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The Perception of Entrepreneurial Risk:
Key Determinants in the Decision Making Process
of Greek Investors

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Abstract

Contrary to conventional theory of finance, this paper argues that the perception of risk of Greek entrepreneurs is closely related to the leverage of the investment projects undertaken. The level of economic developments, domestically and on a Eurozone level, as well as institutional factors have been mainly responsible for the sharp decline in the number of investment projects in the domestic market.

Our analysis suggests that entrepreneurs' risk perception is adequately explained by leverage, equity, the residual amount of the government subsidy to be collected upon project completion, and the new job positions created by the venture. A close relationship between risk management practices and investments in new products is indicated

Finally, it is found, on the basis of our sample, new job positions positively influence employment in the respective regions under study. This is an outcome with major economic and social implications, particularly for economies that experience accelerating unemployment rates.

JEL Classification: C33, G31, G32, L10

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1.   Introduction

The concept of entrepreneurial risk has been a key component in investment decision making. Conventional corporate finance treats entrepreneurial risk as a uni-dimensional concept and attempts an 'objective' measurement of risk against expected returns of the underlying investment project. Despite the direct relationship between entrepreneurial risk and corporate initiatives, a clear-cut definition of the former is, surprisingly, lacking. Behavioral finance, however, has more recently emphasized the multi-dimensional nature of risk and has focused on the assessment of the 'subjective' perception of entrepreneurial risk. What really matters in this case is to identify the process of risk perception by entrepreneurs and to assess how it eventually affects investment decisions on evaluating potential projects. An interdisciplinary approach would then appear to be more convenient, on the basis of market information, personal judgment, knowledge, and instinct (Ricciardi, 2004).

In order to analyze the perception of risk, past behavioral finance studies have more frequently employed conveniently structured questionnaires or clinical experimental cases, where the sample population is determined on the basis of prespecified criteria and constraints set by the analyst (Ricciardi, 2004). However, in the majority of cases the perception of risk refers to institutional or private investors, to portfolios of securities (mainly stocks) or to capital markets. Most frequently, the focus is on mature, developed markets, predominantly the US and UK. With the exception of Allen (2002), empirical research on the perception of entrepreneurial risk has been surprisingly limited.

It is in this framework that this study attempts to contribute some innovative conclusions on the issue of entrepreneurial risk perception, focusing on the Greek entrepreneurs as a case study. The Greek economy has recently been upgraded to the newly developed Euroland members. Over the last decade, the domestic economy has experienced robust growth rates well above Eurozone averages. Greece has adjusted its fiscal and monetary policies to the European Union directives and has adopted euro as its currency. The Greek entrepreneurs have shown dynamism and responsiveness to adjust their business strategies towards an internationalized environment of increasing competition. The majority of domestic companies have proceeded to strengthen their capital base, raising funds in the capital markets, with a view to realize their investment programs and modernize their infrastructure.

The emphasis of the study is on the small and medium enterprises (SME), as this market segment constitutes the core body in any economy (Tarka, 2004). According to the British

Employment Service, it is mainly SME that contribute substantially to a sustainable growth path, implement the most dynamic investment projects and create new job opportunities. This study follows past practice and, at an initial stage, implements a convenient questionnaire addressed to a carefully selected sample of Greek entrepreneurs. The aim is to collect direct input on the concept of risk as entrepreneurs themselves define, perceive and attempt to control for. In addition a range of advanced quantitative tools, including cluster analysis, probit models and weighted least squares regressions, is also employed.

The structure of the paper is as follows: the next section covers a concise literature review of the perception of risk; section 3 refers to the data and the empirical methodology; sections 4 and 5 present and discuss the empirical findings; and, finally, section 6 concludes.

2.   A Concise Literature Review on 'Risk Perception'

The multi-dimensional nature of risk has led to the proposal of a variety of risk measures over time (Slovic, 1964; Payne, 1973, 1975; Holtgrave and Weber, 1993; Weber and Milliman, 1997, *inter alia*). According to Rohmann (1999) and Rohrmann and Renn (2000), a commonly accepted definition of risk is not available, although the concept of 'probability' is more frequently employed. Lane and Quack (1990) suggest that the concept of risk should include a range of statistical probabilities that assess upside as well as downside risk for an expected outcome. Other studies estimate risk as [event consequence times probability of occurrence]; [uncertainty plus damage]; or [danger plus opportunity] (Kaplan and Garrick, 1981; Elmiger and Kim, 2003, *inter alia*).

Overall, the evaluation of entrepreneurial risk appears to be a complex exercise that is directly related to the specific characteristics of the investment project under study, the micro- as well as the macro-environment, the institutional framework and the timing. According to Garland (2002), the multi-facet concept of entrepreneurial risk is related to the 'method of estimation', and can be considered as 'product or service', as 'capital', as 'management style', as 'threat', or as 'source of potential profits'. For Baird and Thomas (1985), risk relates to the case where the consequences of an assessment or judgment and their associated probabilities can be considered as factors to define 'measurable uncertainty'. From a strategic management perspective, risk can be considered as the entrepreneur's subjective judgment for the business consequences that may arise due to specific entrepreneurial decisions. Yates (1992) and Yates and Stone (1992) perceive risk-taking in a decision-making process by determining specific aspects of risk, such as loss, returns lower-than-target-returns and loss uncertainty.

