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DO INTERNATIONAL FINANCIAL REPORTING STANDARDS INFLUENCE STOCK RISK?

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Abstract

The objective of this research work is twofold: to study what information explains the risk of the shares and to analyze whether the implementation of the International Financial Reporting Standards (IFRS) , carried out in the Spanish market in 2005, influences said information . Know what information accounting and/or macroeconomic accounting explains the risk of a stock. It is useful information for the businessman and the management professional, as it tells us which variables to observe to estimate the evolution of the risk and, consequently, the evolution of the cost of capital or update rate. The update rate is a very important variable in many financial decisions , and its value, which depends among other variables on risk, has a great influence on the decision. For this reason it is important that said rate be determined objectively , something especially difficult in small and medium-sized enterprises (SMEs). Efficient management involves being able to anticipate future effects, act to capture positive effects and minimize negative effects. If we know which variables explain the risk, we will know which indicators to observe to analyze their behavior and predict what will happen in the future regarding the update rate .

Keywords: Risk; International Financial Reporting Standards (IFRS); Small and medium-sized enterprises (SMEs); Cost of equity capital; accounting information; Macroeconomic

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Introduction

There are many business decisions that need an objective measure of risk, for example, analyzing whether a new investment can create value for the shareholder or calculating the market value of a business that we want to buy or sell. Knowing the risk allows us to determine the risk premium and, consequently, the cost of capital or update rate 1 of future flows . free of treasury, whose value has a great influence on any valuation process , since reducing (increasing) the update rate increases (decreases) the market value of the asset being valued . For this reason, it is important that this update rate is set reliably and objectively. For companies whose shares are listed on the stock exchange, there are methods. such as the *Capital Asset Pricing Model* [2] (CAPM), to estimate the risk of stocks objectively [3] . The CAPM measures risk by calculating the variability of the stock price with respect to a reference stock index . To this measure of risk It is commonly called " market beta ." For unlisted companies , which represent more than 80 % of the Spanish business structure , the market risk of the shares (the market beta) cannot be estimated because

1 The update rate or minimum required profitability is always the result of adding the interest rate free of risk a risk premium . _ The main problem in this estimation is , for SMEs , in the objective estimation of the risk premium.

2 Although there are other methods to estimate the risk of stocks , the CAPM is, despite its limitations , a

current method that provides good results , as the textbooks most abundantly show used in the best business schools in the world . See, for example, Brealey, Myers , & Allen, 2010; Damodaran (2012) .

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3 Objective as far as possible , since 100 % objectivity is impossible to achieve , because although the _ _

capital market to be efficient , movements in share prices are determined by the decisions made by investors . _ _ _ It is objective in the sense that it is not influenced by the particular interests of the moment.

We do not know the time series of stock prices. Consequently, if we do not find a way to alleviate this limitation, it is possible that we make decisions about these companies using incomplete, imprecise and, sometimes, subjective information.

A possible solution to this problem began with Beaver, Kettler and Scholes (1970) . This work seeks to determine which accounting variables explain the market risk of the shares of listed North American companies. From this seminal article, multiple works are developed analyzing the connection between the information revealed by companies and the movements of the capital markets . However , the vast majority of them continue to use North American data and their results are far from conclusive. Taking into account that market risk is not the same in all economies , Foster, Kasznik and Sidhu (2012) show the importance of the country factor in the explanatory power of the models, and it seems logical to ask what relationship there is in the Spanish market. ˜ol between accounting and macroeconomic information and stock risk.

With this article we want to contribute to the solution of the previous problem by studying a sample of Spanish companies with a double purpose : 1) to study if there is a significant and stable relationship over time between accounting and macroeconomic information and market risk of the shares (or systematic risk), and 2) check if the application of the International Financial Reporting Standards (IFRS) influences the connection between information and

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the systematic risk of stocks .

Knowing what information explains the risk of the actions is useful for the businessman, and also for the financial analyst, since it identifies what characteristics of the company and the economyinfluence the risk of their actions. This information is a guideline that indicates the variables to be taken into account to measure the risk of SMEs in a more objective way, to subsequently establish the minimum required profitability or cost of capital. Studying the impact of IFRS is useful, as it allows us to assess whether its implementation improves the level of quality of the information disclosed or whether it changes the information that explains the risk.

The development of empirical research allows us to confirm that the information that explains risk is a combination of accounting and macroeconomic information and that the information that explains risk differs for financial and industrial companies.

The article follows the following order. From this introduction we find a review of the existing literature , then the research design and then , in the fourth section, we comment on the most significant results of the different estimates made and, finally , we find the most important conclusions and implications for business management of the results obtained.

Literature Review

The starting point of the research developed here is found in the work of Beaver et al. (1970) , considered a pioneer in the search for a relationship between the systematic risk of stocks and the company's accounting information. Later, multiple works appeared with the same purpose: Breen and Lerner (1973) , Lev and Kunitzky (1974) , Lev (1974) , Bildersee (1975) , Agusman, Monroe, Gasbarro and Zumwalt (2008). , Menéndez, Prior and Orgaz (2012) and Papadamou and Tzivinikos (2013) .

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Table 1 shows the purpose and results obtained in each of the previous investigations .

