	CFI	-0.08	-0.63	-0.04	-0.73
2009	Equity ratio	0.40	0.33	0.36	0.41
2009	Cash ratio	0.10	0.71	0.08	0.76
2009	Financial costs	0.02	0.49	0.03	0.44
2009	Leverage	0.26	0.50	0.28	0.47
2009	CFF	-0.02	-2.33	0.00	-9.64
2009	Trade payables	0.12	0.56	0.13	0.52
2009	Revenue	1,392,134.54	1.64	472,167.17	1.45
2009	ROE	0.03	1.04	-0.06	-0.68
2009	ROA	0.05	0.65	-0.05	-0.94
2009	CFO	0.09	0.59	0.04	1.15
2009	Revenue to assets	0.93	0.40	0.87	0.38
2009	Operating margin	0.07	0.74	-0.06	-1.02
2009	CFI	-0.05	-0.68	-0.03	-0.91
2010	Equity ratio	0.43	0.30	0.37	0.35
2010	Cash ratio	0.10	0.63	0.08	0.74
2010	Financial costs	0.02	0.54	0.02	0.53
2010	Leverage	0.25	0.55	0.26	0.51
2010	CFF	-0.02	-1.99	0.00	-11.27
2010	Trade payables	0.10	0.55	0.15	0.43
2010	Revenue	2,292,651.03	1.59	786,864.04	1.52
2010	ROE	0.04	0.68	0.01	2.85
2010	ROA	0.07	0.52	0.03	1.12
2010	CFO	0.09	0.37	0.04	1.00
2010	Revenue to assets	0.87	0.45	0.96	0.40
2010	Operating margin	0.10	0.64	0.04	1.41
2010	CFI	-0.06	-0.67	-0.03	-0.79

Source: ERICA 2018 database (own calculations).

TABLE 7 DESCRIPTIVE STATISTICS FOR BOTH CLUSTERS (2011 – 2013)

Year	Variable	Lower-risk cluster		Higher-risk cluster	
		Mean	Coef. var	Mean	Coef. var
2011	Equity ratio	0.51	0.20	0.36	0.33
2011	Cash ratio	0.11	0.59	0.08	0.72
2011	Financial costs	0.02	0.55	0.03	0.43
2011	Leverage	0.16	0.60	0.31	0.42
2011	CFF	-0.02	-1.65	0.00	-12.09
2011	Trade payables	0.10	0.45	0.13	0.54
2011	Revenue	716,263.36	1.43	1,678,931.10	1.70
2011	ROE	0.05	0.51	0.02	2.47
2011	ROA	0.08	0.43	0.04	0.97
2011	CFO	0.07	0.64	0.05	0.86
2011	Revenue to assets	0.97	0.34	0.89	0.46
2011	Operating margin	0.09	0.56	0.06	1.24
2011	CFI	-0.05	-0.60	-0.05	-0.77
2012	Equity ratio	0.50	0.24	0.38	0.33
2012	Cash ratio	0.12	0.53	0.08	0.65
2012	Financial costs	0.02	0.55	0.03	0.47
2012	Leverage	0.15	0.58	0.30	0.43
2012	CFF	-0.04	-0.89	-0.01	-3.59
2012	Trade payables	0.11	0.59	0.12	0.54
2012	Revenue	813,443.96	1.54	2,210,436.75	1.63
2012	ROE	0.06	0.41	0.01	4.02
2012	ROA	0.09	0.34	0.04	1.21
2012	CFO	0.09	0.40	0.06	0.78
2012	Revenue to assets	1.07	0.31	0.88	0.46
2012	Operating margin	0.09	0.51	0.05	1.52
2012	CFI	-0.05	-0.67	-0.05	-0.76
2013	Equity ratio	0.47	0.27	0.37	0.37
2013	Cash ratio	0.14	0.54	0.08	0.64
2013	Financial costs	0.02	0.55	0.03	0.46
2013	Leverage	0.19	0.54	0.30	0.46
2013	CFF	-0.01	-5.14	-0.02	-2.59
2013	Trade payables	0.12	0.54	0.12	0.55
2013	Revenue	1,031,560.14	1.35	2,105,383.28	1.68
2013	ROE	0.05	0.43	0.00	10.07
2013	ROA	0.08	0.37	0.03	1.47
2013	CFO	0.09	0.45	0.05	0.80
2013	Revenue to assets	1.05	0.34	0.87	0.44
2013	Operating margin	0.09	0.51	0.05	1.66
2013	CFI	-0.06	-0.58	-0.03	-0.91

Source: ERICA 2018 database (own calculations).