The standard corporate finance approach to investment decisions is based on the notion that financial agents are rational and take optimal decisions under risk and uncertainty, based on statistical data, probabilities and ratios; this refers to the 'objective' perception of risk. According to Shan (1997), financial and investment risk includes the following distinction during investment decision-making: risk aversion; risk neutrality; and, risk taking. A major contribution of modern portfolio theory (Markowitz, 1952; Sharpe, 1964) is the measurement of risk by the statistical moment of return variance (or standard deviation). Risk control is attained through investment diversification and the 'β' coefficient is a measure of risk relative to the market. The capital asset pricing model (CAPM) is a convenient, flexible framework to assess investment risk and return jointly. Risk is decomposed into a systematic (market) and a diversifiable (asset-specific) component. Major types of risk include default risk, liquidity risk, interest rate risk, inflation risk, and political risk.

Recent empirical developments in the field of behavioral finance emphasize the importance of the 'subjective' perception of risk. This line of argument is related to the notion that 'objective' and 'subjective' perception of risk are not necessarily the same for financial agents (Modani *et al.*, 1983). The entrepreneur (investor) focuses on the 'perceived' risk, according to subjective factors, such as information and data availability, knowledge, beliefs, psychological attitude on risk-aversion and feelings (Garland, 2002; Olsen, 2000). Contrary to the 'objective' standard finance approach, behavioral finance assumes a 'subjective' perception of risk whenever an investor is in the process of decision-making. Assuming that risk is 'subjective' in nature, so should be its assessment too (Slovic, 2000). Hence, on top of traditional risk measures, the behavioral finance approach is useful in expanding our understanding on the notion of risk perception.

Standard risk measures (such as variance and standard deviation or variance of the expected return probability distribution) have been widely employed by financial researchers (Tobin, 1958; Lintner, 1965; Modigliani and Pogue, 1974; Sharpe, 2000, *inter alia*). Alternative risk measures (such as net profits growth, volatility of dividend growth, volatility of earnings or the higher moments of a distribution) have also been proposed (Capstaff, 1991; Selva, 1995; Lerner and Carleton, 1996, *inter alia*).

An expanding body of studies focuses on investment risk, initially, by grouping certain risk characteristics (such as investors' judgment, impressions, opinions, personal background, perception, professional experience) and, subsequently, by evaluating and understanding their implications (Slovic, 1988). In this case, financial research assumes that studying 'perceived'

risk is more essential than actual risk in an investment decision-making process (Selva, 1995; De Bondt, 1993; De Bondt and Thaler, 1994; Lipe, 1998; Ciancanelli *et al.*, 2001; Koonce *et al.*, 2001, *inter alia*). The research methodology of these studies has most frequently been based on surveys (questionnaires) directed to either random or convenience samples (experimental environment). The statistical analysis employed has been one or combination of multi-criteria analysis, regression models, factor analysis, principal components, variance and correlation, or discrete analysis. Pioneer studies on 'perceived' risk include Green and Maheshwari (1969), Alderfer and Bierman (1970), Gooding (1976, 1978), McDonald and Stehle (1975), Oster (1976) and Blandon and Ward (1979), *inter alia*.

Farrelly *et al.* (1985) employ a number of accounting and financial risk measures, such as liquidity, profit margin, ROE, debt to equity and times interest coverage; leverage and earnings volatility were found statistically significant in explaining 'perceived' risk. Henderson and Nutt (1980) focus on the perception of risk to evaluate eight projects of varying risk level, in a sample of 32 public sector managers and 30 private sector managers; personal attitudes and knowledge were found to affect risk assessment and investment decisions. In the same context, other studies conclude that managers exhibit diversifying risk behaviour when deciding on investments but do take into consideration the probability of financial losses or below target returns (Laughhunn *et al.*, 1980; McInish, 1980; Bart and Masse, 1981; Dickson and Giglierano, 1986; Maital *et al.*, 1986; Shapira, 1995, inter alia). Two studies by Sullivan and Kida (1995) investigate risk perception in a random sample of 72 corporate managers and conclude that managers exhibit risk-averse behavior when earnings are higher than target. Weber and Hsee (1998) compare perceived risk in a sample of four countries; investors were found to exhibit diversified risk perception, which was attributed to cultural differences on investment decisions. Sarasvathy *et al.* (1998) investigate risk perception between entrepreneurs and bankers in circumstances of high entrepreneurial risk. MacGregor *et al.* (1999) study perception of risk in relation to investment decisions on different asset classes, whereas Williams and Voon (1999) emphasize the notion of sentiments ('feelings') in entrepreneurial ventures.

Past empirical research has indicated a number of 'behavioural' factors which affect the perception of entrepreneurial risk and investment decisions. These findings can be considered as complementary to those of the traditional financial management and point to new frontiers for the risk-return relationship. The promotion of an interdisciplinary approach (finance – accounting - psychology) appears to be promising for expanding our understanding on the perception of entrepreneurial risk.

This paper investigates the behaviour of Greek entrepreneurs in small and medium firms with respect to risk perception during investment decision-making. The main aim of the empirical research is to investigate and quantify the major determinants of entrepreneurial risk, as this is perceived and defined by entrepreneurs themselves.

3.   Data and Methodology

In the context of a market model, the entrepreneur assumes the role of the main agent in the growth process of the economy. Understanding, therefore, entrepreneurial perception of risk and its implications for investment decisions is crucial. This study employs a convenient, well-defined questionnaire, in order to support a thorough investigation of the issues at hand. The questionnaire has been designed with a view to identify major determinants of perceived risk by Greek entrepreneurs and to assess their impact on entrepreneurial investment behaviour. The study period runs from 1996 to 2004; this has been a period of dynamic entrepreneurial activity, whereas the Greek economy has attained substantial growth rates and large amounts of EU subsidies have been channelled towards restructuring of the domestic corporate productive capacity and infrastructure.