The previous literature shows the great interest in knowing what information explains the risk of the actions, and the last work cited collects the same interest but taking into account the

Table 1

Literature Review _

Author	Purpose	Results
Breen and Lerner (1973)	Theresearchconsistsofstudying whether	
Bildersee (1975)	Analyzesthe relationship between beta andaccountingvariablesto determinetheimpactofthedividendpolicyandthecompany'sabilitytocoveritscorrespondingdividendfromthepreferred companies,ineach of the years of the sample	The traditional explanatory variables of risk explain the changes in the company's beta during the period 1965-1970
Lev and Kunitzky (1974)	Investigatetherelationshipbetweenrisk and smoothing measures _	
Elgers and Murray (1982)	Investigatetheimpactof theindex of market in the relationship between systematic risk and accounting information _ _	
(1974)	Investigatestherelationshipbetweenoperatingdebtandstockrisk	

Kim (1989)	*Study whether the cash flow* variableiscapable of improving the informationprovidedprofitswhenexplaining market risk.	The significant variables are not always the same. The stability of earnings growth, *size* , and payout ratio present a mainly negative regression coefficient . The rate of
Karpik and Belkaoui (1990)	Investigatewhetheraddedvalueexplains better than other variables the risk of the stock	Growth and the number of shares on the market mostly present a positive sign. The debt ratio shows less stability in the sign of the relationship than the other variables
Elyasiani and Mansur (2005)	Studytherelationshipbetweenmeasures of risk based on market and financial ratios obtained from accounting, using the GARCH model to estimate betas	Sales , dividend and capital expenditures , smoothed, and the average *payout* ratio are explanatory variables of the systematic risk of the shares. Operating debt is a significant explanatory variable of systematic risk with a negative sign in 2
Brimble and Hodgson (2007)	Examinestheassociationbetween accounting information and various measures of systematic risk , including beta determined using the GARCH model	

industries: power plants and the steel industry	has been estimated using the M - GARCH model .
The results suggest that the relationship is more consistent when accounting and non-accounting information is incorporated into the model than when only independent variables of accounting origin are used.	
Asset growth, financial debt and asset size explain market risk in the 3 market indices used	
Cash *flow* contains more information if you want *to* explain the risk	
The results show that the added value provides more information about the beta of the shares than that offered by profit and *cash flow*.	
The relationship between accounting variables and beta is weaker in Japanese banking institutions than in those in the United States .	
The best relationship between accounting information and beta is obtained when beta	

Table 1 (*continued*)

Author	Purpose	Results
Agusman et al. (2008)	Investigatestherelationshipbetween accounting and capital market risk for a sample of Asian banks using panel data	Only the ratio of reserves for credit losses / total loans is a significant variable that explains the systematic risk of the actions of financial companies.
Campbell, Polk and Vuolteenaho (2010)	Analyze which company characteristics predict the stock update rate	The results show that accounting data should play an important role in determining the company's cost of capital .
Menendez et al. (2012)	Studywhatinformationexplains the systematic stock risk _ _	The results show that the information that explains the risk is a combination of accounting variables, macroeconomic information and productivity indicators.

Papadamou and Tzivinikos (2013)	It studies what information explains the systematic and unsystematic risk of the shares of Greek banks before and after the application of IFRS (IFRS)	The results reveal that size is an explanatory variable of stock risk after the application of IFRS, with a negative sign, and that the debt ratio, long-term debt/equity, is not a statistically significant variable . neither before nor after the adoption of IFRS

Source : own elaboration based on the indicated research works .

adoption of IFRS. As we have already said, knowing this information facilitates management, as it allows us to anticipate changes in risk and, therefore , changes in the cost of capital or discount rate.

However , there is also great interest in the financial community to know the effects of the application of IFRS either on the cost of capital (Li , 2010) and , consequently, on risk, or on accounting information (Landsman, Maydew and Thornock, 2012) or on the liquidity of the shares (Christensen, Hail and Leuz (2013) .

Given that the cost of capital depends on risk , below we will focus on the main studies that analyze the effects of the application of IFRS on the cost of capital of shares .

Li (2010) showsinhisworkthatonaveragetheapplicationofIFRSreducesthecostof capital of shares, and that the effect is greater in countries with a strong and quality judicialsystem .

Landsman et al. (2012) showintheirresearchthat,in16countriesthatadoptIFRS(IFRS), the information content of the earnings announcement increases in relation to 11 countries thatmaintaindomesticaccountingstandardsalthoughtheeffectoftheapplicationof IFRSIt depends on the legal force in the application of the new accounting standards.

Christensen et al. (2013) showwiththeirresearchthatthere islittleevidencethat a voluntary adoption of IFRS means an increase in the liquidity of sharesand a reduction in the cost of capital of own funds, although the results are very heterogeneous .

Table 2

Study techniques used _

Study Analysis	Technique _

Chen (2013)	Static paneldata
Christensen et al. (2013)	Static paneldata
Han and He (2013)	Static paneldata
Landsman et al. (2012)	Static paneldata
Menendez et al. (2012)	Static paneldata
Papadamou and Tzivinikos (2013)	Static paneldata
Kim et al. (2014)	Regressionmodel
Daske, Hail , Leuz and Verdi (2013)	Regressionmodel
Li (2010)	Regressionmodel

Source : own elaboration based on the indicated research works .

Han and He (2013) show with their study that changes in the cost of capital of foreign companies in the United States are affected by the use of IFRS in the country of origin.

Kim, Shi and Zhou (2014) show, byanalyzingasampleof21,608companiesfrom differentcountries,thatthevoluntaryadoptionofIFRSreducesthecostofequitycapital,especially in countries with strong financial and legal institutions.

The existing literature both in the study of the variables that explain the risk of shares and in the study of the effects of NIFF on the cost of capital or in the capital market _ _ shows homogeneity and a trend in the analysis technique used. In Table 2 we list the most recent works in both fields and the study technique used.

The information in Table 2 shows that recently the most used techniques are the regression model and the study with static panel data, which partially justifies why we have opted for

the second technique, since it allows us to incorporate the regression of the time variable, providing the results with more exact and precise information about the analyzed sample.