TABLE 8 DESCRIPTIVE STATISTICS FOR BOTH CLUSTERS (2014 – 2016)

Year	Variable	Lower-risk cluster		Higher-risk cluster	
		Mean	Coef. var	Mean	Coef. var
2014	Equity ratio	0.45	0.31	0.37	0.38
2014	Cash ratio	0.12	0.57	0.07	0.64
2014	Financial costs	0.01	0.52	0.03	0.36
2014	Leverage	0.19	0.55	0.34	0.38
2014	CFF	0.00	-35.92	-0.01	-6.78
2014	Trade payables	0.14	0.49	0.10	0.58
2014	Revenue	1,094,339.14	1.39	2,205,160.75	1.67
2014	ROE	0.04	0.85	0.01	4.75
2014	ROA	0.06	0.62	0.03	1.20
2014	CFO	0.06	0.75	0.05	0.79
2014	Revenue to assets	1.05	0.32	0.71	0.48
2014	Operating margin	0.06	0.72	0.06	1.37
2014	CFI	-0.05	-0.77	-0.04	-0.85
2015	Equity ratio	0.42	0.31	0.40	0.37
2015	Cash ratio	0.10	0.68	0.10	0.64
2015	Financial costs	0.02	0.58	0.02	0.53
2015	Leverage	0.23	0.51	0.29	0.48
2015	CFF	0.00	-8.58	-0.01	-7.06
2015	Trade payables	0.14	0.49	0.10	0.57
2015	Revenue	991,442.01	1.49	2,176,544.68	1.60
2015	ROE	0.01	2.63	0.04	0.78
2015	ROA	0.03	1.10	0.07	0.49
2015	CFO	0.05	0.85	0.08	0.51
2015	Revenue to assets	1.01	0.36	0.82	0.47
2015	Operating margin	0.03	1.43	0.10	0.64
2015	CFI	-0.04	-0.81	-0.06	-0.67
2016	Equity ratio	0.43	0.32	0.34	0.36
2016	Cash ratio	0.11	0.60	0.07	0.65
2016	Financial costs	0.01	0.59	0.03	0.31
2016	Leverage	0.23	0.52	0.39	0.26
2016	CFF	-0.01	-5.98	-0.03	-1.21
2016	Trade payables	0.12	0.53	0.09	0.65
2016	Revenue	1,685,222.95	1.78	1,366,461.29	1.24
2016	ROE	0.03	1.16	0.02	1.18
2016	ROA	0.06	0.75	0.05	0.61
2016	CFO	0.07	0.65	0.06	0.73
2016	Revenue to assets	0.95	0.38	0.58	0.53
2016	Operating margin	0.07	0.90	0.11	0.85
2016	CFI	-0.05	-0.72	-0.02	-1.05

Source: ERICA 2018 database (own calculations).

TABLE 9 DESCRIPTIVE STATISTICS FOR BOTH CLUSTERS (2017 – 2018)

Year	Variable	Lower-risk cluster		Higher-risk cluster	
		Mean	Coef. var	Mean	Coef. var
2017	Equity ratio	0.50	0.22	0.36	0.32
2017	Cash ratio	0.11	0.59	0.10	0.65
2017	Financial costs	0.01	0.59	0.02	0.64
2017	Leverage	0.21	0.47	0.29	0.44
2017	CFF	-0.03	-1.31	0.00	11.80
2017	Trade payables	0.10	0.55	0.14	0.51
2017	Revenue	1,193,181.21	1.36	2,689,496.90	1.52
2017	ROE	0.06	0.50	0.02	1.76
2017	ROA	0.08	0.41	0.04	0.80
2017	CFO	0.09	0.43	0.05	0.83
2017	Revenue to assets	0.86	0.39	0.84	0.46
2017	Operating margin	0.11	0.46	0.07	1.06
2017	CFI	-0.06	-0.68	-0.04	-0.85
2018	Equity ratio	0.50	0.27	0.38	0.32
2018	Cash ratio	0.13	0.55	0.09	0.61
2018	Financial costs	0.01	0.63	0.02	0.59
2018	Leverage	0.20	0.60	0.30	0.42
2018	CFF	0.00	126.51	-0.01	-6.38
2018	Trade payables	0.12	0.51	0.13	0.58
2018	Revenue	1,116,680.95	1.45	3,147,870.66	1.59
2018	ROE	0.06	0.40	0.02	1.26
2018	ROA	0.09	0.37	0.05	0.75
2018	CFO	0.08	0.54	0.05	0.81
2018	Revenue to assets	0.92	0.35	0.81	0.45
2018	Operating margin	0.10	0.48	0.07	0.99
2018	CFI	-0.07	-0.62	-0.05	-0.73

Source: ERICA 2018 database (own calculations).