The following key objectives can be identified in the questionnaire on domestic entrepreneurial behaviour:

- to report vital information and disclose data that are difficult to collect and refer to approved investment plans of entrepreneurial initiatives in Greece during 1996-2004; a capital expenditure threshold of €100.000 per project was set for the investment projects selected;

- to produce primary and innovative data on risk perception of Greek entrepreneurs with respect to proposed investment plans and identify relevant key determinants;

- to develop primary information concerning risk management practices of Greek entrepreneurs - if there are any such practices at all - during the phase of investment implementation or subsequent to its completion.

The discussion of these issues evolve on the basis of the responses collected via the aforementioned questionnaire, which directly reflects entrepreneurs' perception of risk and risk management practices applied. The first part of the survey includes questions on the

characteristics of corporate investment decisions during the last decade. A number of questions investigate the risk perception of entrepreneurs and the way this risk perception affects entrepreneurial decisions. In the second part of the survey, emphasis is placed on corporate characteristics as well as on (personal and educational) entrepreneurial profile.

A total number of 600 questionnaires were mailed to a carefully selected sample of firms, which were identified on relevant lists of the Ministry of National Economy. The response rate came up to 52% (310 firms), surpassing the half sample size threshold. Of this response pool, a total of 161 filled questionnaires were kept; in some cases, questionnaires were returned for supplementary responses. This later figure corresponds to a 27 percentage of the initial sample. This was rendered satisfactory, as capital expenditure allocated to investment projects by these 161 firms covers 75 percent of total investments over the study period. As a result, capital expenditure of a sole investment project in the sample, was formed at € 3,000,000 or above.

In order to confirm response validity and survey robustness, thirty personal interviews with entrepreneurs were also held. Despite confidentiality constraints, data collected on key variables, such as investment cost, investment subsidies, leverage and equity of the firm, were cross-checked with the Greek Centre for Investments (ELKE), following special authorisation. The empirical output produced was initially portrayed with employment of standard descriptive statistics that permit acquaintance with the main characteristics of the investment behaviour of Greek entrepreneurs.

Examining the geographical distribution of the investments under study, it is apparent that the largest share is concentrated in the region of Attica (32 investment projects), followed by Viotia and Rodopi (17 investments projects each), Evia, Magnesia and Kilkis (14, 13 and 11 investment projects, respectively). Following grouping of these regions into larger geographical entities, it becomes apparent that Central Greece (Sterea Hellas) attracts a 32% share of investment projects, Attica comes next with a 20% share; and, Thrace and Macedonia follow with smaller shares (Table 1).

Table 1: Investments by region

Region	No of investments	Share (%)
Central Greece	51	31.68
Attica	32	19.88
Thrace	27	16.77
Macedonia	26	16.15
Peloponnesus	15	9.32
Epirus & Islands	8	4.97
Creta	2	1.24
Total	**161**	**100.00**
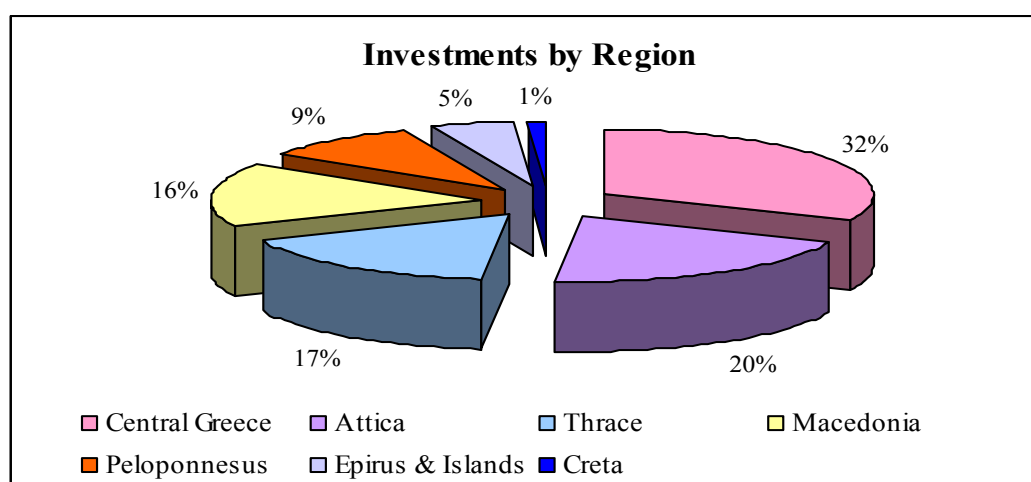
With view to distribution of investments by sector of economic activity, 71% of total investments are allocated to the industrial sector, 26 % to the service and the energy sectors jointly, and only 2.5% in the agricultural (rural) sector (Table 2). At a period of time that the developed countries have made a decisive shift from the industrial towards the service and energy sectors, Greece is found to still pursue a growth model that lacks some rigorous economic planning. This comes in contrast to business globalization in an international environment that requires companies to pursue competitiveness and technological innovations in order to differentiate their growth path.