The panel data technique has advantages over least squares regression , as indicated by Hsiao (2003) and Baltagi (2012) . According to the authors , the panel data technique provides the researcher with more data, increasing the degrees of freedom and reducing collinearity between the explanatory variables . The technique panel data improves the efficiency of econometric estimates [4] .

Research design _ _ _ _

The starting point of the study is the semiannual estimate of the stock risk (market beta) of each of the 98 companies that make up the sample. We measure risk using the CAPM model, and therefore calculate the market beta of the shares by calculating the covariance between the daily return of said shares and the daily return of the reference market index [5] . Next , using the static panel data technique we study

4 *Econometric Analysis of Panel Data* , Badi H. Baltagi (fourth edition), 2012.

5 Although the beta that we estimate is obtained from the IBEX-35 with ordinary least squares regression models, it should be noted that we have made alternative estimates using other indices (the Total Index and the General Index of the Madrid Stock Exchange) and methodological approaches alternatives (such as EGARCH autoregressive models) without obtaining better results .

the relationship between the beta of each company and a broad set of independent variables (containing accounting, financial and macroeconomic environment information).

Firstly , we study which explanatory variables influence the systematic risk of stocks , using the total sample and the entire study period (2001-2011), but as the main objective is to analyze the effect of IFRS on the relationship between the dependent and independent variables, then we incorporate the dichotomous IFRS variable and subsequently investigate

the relationship between the variables by separating the sample into 2 time periods , 2001-2004, before the application of IFRS, and 2005-2011, after the application of IFRS.

To carry out the research we used a total of 20 independent variables , classifiable into 3 large blocks: a) VC or information obtained directly from accounting (basically, the balance sheet and the income statement); b) VCF or treasury indicators, and c) MV or variables of the macroeconomic environment. In Table 3 we present each variable and indicate for each of them a bibliographic reference that justifies its use in the study. With all this, we postulate the following model:

$$\beta_{it} = \alpha_0 + \sum_{j=}^{JFM} \alpha c_j \cdot VC_{jit} + \sum_{f=} \alpha cf_f \cdot VCF_{fit} + \sum_{m=} \alpha m_m \cdot VM_{mt} + \mu_i + \varepsilon_{it} \quad (1)$$

where : β_{it} is the measure of *the* market risk of the shares of company *i* in period t . _ VC_{jit} identifies the accounting indicator *j* obtained from the annual accounts of company *i* in the period _

t . VCF_{fit} identifies the treasury variable *f* of company *i* in period *t* . VM_{mt} identifies the macroeconomic environment variable *m* for period *t* .

The sample includes companies representative of all economic sectors of the Spanish economy , of which 14 are financial and 84 industrial . We work with semiannual accounting information and consider all semesters included in the period 2001-2011 . To deflate variables expressed in values _ In absolute terms , 4 denominators were used : book value of own funds (VCFP), sales (VENT), financial expenses (GF) and total assets (AT).

In the following tables we can see the descriptive statistics of each of the variables in the sample. Table 4 incorporates the descriptive statistics of the variables from the accounting information.

In table 5 we find the descriptive statistics of the treasury variables .

Table 6 shows the descriptive statistics of the macroeconomic variables .

The descriptive statistics reveal that the sample investigated is a sample in which companies have an average operating profitability (ROA) of 4.58% and an average shareholder return

(ROE) of 8.46%, with the standard deviation being This latter profitability is higher than the profitability of the operation. The operating margin, or profit before interest and taxes (BAIT)/VEN , a statistically significant variable in all analysis carried out on the sample of industrial companies, has an average value equal to 8%, although the standard deviation is very high.

We also see that:

a) The BAIT/GF ratio has an average value equal to 35.092, that is, the BAIT is, on average, 35 times higher than financial expenses.
b) The average value of business debt is equal to 1.336.
c) The solvency of companies is represented by an average value equal to 1.89 .
d) The operating leverage of the companies acquires an average value equal to 0.082.

Table 3

Description of the variables used

Variable definition	Description
VC	Information obtained from the annual accounts
Solvency ratio (SOL) (Brimble and Hodgson, 2007)	Current assets / Current liabilities
Debt ratio (RE) (Brimble and Hodgson, 2007)	Long - term debt /(Equity Funds + Long - term Liabilities)
Size (TA) (Lee and Jang, 2007)	Natural logarithm of total assets
Payout (PA) (Elmoatasem, 2005)	Dividend/ Net profit
Growth (CR) (Brimble and Hodgson, 2007)	Natural logarithm of the ratio: (Total assets at the end of t)/(Total assets at the end of t − 1)
Gross value added (GVA) (Karpik and Belkaoui, 1990)	(Income − Intermediate consumption)
Net value added (NPV) (Karpik and Belkaoui, 1990)	(Gross value added − Amortization provisions)
Profit from exploitation (BAIT) (Campbell et al., 2010)	Earnings before interest and taxes _
Net profit (BN)	Net profit

Operating leverage (EO) (Lord, 1996; Brimble and Hodgson, 2007) BAIT/Sales

Financial leverage (EF) Net profit /BAIT

VCF Treasury variables _

Treasury 1 (CF1) (Da and Warachka, 2009; Sloan, 1996) *Treasury free flow :* Result of the operating + Amortization provision + Financial income – Financial expenses (+/-) variation in debtors (+/-) variation in inventories (-/+) variation in suppliers

CF1 – Change in investments in fixed assets due to replacement

Treasury 3 (CF3) CF1 – Amortization provision

VM Macroeconomic environment variables _

Euribor (EUR) (Arfaoui and Abaoub, 2010) Price of short - term money set in the market European interbank

Statutory interest rate (TIL) (Arfaoui and Abaoub , 2010) Basic interest rate on public debt