Table 2: Investments by economic sector

| Sector	No of Investments	Share (%)
Industry	114	70.81
Agriculture	4	2.48
Services	23	14.29
Energy	20	12.42
Total	**161**	**100.00**

Investments by Sector
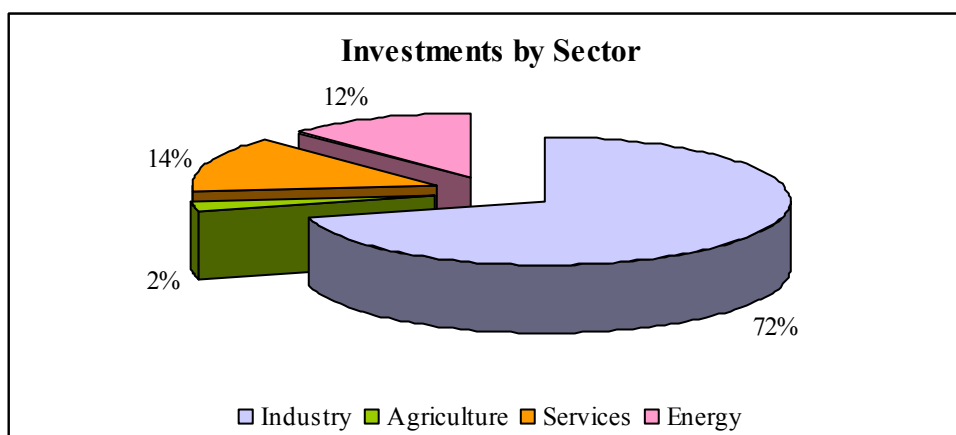
The analysis of the entrepreneurial activity in Greece indicates that the dominant type of investment has been related to the foundation of new enterprises and the upgrading of older ones (Table 3). However, these investments have not always been directed towards the most robust, growing and promising sectors of the economy.

Table 3: Investments by type

Sector	No of Investments	Share (%)
Foundation	63	39.13
Relocation	16	9.94
Expansion	29	18.01
Upgrading	50	31.06
Other	3	1.86
Total	**161**	**100.00**

An interesting issue relates to an increase and decline of investments during 1996-2004. The number of investment projects between 1996 and 1997 increased from seven to 47. This was mainly due to the replacement of investment Law Decree 1892/90 by Law Decree 2601/98, on the one hand, which allocates subsidies according to new job positions created by investment projects. On the other hand, this was also due to a skewed distinction between old and new entrepreneurs that was induced by the new legal framework. Following that, the number of investments has experienced a gradual decline. A reversion of this trend was only seen in 2001, at a period that Greece was entering the European Monetary Union. In anticipation of a more stable and secure economic and political environment, entrepreneurial expectations were realised through an increase in investment projects. Overall, private sector investment activity in Greece has decreased dramatically during 1996-2004. In fact, it has followed a path that was in sharp divergence to the European model of development. Reasons for that include the excessive and inefficient public sector, burdened by delaying bureaucratic procedures, which, in turn, has

exerted a discouraging impact on potential investors. In addition, frequent reforms of legislation on taxation, including imposition of increased firm tax rates, combined with increasing labour and raw material costs, have prevented the creation of favourable conditions for entrepreneurial initiatives and potential investors.

Investment trend during 1996-2004

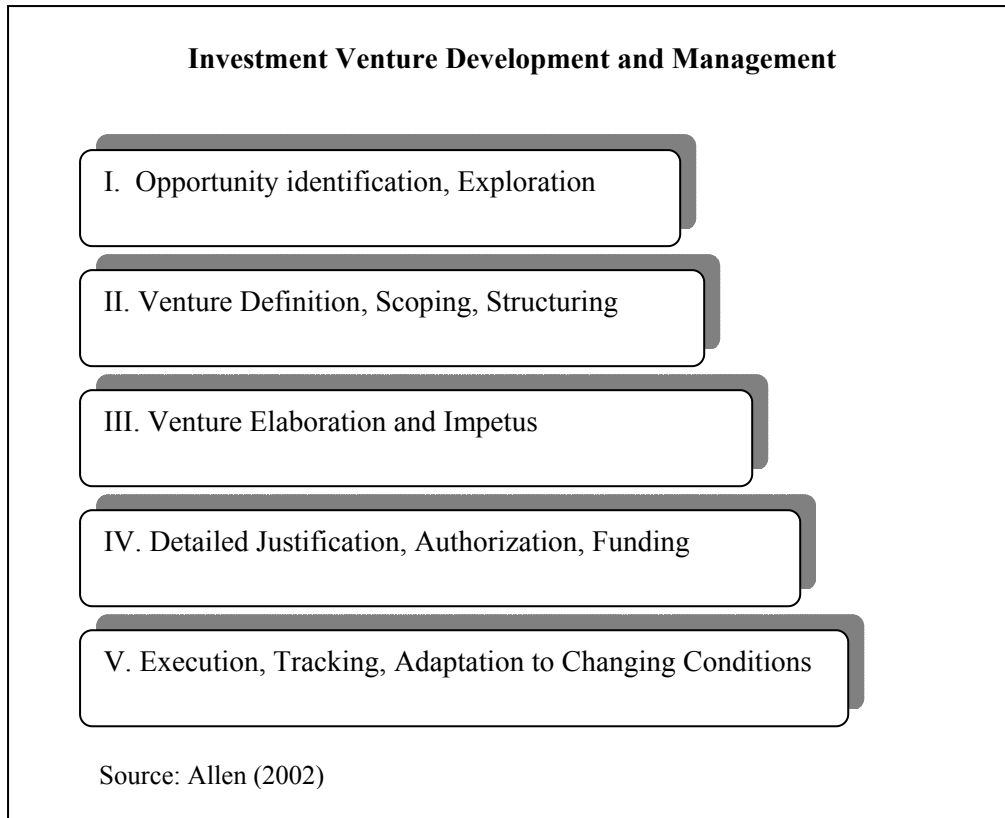**Investment trend during 1996-2004**
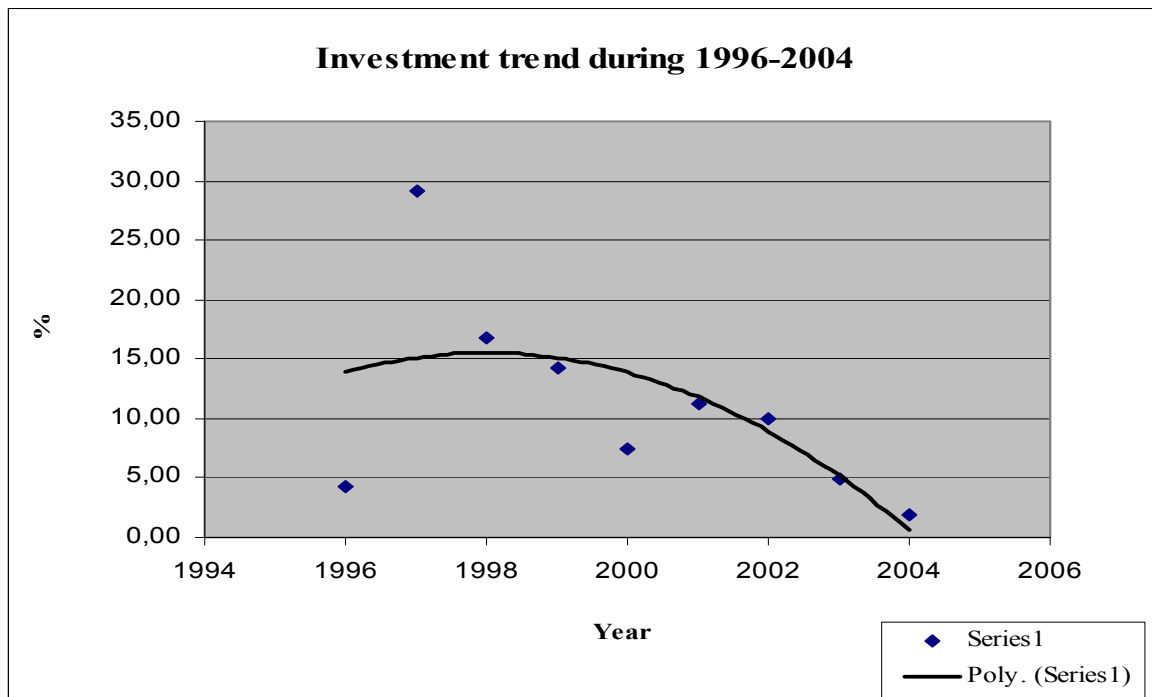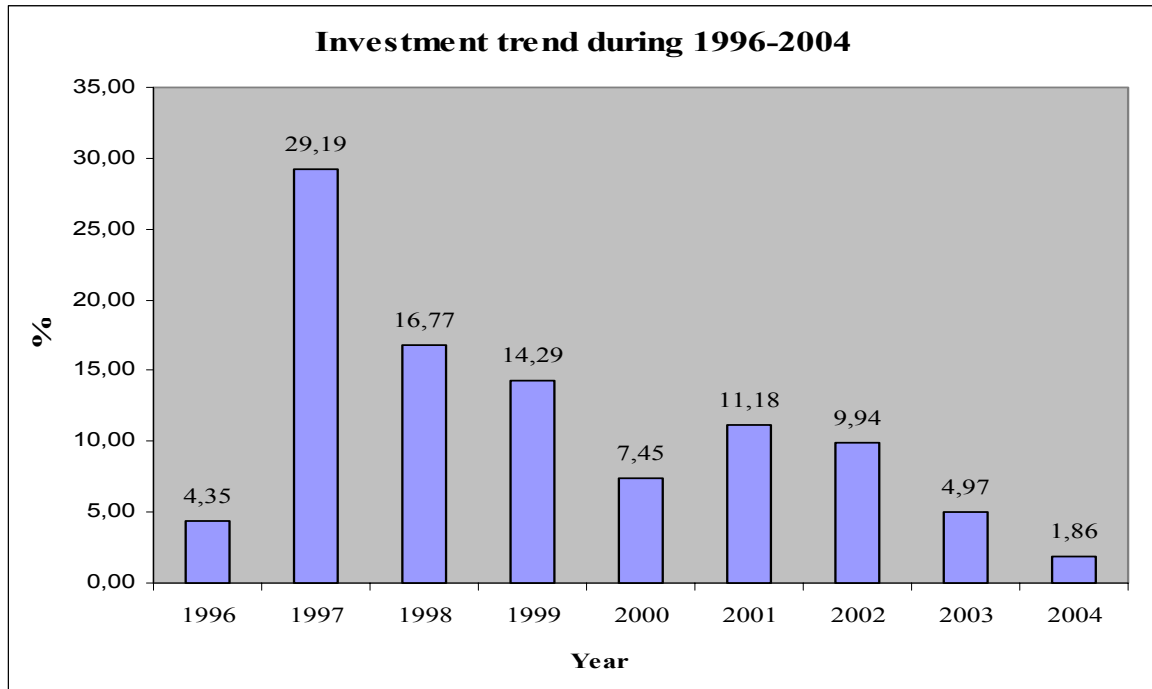
Our analysis focused on the classification of data categories with the employment of *cluster analysis*. The aim is to classify investment decisions per region and type, on the basis of the entrepreneurial profile with respect to attitudes towards investment risk. Allen (2002) has proposed a theoretical model to analyze the perception of entrepreneurial risk on investment projects. More specifically, risk is decomposed into three interacting components:

Risk = (Exposure) (Uncertainty of Cash Inflows) (Time)

According to Allen, '*exposure*' is a function of the size and timing of outlays undertaken to launch an investment, including pre-revenue R&D and commercialization expenses and investments in fixed assets. Within constraints imposed by technological and market characteristics of the project, managers typically have a wide number of choices regarding size, scope, and speed with which they proceed. '*Uncertainty*' can relate to exposure as well as the onset, stability, and duration of net operating cash flows. It reflects time-to-market, level of market acceptance, competition responses, and efficiency of venture operations. Both exposure and uncertainty are '*time*' dependent. Risk is encountered at various stages in the life of a corporate venture. Nevertheless, standard discounted cash flow calculations treat risk as time invariant. The employment of different discount rates, both for different stages of investment ventures and for different elements of the cash flow stream has been proposed.