Consumer Price Index (CPI) (Gosnell and Nejadmalayeri , 2010) Change in gross domestic product (GDP) (Vassalou, 2003)

Unemployment rate (TD) (Gosnell and Nejadmalayeri, 2010)

Rate of variation of the consumer price index	Unemployment rate
	GDP variation rate _ _

Dow Jones Index (DJ) (Hamao, Masulis and Ng, 1990) Stock index of the North American market Source: own elaboration based on the indicated research works.

e) The average business size of the sample is 14 , with the standard deviation being 2.45 .

f) The business treasury, *cash flow* , has an average value that is always positive regardless of the denominator used. Thus, for example, the average value of the CF1/AT ratio is equal to 29.49 and the average value that identifies the entire sample of the CF1/VCFP ratio is equal to 78.75 .

g) The average value that identifies the unemployment rate variable is equal to 13.10 . _

h) The average value of the variation in the gross domestic product (GDP) is 1.11 .

i) The Euribor average takes a value equal to 2.73, with the standard deviation being very small.

Table 4

Descriptive statistics variables obtained from the annual accounts (n = 1,906)

Variable	Mean	DE	Min	Max
SOL	1.8940	7.8440	0.0226	267.0189
CR	0.01374	1.7618	− 13.3585	10.0068
EO	0.0824	3.3323	− 68.55	69.5
EF	− 0.7329	40.1526	− 1447.045	161.28
GVA/VCFP	0.0269	1.2953	− 15.1743	43.2561
NPV/VCFP	− 0.0369	1.5555	− 16.1654	53.2561
BAIT/VCFP	0.1628	0.2859	− 0.8294	5.1508
BN/VCFP	0.0845	1.2560	− 13.9227	32.3561
GVA/VENT	− 0.0367	2.8038	− 74.55	26.2127
NPV/VENT	− 0.1569	3.8038	− 79.7095	16.2766
BAIT/VENT	0.0807	2.9314	− 68.55	69.5
BN/VENT	0.4302	4.6396	− 56.2857	74.4261
GVA/AT	− 0.0169	0.1449	− 1.3533	1.1515
NPV/AT	− 0.0326	0.1451	− 1.3533	1.0985
BAIT/AT	0.0458	0.1011	− 0.8940	1.3155
BN/AT	0.0311	0.0823	− 1.2784	0.8236
GVA/GF	21.1703	565.0327	− 450.2137	18363.5

NPV/GF 11.6983 536.9527 − 516.9695 18363.5 BAIT/GF 35.0928 590.6011 − 114.6694 18363.5 BN/GF 34.5037 592.2132 − 117.6861 18526

AT: total assets; BAIT: earnings before interest and taxes; BN: net profit or shareholder profit; CR: growth; EF: financial leverage ; EO: operating leverage ; GF: financial expenses ; RE: indebtedness; SOL: solvency; TA: size, GVA: gross current value; NPV: net present value; VCFP: book value of equity ; VENT: sales.

Table 5

Descriptive statistics variables obtained from treasury variables (N = 1906)

Variable Mean Std. typical Min Max CF1/VCFP 78.75621 2,917.615 − 124.7762 110,673.7

CF2/VCFP 223.6988 7,906.332 − 124.6212 299,736.3

CF3/VCFP 210.2871 7,901.489 − 124.7892 299,736.3

CF1/VENT 101.0607 2,576.939 − 568.6667 69,826.57

CF2/VENT 760.9844 23,336.23 − 568.3333 862,209.8

CF3/VENT 186.7152 5,312.42 − 571.6667 189,110.4

CF1/AT 29.48855 1,684.88 − 61,630.55 18,102.24

CF2/AT 138.0153 4,005.131 − 7.969925 144,635.3

CF3/AT 8.135573 2,065.987 − 61,630.55 49,026.06

CF1/GF 4,574,034 156,360.6 − 16,508 546,119.2

CF2/GF 12,592.06 423,503.3 − 16,508 1.48e + 07

CF3/GF 12,281.62 423,454.2 − 18,164 1.48e + 07

AT: total assets ; CF1 : cash flow from operations ; CF2 (CF1 variations in cash flow from investment operations ; CF3: CF1 provisions for economic amortization ; GF: financial expenses ; VCFP: book value of own funds ; VENT: sales.

Table 6

Descriptive statistics of macroeconomic variables (n = 2,056)

Variable	Half	Dev. Typical	min	Max.
EUR	2.7341	0.6057	2014	3,869
TIL	4.3336	0.5690	3.75	5.5
CPI	1.0834	1.0656	− 1.3	2.9

TD 13.1065 4.7385 7.95 22.85

GDP 1.1086 2.1423 − 4.5 3.734219

DJ − 0.0171 0.0986 − 0.2384 0.1100

S&P500 − 0.01418 0.1109 − 0.2970 0.1388

DJ: Dow Jones stock index; EUR: Euribor; CPI: variation in the consumer price index; GDP: variation in gross domestic product ; S&P500: Standard & Poor's stock index ; TD: unemployment rate ; TIL : legal interest rate of money.

Results

In this section we present the best models obtained after :

a) Select the independent variables one by one using a least squares regression between the systematic risk and each of the independent variables used in the study. Only statistically significant and uncorrelated variables [6] have been incorporated into the model.
b) Correct heteroscedasticity and autocorrelation using estimates made with _ _ _ *Panel Corrected Standard Errors* (Wooldridge, 2002) [7] .

In the next section we refer to the results of studying the connection between the market risk of the stock , the beta, and the independent variables using the entire study period, 2001-2011, and in the section «Analysis of the effect exerted the introduction of IFRS" shows the results of analyzing how the introduction of IFRS influences this relationship.