Allen suggests that corporate entrepreneurs know intuitively that risk is inherent in business initiatives. However, entrepreneurs do not have a clear perception of key drivers of risk in investment projects. Past empirical studies have paid attention to valuation methods of project risk and return. Surprisingly enough, though, research on how investment ventures are actually conceived, justified and implemented remains thin. Allen conceives investment venture development and management as a five-stage iterative process, depicted in the figure that follows. This approach provides a basis for exploring key determinants of entrepreneurial risk perception in investment decision making.

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│            Investment Venture Development and Management           │
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│   │  I.  Opportunity identification, Exploration │                 │
│   └───────────────────────────────────────────┘                  │
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│   │  II. Venture Definition, Scoping, Structuring  │               │
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│   │  III. Venture Elaboration and Impetus              │           │
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│   │  IV. Detailed Justification, Authorization, Funding   │        │
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│   │  V. Execution, Tracking, Adaptation to Changing Conditions  │  │
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│        Source: Allen (2002)                                       │
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Following Allen's theoretical justifications, this study investigates the following key determinants of risk 'perception' by entrepreneurs (based in the relevant survey): the level of investment riskiness relative to leverage, L; the uncertainty emanating from the remainder of the government subsidy which is not received until investment completion, UN; the firm's equity, EQ; the total cost of investment, C; and, the number of jobs created by the investment project, SP. Investment projects that have these variables above the sample mean risk could be characterized as of high risk; on the other hand, investment projects with these variables under the sample mean could be considered as of low risk level.

4. Empirical Findings

Clustering according to investment type

Table 4 that follows presents fifteen classifications - clusters - according to the type of investment. The Schwarz Bayesian Criterion (BIC) is calculated for each likely number of classifications. Small BIC values indicate better models. The best solution cluster has the smallest BIC value.

Table 4: Clusters of investment type

Number of clusters	Schwarz's Bayesian Criterion (BIC)	BIC change (a)	Ratio of BIC changes (b)	Ratio of distance measures (c)
1	1259.771			
2	1065.286	-194.485	1.000	1.506
3	978.782	-86.504	0.445	1.792
4	986.656	7.875	-0.040	1.705
5	1043.818	57.162	-0.294	1.316
6	1117.768	73.950	-0.380	1.052
7	1194.346	76.579	-0.394	1.357
8	1284.211	89.864	-0.462	1.130
9	1378.352	94.141	-0.484	1.194
10	1477.826	99.474	-0.511	1.495
11	1586.424	108.598	-0.558	1.301
12	1699.290	112.866	-0.580	1.072
13	1813.103	113.813	-0.585	1.048
14	1927.523	114.420	-0.588	1.057
15	2042.620	115.097	-0.592	1.015

According to the empirical findings, the third cluster appears to be the best solution. Taking a closer look at each of the three clusters offered by our method as potential solutions, we construct Table 5 with cluster profiles. This table presents the mean and standard deviation of each variable by cluster. The variables are consecutively: leverage, subsidy, equity, cost of investment, and job positions. In the first cluster, investments are characterized by low cost, low leverage, low equity and few job positions resulting from each investment project. On the contrary, in the second cluster investments are characterized by high cost, high leverage, and a relatively large number of job positions. In the third cluster, which is the most representative according to criterion BIC, the investment decisions are characterized by low cost and low leverage (below the mean). It appears that this is the dominant type of investments if we classify them by type. Entrepreneurs appear to prefer low risk type of investments. Hence, projects of priority are basically those related to business modernisation and extension rather than to establishing a new business venture.

Table 5: Cluster profile – investment type

		Cluster			
		1	**2**	**3**	**Combined**
L	mean	2.7726	13.8513	1.2416	2.5148
	std. deviation	1.8028	8.7153	1.3124	3.5921
UN	mean	4.9516	15.8851	3.1270	4.5316
	std. deviation	2.5730	11.8515	1.7296	4.2492
EQ	mean	4.6700	23.4400	3.8000	5.1400
	std. deviation	2.6220	19.3330	2.0730	6.2670
C	mean	12.3900	53.1800	8.1700	12.1900
	std. deviation	5.9090	32.4440	4.0590	12.7250
SP	mean	60.5300	242.2500	38.1200	57.7300
	std. deviation	57.9520	251.6140	47.7930	85.3540

Clustering according to geographical region

We repeat cluster analysis with the consideration that the geographical region is the qualitative variable. The BIC criterion offers two potential solutions; based on the smaller BIC value, the second cluster is chosen (Table 6). This classification indicates that the dominant type of investments by region is that of high risk. Concentration is apparent in the regions of Attica and Central Greece (Sterea Hellas), where investments are characterised by high cost, high leverage and above the mean equity and job positions.