Analysis of the risk relationship of action - information in the period 2001-2011

For this analysis we use 3 samples: the total sample (containing 98 companies), that of financial companies (with 14 companies) and that of industrial companies (with a total of 84 companies). Table 7 shows the best estimates for each sample of companies .

The study developed allows us to conclude that the risk of the stock can be explained by a combination of accounting and macroeconomic variables, although the variables are not always the same, as they vary depending on the type of company.

Thus, for industrial companies the statistically significant variables that explain the risk are size , the BAIT/VEN ratio , the Euribor, the unemployment rate , the legal interest rate and GDP. The results of the study indicate that the accounting variable that has the greatest explanatory power of the stock 's risk is the operating margin , BAIT /VEN. The higher the value

6 Correlation coefficients are presented in Appendix 1 . _ _ We have also used the panel data technique _ to study the relationship between risk and each of the independent variables that make up the research, but the study using the regression technique has provided us with results with a better R^{2}.

7 See Beck and Katz (2001) .

Table 7

Estimation of the models with the total sample

Variable	Expected sign	Total sample (n = 1,794)	Sample of companies financial (n = 222)	Sample of companies _ financial (n = 1,572)
α 0 9.67 − 0.93 6.43				
(0.000)				
TA	+	3.57 ***	3.08 ***	1.61 *
		(0.000)	(0.002)	(0.108)
BAIT/VN	+	− 4.68 ***		− 4.17 ***
(0.034)				(0.000)
BAIT/AT	−		− 2.13	
(0.000) (0.0021)		− 8.09 ***	− 2.33 *	
EUR				− 7.38 ***
				(0.000)
T.D.		+	− 27.69 ***	− 5.58 *** − 5.58 ***
				(0.000) (0.000)
TIL	+			2.22 *
(0.004)				(0.026)
GDP	−		− 1.92 *	− 4.90 ***
				(0.000)
CPI	+		2.13 *	
			(0.035)	
DJ	±	− 2.89 ***		
R^2	0.2528	0.424	0.2731	
Prob > F	0.0000	0.0000	0.0000	
Hausman test	96.78	61.51	46.60	
Prob > chi 2	0.0000	0.0000	0.0000	
(0.057)	Fixed effects	Fixed effects	Fixed effects	

(0.004)

BAIT/AT: operating profit related to total assets, operating profitability; BAIT / VEN: operating profit related to sales ; DJ: Dow Jones stock index ; EUR: Euribor; CPI: variation of the index of consumer prices; GDP: gross domestic product; TA: size; TD: unemployment rate; TIL: legal interest rate.

Source: own elaboration .

* The variable is significant at 10%.

** The variable is significant at 5%.

*** The variable is significant at 1%.

of the indicator, the less systematic risk the actions present. The other accounting variable that explains risk is size , and the results show a positive relationship between risk and the size of the company, a result that agrees with that obtained in Brimble and Hodgson (2007) and in Menéndez et al . to the. (2012) .

The other variables that explain the risk of industrial actions are macroeconomic . The results show that the systematic risk of the stock is reduced with an increase in the Euribor, the GDP and the unemployment rate. The 3 variables are highly significant from a statistical point of view, but the most surprising result is the relationship between the beta of the stock and the unemployment rate, a relationship with a negative sign. However, if we take into account that beta or systematic risk is a calculation of the variability of the profitability of the stock with respect to the stock market index, it is possible to find that the higher the unemployment rate, which coincides with a scenario of no economic growth , the volatility of the stocks is lower. Anticipating the subsequent results, it is observed that this variable is always highly significant and with a negative sign, regardless of the period analyzed.

The R^2 acquires a high value, 0.2731, which justifies the goodness of the model and the results.

The results obtained from the study of the sample of financial companies are somewhat different from those of industrial companies ; Thus, the only accounting variables that explain the risk of financial stocks are size and the BAIT /AT ratio . Both are statistically significant variables , although the size has more explanatory power , and the results reveal a positive relationship between risk and business size and between risk and the BAIT/AT ratio, perhaps due to the fact that a greater BAIT in the financial company is the result of a higher corporate debt. It must be taken into account that the study is carried out over a long period of time characterized by high growth and the subsequent bursting of the real estate bubble.

The other variables that explain the risk of stocks are the Euribor, the unemployment rate , the GDP and the consumer price index. Although the 4 variables explain the risk, the

independent variable with the greatest explanatory power is the unemployment rate. The systematic risk of stocks, or beta, reduces with an increase in the Euribor and the unemployment rate and increases with an increase in GDP and the consumer price index.

The study of financial companies provides the model with the highest R 2 and , therefore, from a statistical point of view , the best model or connection between the dependent variable and the explanatory variables of the risk.

The study of the total sample , the 98 companies, reveals results similar to those obtained in the study of industrial companies. Thus, the size, the BAIT/VEN efficiency ratio, the Euribor and the unemployment rate explain the risk of the action, as for the sample of industrial business. However, the Dow Jones stock market index appears as a risk explanatory variable, so that if the Dow Jones increases, the risk of Spanish stocks is reduced.

The research carried out shows that most of the accounting information used as an independent variable does not have explanatory power for the systematic risk of the stock; Surprisingly, neither debt nor shareholder profitability play an important role from a statistical point of view, although this result coincides with that obtained in previous works (Papadamou and Tzivinikos, 2013; Menéndez et al., 2012 , Brimble and Hodgson , 2007).

Analysis of the effect of the introduction of IFRS _

In this section we study whether the introduction of IFRS affects the connection between stock risk and the explanatory variables . To do this, we first introduce a dichotomous variable , IFRS, which takes a value of 1 for the years 2005-2011 and 0 for the years 2001 to 2004. We subsequently analyze the effects of the IFRS, but studying the 2 periods separately: 2001-2004. and 2005-2011.