Table 6: Cluster profile – geographical region

		Cluster		
		1	**2**	**Combined**
L	mean	1.5458	4.6660	2.5148
	std. deviation	1.4242	5.5436	3.5921
UN	mean	3.5000	6.8217	4.5316
	std. deviation	2.0147	6.4872	4.2492
EQ	mean	4.0100	7.6600	5.1400
	std. deviation	2.1850	10.3980	6.2670
C	mean	9.0500	19.1500	12.1900
	std. deviation	4.8360	20.1110	12.7250
SP	mean	35.7700	106.4800	57.7300
	std. deviation	44.5980	125.7220	85.3540

5.   Discussion of Results

As the focal point of discussion refers to entrepreneurs' perception of risk, this concept was built upon the responses collected from the market survey (questionnaire) and personal interviews. The empirical model employed investigates the determinants of entrepreneurial risk and attempts to quantify their impact.

The dependent variable is a measure of risk, as this was conceived and defined by the entrepreneur. This is the 'loan exposure of the entrepreneur', expressed in percentage terms. For purposes of normalization, we have defined risk as 'squared deviation from the sample mean'. The independent variables of the model are defined in a way to capture uncertainty associated with the specific business venture: leverage of the entrepreneur, L; uncertainty associated with the remaining subsidy amount due upon investment completion, UN; it is defined as $\{UN = S_t - 0.2\,S_t\}$, where 20% refers to the subsidy proportion the entrepreneur roughly collects at the initial phase of the investment; investment duration, T; and, return on equity of the sector, ROE. The theoretical model was discussed earlier and has been based on the framework proposed by Allen (2002). In addition to the independent variables discussed, our model also includes a variable that represents entrepreneur's own contribution to the investment expenditure, EQ; and, a variable that depicts the number of job positions that are created and subsidised until the completion of the venture, SP. The sample observations are cross-sectional and concern 161 investment projects, scattered domestically over 1996-2004. The Ordinary Least Squares method was employed for regression estimation. The proposed model (Eq. 1) is then formulated as:

$$RISK_t = b_0 + b_1\,L_t + b_2\,EQ_t + b_3\,UN_t + b_4\,SP_t + b_5\,T_t + b_6\,ROE_t + u_t \qquad (t = 1, \ldots 161) \quad (1)$$

Alternative versions of the initial model were subsequently estimated and statistically tested. The ROE variable was found to be statistically insignificant and was eventually dropped from the final model version. The variable T also came out with a wrong sign and was finally not included in the model without any particular impact on the empirical results. The final model selected was estimated with the method of weighted least squares, since heteroskedasticity related to the SP variable was detected (Table 7):

Table 7: A model on the perception of entrepreneurial risk

$RISK_t = b_0 + b_1 L_t + b_2 EQ_t + b_3 UN_t + b_4 SP_t + b_5 T_t + b_6 ROE_t + u_t$

The model
$RISK_t$ = -6.76 + 3.65 L_t + 5.01 EQ_t - 5.48 UN_t - 0.003 SP_t
     (4.69) (1.33)   (1.67)   (1.73)   (0.001)

Diagnostic statistics
R^2 = 0.69
D.W. = 1.91
$LM_{(2)}$ = 98.55
RESET = 285.57
White Test = 158.59
Theil Inequality Coefficient = 0.486

Notes: L = leverage of the entrepreneur; UN = uncertainty associated with the remaining subsidy amount due upon investment completion; it is defined as {UN = S_t - 0.2 S_t}, where 20% refers to the subsidy proportion the entrepreneur roughly collects at the initial phase of the investment; T = investment duration; ROE = return on equity of the sector.

The explanatory variables included in the proposed model are found to explain 69% of the behaviour of investment risk, a considerably high percentage for a cross-sectional sample. The Durbin-Watson statistic (1.91) and the $LM_{(2)}$ test (98.55) indicate absence of autocorrelation in the population disturbances, while the RESET test (285.57) supports the adequate model specification. Finally, the White Test (158.59) indicates that heteroskedasticity may not be a problem and the Theil inequality coefficient shows a satisfactory predictive power for the model.

The empirical results confirm that the loan burden affects positively the entrepreneurial perception of investment risk, as it has been anticipated. More specifically, an increase in leverage by one percent, results to a corresponding investment risk increase by 3.6 percent. The entrepreneur's contribution appears to exert a positive impact on investor's risk. On the contrary, entrepreneurial uncertainty, associated with the remaining amount of investment subsidy, reduces investment risk. This may be related to investor considerations that this remaining amount will be collected upon investment completion beyond doubt, despite occasional, short-term, financial discomfort it may induce. The empirical results also indicate, as expected, that the variable corresponding to subsidised job positions related to investments undertaken affects negatively entrepreneurial risk.

Another hypothesis under investigation refers to the practicing of risk management by the Greek entrepreneurs. In this framework, the following model was specified (Eq. 2):

$$NP_t = b_0 + b_1 L_t + b_2 UN_t + b_3 RM_t + b_4 T_t + u_t \qquad (t = 1, ...161) \quad (2)$$

The dependent variable, NP, is a dummy variable that takes the value of unity, in case the investment is related to the production of a new product and zero in all other cases. The independent variables include leverage, L; risk management, RM, defined as the 'squared deviation of each investment risk from the mean risk'; the remaining amount of subsidy, UN, that entrepreneurs anticipate to collect upon investment completion; and, investment duration, T.