The incorporation of the dichotomous variable is justified by performing the Chow test [8] , which reveals the following results [9] :

F-statistic = 122.98, prob > F = 0.0000

8 Greene (2012) and Pulido and Pérez (2001) .

9 STATA.12

Table 8

Estimation of the models with the dichotomous variable

tal sample (n = 1,779)

	Sample of financial companies (n = 222)	Sample of non-financial companies (n = 1,572)

α_0		10.77	− 6.47	4.40
T.A.	+	2.90 **	13.22 ***	2.69 ***
		(0.004)	(0.000)	(0.007)
BAIT/EN	−	− 3.10 ***		− 3.07 ***
BAIT/AT	−		1.13	(0.002)
			(0.260)	
EUR	+	− 10.32 ***	− 3.09 ***	− 9.74 ***
				(0.000)
T.D.	+	− 27.68 ***	− 5.22 ***	− 19.93 ***
		(0.000)	(0.000)	(0.000)
TIL	+			1.21
				(0.226)
GDP	−		1.40	4.76 ***
			(0.161)	(0.000)
CPI	+		1.65 *	
			(0.100)	
DJ	±	− 1.16		
IFRS	−	9.09 ***	− 1.87 *	9.67 ***
		(0.000)		(0.000)
R2		0.2782	0.5634	0.3159
Prob > F		0.0000	0.0000	0.0000
Hausman test Chi ^{2}		− 30.58	34.56	9.0
Prob > Chi ^{2}			< 0.0000	0.2475

(0.002)

(0.000) (0.002)

(0.246)

(0.062)

< 0.0000

BAIT / AT : operating profit related to total assets , operating profitability ; EUR: Euribor; CPI: variation of the consumer price index; TA: size; TD: unemployment rate.

Source: own elaboration .

* The variable is significant at 10%.

** The variable is significant at 5%.

*** The variable is significant at 1%.

Therefore , it shows the existence of a structural change starting in 2005 that justifies the *dummy* variable and the study of the sample in 2 different periods, before and after 2005.

Study of the effect of the application of IFRS using dichotomous variables

In this section we analyze whether the relationship between the systematic risk of the stock and information is different for the period 2005-2011, in which listed companies

apply IFRS . The result of this estimation is presented in table 8 .

The results obtained tell us that the application of IFRS does affect the relationship between the systematic risk of stocks and the explanatory variables. The dichotomous variable is significant in the study of the 3 samples, being more significant for the total sample and for the sample of industrial or non-financial companies.

The study of the sample of industrial companies reveals that the application of IFRS entails :

a) An increase in the risk of stocks, since the dichotomous variable shows a positive sign.
b) The explanatory variables of risk generally maintain their statistical significance. Only the size increases the explanatory power , and the legal interest rate ceases to be information that explains the risk .
c) The sign of the relationship remains the same, except for GDP, which now shows a positive relationship with risk.

The statistical goodness of the model improves, since the R^2 obtained in this case is higher than that obtained without the incorporation of the dual variable.

The analysis of the sample of financial companies reveals that:

a) The risk of stocks is reduced , since the binary variable shows a negative sign .
b) The explanatory variables of the risk are maintained, although there is some change in the level of statistical significance. Thus, the Euribor increases the explanatory power and the GDP ceases to be an explanatory variable.
c) The risk of stocks increases with size and the consumer price index and decreases with the Euribor and the unemployment rate .
d) The goodness of the model is increased by obtaining a higher R^2 than in the previous study , without a dummy variable .
e) Again , it is the sample of financial companies that allows us to obtain the best explanatory model .

The study of all companies at the same time does not reveal major changes, since the variables explaining the risk are practically the same as without the binary variable ; only the Dow Jones stock market index is no longer an explanatory variable for risk.

Study of the influence of IFRS dividing the period 2001-2011 into 2 periods _

In order to make the most of the sample, we have analyzed the relationship between the dependent variable and the independent variables by dividing the study period, 2001-2011, into 2 periods: a) from 2001 to 2004, and b) from 2005 to 2011. In this section we show the results obtained from said study. In table 9 we present the results of the study for the period 2001-2004, and in table 10 we show the results of the study for the period 2001-2004 . period 2005-2011. The data in Table 9 show that the relationship between stock risk and accounting and macroeconomic information is only slightly different in the period 2001-2004 compared to the total period, as some changes are observed in the level of statistical significance . It is observed that in the period 2001-2004, before the application of the IFRS, the variables that appear as explanators of the risk are practically the same as in the first study, although they are perceived

certain changes:

a) In the analysis of the entire sample , the explanatory power of the unemployment rate and Dow Jones variables is reduced , although the signs of the relationship are maintained. The R^2 obtained

Table 9

Econometric analysis of the period 2001-2004

Variable	Expected sign	Total sample (n = 642)	Sample of companies financial (n = 98)	Sample of companies _ financial (n = 544)
α_0		2.69	0.78	2.45
T.A.	+	3.62 *** (0.000)	− 1.58 * (0.119)	2.76 *** (0.006)
BAIT/COME	–	− 3.57 *** (0.000)		− 2.97 *** (0.003)
BAIT/AT	–		− 0.58 (0.561)	
EUR	+	− 2.99 ***	− 2.71 **	− 1.06 (0.289)
T.D.	+	− 2.48 **	1.07 (0.289)	− 3.16 *** (0.002)
TIL	+			− 1.86 * (0.063)
GDP			2.37 *	− 0.25
CPI			2.50 * (0.014)	
DJ		− 1.62 *		
R2		0.1061	0.529	0.1216
Prob > F		0.0000	0.0000	0.0000
Hausman test		2.90	13.57	22.74
Chi ^{2}		0.7161	0.0348	0.0009
Prob > chi ^{2}				

(0.003)

(0.013)

(0.020) (0.802)

(0.105)

BAIT / AT : operating profit related to total assets , operating profitability ; EUR: Euribor; CPI: variation of the consumer price index; TA: size; TD: unemployment rate.