Since the dependent variable in the model takes only the values of 1 and 0, a standard regression approach is not appropriate; a PROBIT model is employed instead. The probability of the dependent variable to take the value of unity can be expressed (Eq. 3) as:

$$Pr (NP = 1 / X_i, b) = 1-F(X'b) \qquad (3)$$

where F is a continuous increasing function that takes real values between 0 and 1. The choice of this function F determines the type of model. Consequently, it holds that (Eq. 4):

$$Pr (NP = 0 / X_{ii}, b) = F (-X'b) \qquad (4)$$

The coefficients of this model can now be calculated with the method of probability maximisation. The ML function is given below (Eq. 5) as:

$$l(b) = \log L(b) = \sum_{i=0}^{n} NP \log(1 - F(-X'_i)) + (1 - NP)\log F(-X'_i b) \qquad (5)$$

The estimation results produced by the PROBIT model are provided below (Tables 8 and 9):

Table 8: A PROBIT model

$NP_t = b_0 + b_1 L_t + b_2 UN_t + b_3 RM_t + b_4 T_t + u_t$

The model
$NP_t = -1.49 + 0.28\ L_t\ -0.16\ UN_t\ -0.003\ RM_t + 0.53\ T_t$
$\qquad (0.38)\ (0.08)\qquad (0.06)\qquad (0.001)\qquad (0.205)$

Diagnostic statistics
$LR_{(4)} = 28.72$
$(McFadden)^2 = 0.146$
Mean Dep. Var = 0.298
SSR = 27.66
H-L statistic = 15.24
Andrews statistic = 28.59

Notes: NP = dummy variable (0 or 1) for investments related to production of a new product; L = leverage of the entrepreneur; RM = risk management; UN = uncertainty associated with the remaining subsidy amount due upon investment completion; T = investment duration.

Table 9: Estimation results from the PROBIT model

	Estimated Equation			Constant Probability		
	Dep = 0	Dep = 1	Total	Dep = 0	Dep = 1	Total
P (Dep =1) < = C	105	35	140	113	48	161
P (Dep = 1) > C	8	13	21	0	0	0
Total	113	48	161	113	48	161
Correct	105	13	118	113	0	113
% Correct	92.92	27.08	73.29	100.00	0.00	70.19
% Incorrect	7.08	72.92	26.71	0.00	100.00	29.81
Total Gain[*]	-7.08	27.08	3.11			
Percent Gain[**]	NA	27.08	10.42			
	Estimated Equation			Constant Probability		
	Dep = 0	Dep = 1	Total	Dep = 0	Dep = 1	Total
E (# of Dep = 0)	85.09	27.72	112.82	79.31	33.69	113
E (# of Dep = 1)	27.91	20.28	48.18	33.69	14.31	48
Total	113.00	48.00	161.00	113.00	48.00	161
Correct	85.09	20.28	105.37	79.31	14.31	93.62
% Correct	75.30	42.24	65.45	70.19	29.81	58.15
% Incorrect	24.70	57.76	34.55	29.81	70.19	41.85
Total Gain[*]	5.12	12.43	7.30			
Percent Gain[**]	17.17	17.71	17.44			

[*] Changes in '% Correct' from default (constant probability) specification.

[**] Percent of incorrect (default) prediction corrected by equation.

According to the empirical results (Table 9), the specified model estimates rightly 73.29 observations. A positive correlation between risk management and investments that refer to new products is apparent. More specifically, only 30 out of 48 entrepreneurs in new products have designed a rescue strategy, in case their investment would not carry through successfully. In one single case reported, a strategy was designed to deal with results better than expected. The empirical findings indicate that in case risk increases by a percentage point above the mean, the probability to invest in new products is to fall by 0.003 of a percentage.

Another issue under investigation refers to the implications of new job positions, created by the investment projects, for employment per geographical region. The number of observations in this case decreases down to 31, as this is the number of regions in which investments are classified. Data on national product per region as well as on employment were collected from the National Statistical Service Bureau. Subsequent to raw data processing, the following model was estimated (logarithmic form) with the method of weighted least squares:

$$LNEM_t = 5.42 + 0.59 LNGDP_t + 0.18 LNP_t \qquad (t = 1,\ldots 31)$$
$$ (0.79) \quad (0.09) \qquad\quad (0.09)$$

$R^2 = 0.97$, D.W=2.15

The dependent variable is employment per region, LNEM. The independent variables include the national product of the region, LNGDP, and the number of job positions created by the investment project in the region, LNP. The empirical findings indicate that there exists a positive relationship between employment in the region and new jobs created by investment projects. This outcome has been anticipated but obviously is embedded with substantial economic and political implications.

6. Conclusions

This study has investigated the perception of risk by Greek entrepreneurs and has attempted to quantify key determinants in the decision making process of investment ventures.

According to the empirical findings, the loan burden holds a key role with a positive impact on investment risk. The entrepreneurs' contribution appears to also have a positive influence on business risk perception. On the contrary, uncertainty related to receipt of remaining investment subsidy reduces investment risk. The entrepreneur considers that this financial support will be collected without fail upon investment completion, despite temporary financial discomfort. It was also found that jobs that are subsidised during the investment period have an adverse impact on investor's risk. These findings are in line with recent studies on entrepreneurial risk perception (Forlani and Mullins, 2000; Olsen and Cox, 2001; Diacon, 2002, *inter alia*).

The study has also argued that there exists a positive relationship between investments concerning new products and risk management. More specifically, only a modest percentage of entrepreneurs focusing on new products were found to have designed a rescue strategy in case that planned investment does not carry through successfully. This is an important finding supported by past empirical studies. Further research would be useful to verify its robustness in the context of a larger sample across sectors. Finally, a positive relationship was found between employment in a region and the new jobs created by an investment project. These finings bear considerable economic and political implications.

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