Source: own elaboration .

* The variable is significant at 10%.

** The variable is significant at 5%.

*** The variable is significant at 1%.

is lower than that obtained in the study in the section "Analysis of the risk relationship of action-information in the period 2001-2011".

b) In the study of industrial companies , size gains explanatory power and Euribor and GDP are no longer explanatory variables of risk, and the R^2 obtained is also lower than that obtained in the first study.

c) In the study of financial companies , the size, the BAIT/AT ratio and the unemployment rate lose statistical significance, to the point that the BAIT/AT ratio and the unemployment rate are no longer significant. The Euribor gains explanatory power and the consumer price index and GDP maintain their statistical significance . The R^2 achieved is higher than that obtained in

the first study and slightly lower than the analysis with dichotomous variable.

The data in table 10 , a study of the period 2005-2011 , show that the models obtained between the systematic risk of stocks and the explanatory variables present the highest R 2

Table 10

Econometric analysis period 2005-2011 _

sign	Total sample (n = 1,133)	Sample of financial companies (n = 124)	Sample of non-financial companies (n = 1,009)

α_0 8.63 − 3.93 6.16 (0.316) (0.003) (0.041) (0.000) (0.004) (0.060)

T.A.	+	− 1.00	7.56 ***	− 1.98 * (0.049)
BAIT/OME	−	− 2.98 ***	(0.000)	− 3.02 *** (0.003)
BAIT/AT	−		− 2.05 *	
EUR	+	− 9.40 ***	− 2.85 **	− 8.25 *** (0.000)
CPI	+	− 29.41 *** (0.000)	− 5.88 *** (0.000)	− 21.17 *** (0.000)
TIL	+			2.46 ** (0.014)
GDP			2.16 * (0.031)	7.31 *** (0.000)
DJ		− 1.88 *		
R2		0.3330	0.5589	0.3683
Prob > F		0.0000	0.0000	0.0000
Hausman test		98.00	3.74	39.94
Chi ^{2}		0.0000	0.5874	0.0000
Prob > Chi ^{2}				
		Fixed effects	Random effects	Fixed effects

BAIT / AT : operating profit related to total assets , operating profitability ; EUR: Euribor; CPI: variation of the consumer price index; TA: size; TD: unemployment rate.

Source: own elaboration .

* The variable is significant at 10%.

** The variable is significant at 5%.

*** The variable is significant at 1%.

of the entire research, except for the sample of financial companies, which is slightly lower than that obtained in the study with dichotomous variable.

The analysis of the period 2005-2011 reveals that the variables that explain the systematic risk of stocks are always a combination of accounting and macroeconomic variables , and that the information varies slightly between industrial companies and financial companies . The results show that:

a) If we use all companies, without considering whether they are financial or not, the variables that explain the risk are the BAIT /VEN, the Euribor, the unemployment rate and the Dow Jones stock market index . The first 3 with a high explanatory power , and all of them with a negative sign in the relationship. The most important difference is that now size is not an explanatory variable. of risk, whether we compare it with the initial study or with the study carried out with a binary variable.

b)

c) If we study the sample of industrial companies we see that the size loses statistical significance and the sign of the relationship changes and the legal interest rate gains explanatory power of the risk with a positive sign , all of this if we compare the models with the results obtained by introducing the IFRS binary variable.

The analysis of the sample of financial companies reveals that size maintains its explanatory power, as does the unemployment rate . BAIT /AT (exploitation profitability) and GDP appear as explanatory variables, although both variables were already explanatory variables in the initial study (section "Analysis of the risk-action-information relationship in the period 2001-2011").

Conclusions

The empirical research developed in this study demonstrates that a combination of accounting and macroeconomic information explains the systematic risk of stocks, although the variables that explain the risk vary depending on the type of company (financial or non-financial) and according to the period analyzed.

The systematic risk of the shares of industrial companies is always related, in all the analyzes carried out, with the size (TA), with the BAIT/VEN ratio (exploitation margin), with the Euribor (EUR), with the unemployment rate (TD) with the legal interest rate (TIL) and with the gross domestic product (GDP). In all the analyzes carried out, the size generally shows a positive sign in the relationship , and the BAIT/VEN ratio , the Euribor and the unemployment rate show a negative sign . The TIL shows a positive relationship with the dependent variable in the total study and in the study of the period 2005-2011 and a negative and significant relationship in the period 2001-2004. And GDP reveals a negative relationship in the initial analysis , the entire period, but positive when introducing the IFRS variable and when studying the period 2005-2011.

Thus , we can conclude that the systematic risk of an industrial action can be estimated by observing 6 pieces of information: 2 accounting variables — the size and the BAIT/VEN ratio (exploitation margin) — and 4 macroeconomic variables — Euribor, interest rate. unemployment, TIL and GDP—.

If we take into account that the vast majority of SMEs are industrial companies, these results are of great help to be able to objectively measure the market risk of business activity that is not listed on the stock market .

Therefore , to measure the risk of a stock objectively, in addition to macroeconomic information, the size of the company and the BAIT /VEN ratio must be taken into account . Thus, 2 companies from the same economic sector and similar size may have different risk and, consequently, a different cost of capital depending on the operating margin . obtained, BAIT/VEN ratio .

The systematic risk of the shares of financial companies is determined or explained by the business size (TA), by the BAIT/AT indicator (ROA), by the Euribor (EUR), by the unemployment rate (TD), by GDP and by the consumer price index (CPI): 2 accounting and

4 macroeconomic variables. The size and the Euribor show stability throughout the different studies in _ _ _ _ its statistical significance and the sign of the relationship . The same does not happen with the other indicators; Thus, the ROA is a significant and positive variable when we study the entire period, but with a negative sign in the analysis of the period 2005-2011; The unemployment rate is always significant with a negative sign , except in the period 2001-2004, in which is not a statistically significant variable . Regarding GDP , this information is always a variable with explanatory power of the risk with a positive sign , except in the study carried out with variable

binary, and the consumer price index is always a statistically significant variable with a positive sign , except in the study period 2005-2011.

The study of financial companies is what has always provided us with the models with the highest R^{2}.

The study of the effect of IFRS using the dichotomous variable reflects that the variables that explain systematic risk are the same for both the sample of financial companies and the sample of industrial companies as those obtained in the initial study, throughout the period. Some small modification is observed in the level of statistical significance, but no relevant changes occur. The dichotomous variable is statistically significantly and positive for industrial companies, which indicates that an increase in risk is manifested. of the shares of these companies in the period 2005-2011. However, the binary variable of financial companies , which is also significant, presents a negative sign , which means that with the application of IFRS, a reduction in the systematic risk of financial actions is observed .

The study of the effect of IFRS separating the sample into 2 periods, 2001-2004 and 2005-2011, reflects that for the sample of financial companies the relationship between the dependent and independent variables is practically the same: there are very few differences . In the period 2001-2004, 4 statistically significant variables appear : size , Euribor , GDP and CPI , while in the period 2005-2011 the Variables with explanatory power are size , the BAIT/ AT ratio, the Euribor, the unemployment rate and GDP . In the first period, 4 variables explain the risk; In the second period, 5 variables explain the risk, which except for the CPI are the same variables that we obtained as explanatory variables of systematic risk

when studying the entire time period (2001-2011).

The model obtained for the period 2005-2011 shows an R^2 slightly higher than the R^2 obtained in the analysis of the period 2001-2004.

For industrial companies, the study of the 2 time periods shows some differences. In the period 2005-2011, 6 variables explain the systematic risk of the stock: size, the BAIT/VEN ratio , the Euribor, the unemployment rate , the TIL and the GDP, while in 2001-2004 only 4 variables explain the risk. The results obtained from the study of the period 2005-2011 show a much better R^2 (0.3683) than that obtained in the study of the period 2001-2004 (0.1216).

In summary, we can conclude that:

a) The risk of industrial stocks is determined by the size, the BAIT/VEN ratio (operating margin), the Euribor, the unemployment rate, and the GDP.
b) The risk of financial stocks is determined by size , BAIT / AT (exploitation profitability), Euribor, unemployment rate , GDP and CPI.
c) The size , Euribor , unemployment rate and GDP are common to both types of companies . _ _
d) The dichotomous variable IFRS is statistically significant with a positive sign for the sample of industrial companies.
e) The dichotomous variable IFRS is statistically significant with a negative sign for the sample of financial companies.
f) Surprisingly , neither debt , ROE nor cash *flow* measures play any role, statistically speaking , *in* explaining stock systematic risk .
g) The models obtained from the study of the period 2005-2011 show greater statistical goodness than the models obtained from the study of the period 2001-2004.
h) The results of the analysis of the period 2005-2011 show and confirm that 6 independent variables explain the risk of industrial actions: size, the BAIT/VEN ratio, the Euribor, the unemployment rate, the TIL and the GDP .
i) The results of the analysis of the period 2005-2011 confirm that 5 indicators explain the risk of financial actions: size, the BAIT/AT ratio, the Euribor, the unemployment rate and the GDP.

The research confirms that there is a connection between risk and accounting and

macroeconomic information, which demonstrates that not only accounting information explains the systematic risk of a stock and, consequently, its cost of capital.

The study carried out allows us to respond to the 2 objectives initially proposed, since the results provide useful information for making rational financial decisions , both for the company's directors and for external professionals, and it is also demonstrated that the adoption of IFRS affects the relationship, since it is a statistically variable significant. The results achieved have a direct practical implication for the entrepreneur, as they represent an advance in how to measure or estimate risk when the company is not listed on the stock market.

The work indicates which variables must be considered and observed to estimate business risk and, subsequently , determine the minimum required profitability or discount rate.

The results tell us how to act so that a very important variable in the field of financial decisions (the cost of capital) is not set arbitrarily and is determined in a more rational way. The work tells us what variables to observe in order to anticipate a change. in the risk and, therefore , in the update rate or cost of capital of the shares and to be able to develop more efficient management. Obviously, this research has limitations inherent to the size and characteristics of the sample analyzed.

Studies carried out with data from other countries (Landsman et al., 2012 , Papadamou and Tzivinikos, 2013 and Kim et al., 2014) allow a certain comparison but little, since only one of the works (Padamou and Tzivinikos, 2013) uses the same dependent variable . This work uses data from Greek banks and shows that with the application In IFRS , more accounting variables appear that explain systematic risk . The research concludes that the application of IFRS affects the information content of the accounting variables , and this influences the systematic risk.

Regarding the other 2 works (Landsman et al., 2012 , and Kim et al., 2014), the first analyzes the effects of IFRS on the informative content of the annual profit for a sample of 27 countries (16 that apply IFRS and 11 that do not apply them), and the results reveal that the countries that have adopted the new standards show an increase in profitability , and the second work studies the effects of IFRS on Russian companies. The results show that size

explains the profitability of shares with a negative sign and that the information published by companies that apply IFRS is better valued than that published by companies that have not yet adopted IFRS.

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