

# **Managing Risk in New Entrepreneurial Ventures\***

***Nicholas S. Vonortas***

Center for International Science and Technology Policy  
& Department of Economics  
The George Washington University

***YoungJun Kim***

Graduate School of Management of Technology  
Korea University

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Edited by

**Yannis Caloghirou, Franco Malerba, Maureen McKelvey, Slavo Radosevic**

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# 1. INTRODUCTION

Risk is pervasive in human activity. The most commonly accepted definition is that risk is the potential that a certain action will lead to an undesirable effect. While the word risk has a negative connotation in the English language, undesirable effects can be either positive or negative (Leitch, 2010). In the business sector, risks have real monetary and operational impact. Every enterprise, by joining the market, implicitly agrees to carry risk as a matter of business. Risks vary by sector, by type of organizational structure, and by (perceived) severity. Experts seem to agree on two broad types of risk: diversifiable and systematic. The former type a firm can hedge away, or reassign (outsource); the latter it cannot and must be dealt explicitly within a firm's business plan. Both kinds of risk must be taken into account in a management plan, but are treated differently. New ventures typically carry higher risks for investors.

Organizations have stakeholders and customers. A stakeholder is "any individual whose personal welfare is affected by the success of the organization" (Culp, 2011). Customers are the demand side of the equation. Depending on the structure of the firm, customers and stakeholders have slightly different roles in the running and risk assessment of a business. The customers and stakeholders themselves can also add to the risk incurred by doing business. For example, if customers expect a certain level of service or quality of product, and the product is not up to expectations, the business may expect a high level of returns and dissatisfaction. This does not bode well for the future of the venture. Stakeholders usually have a financial stake in the company. Depending on the financial structure (Ben-Ari & Vonortas, 2007), stakeholders may require a portion of the returns on a certain schedule. Without an adequate discussion of the firm's risk and realistic projections for economic success, these obligations to stakeholders may not be met.

Aligning the goals of stakeholders is critical to determining the level of risk the organization is willing to take, and how it will be managed. It would be fair to say that the literature is still undecided on a robust list of well defined risks for businesses: definitions and specific types of risk abound. Ebben (2005), for example, lists five types:

- Market risk: Is the market ready for entry? Is there demand for the product?
- Operational risk: Is the business set up effective internally to deliver its goods?
- Financial model risk: Possibility the business won't work due to the numbers.
- Financial risk: Tangible value the investors lose if the business fails.
- Opportunity risk: The opportunity cost of the entrepreneur: What's the alternative to setting up the business in question?

In essence, such lists try to replicate business-making processes and capture the obstacles to a successful, profit-making business. For instance, even if the business is run well, has plenty of funding, and makes a quality product, the market may be already saturated and carving a niche for your product is nearly impossible. This is an example of market risk, one that requires a skilled entrepreneur from the very beginning to realize the right moment to introduce a product or start a business.

This Chapter investigates aspects of risk management in young entrepreneurial companies. In particular the Chapter empirically relates various types of risk to risk-mitigation strategies of newly established knowledge-intensive enterprises (KIEs). We use a new important set of information on 4004 young businesses in ten European countries (AEGIS survey) to understand the important factors in their efforts to mitigate risk.

Straightforward data tabulation and t-tests indicate that a prevalent risk management procedure is the start up of new companies in areas in which the entrepreneur has had significant prior experience. Extensive financial risk obliged the vast majority of our entrepreneurs to fund their new ventures through own funds. The vast majority of survey respondents reported heavy competition risk. Competition is present in terms of both quality and price. When rating the different factors that shape competitive advantage, the clear winner was the capacity to adapt products/services to customer needs, followed by product/service quality and novelty. Market risk/uncertainty was an important perceived obstacle to company growth, followed by funding difficulties (financial risk) and difficulties in recruiting high-skill employees (recruiting risk). Lack of technological know-how and technology risk/uncertainty were rated at the bottom of the obstacle list. A slew of external factors were considered important barriers for operating the company, including frequently changing taxation regulations, high tax rates, bureaucracy for permits and licenses, poorly enforced competition legislation, and weak intellectual property protection. These make up systematic risks that must be considered in the business plan.

Our empirical analysis indicated that the lesser obstacle, technology risk, is also the easiest to deal with. Companies treat technology risk as unsystematic (diversifiable), manage it actively, and try to decrease it through networking. Timing risk is also diversifiable – depends largely on company circumstances – and is, thus, actively managed too. On the other hand, we find competition risk, market risk, financial risk, and IPR risk apparently being considered systematic. Consequently they do not lend themselves easily to management. One should observe here that market risk and financial risk were placed (in that order) at the top of the list of the obstacles to a successful company operation. Networking appears to be a way companies try to defend against them as well as against IPR risk.

Within the examined population of relatively small KIEs, growing size is associated with higher/better risk management and, in conjunction to better educational background of the entrepreneurs, higher likelihood of networking.

Three important policy implications arise from this analysis. First, the government should primarily concentrate in assisting young entrepreneurial companies with factors that underlie systematic risks, i.e., risks that the companies cannot hedge or diversify. These include financial risk and IPR risk. Market risk and competition risk, on the other hand, while also perceived by companies as systematic, do not lend themselves easily to government intervention. Second, contrary to popular belief, on the basis of self-reported information there seems to be little perceived need for direct government intervention in

alleviating technology risk for young KIEs. Finally, the government should also concentrate on the factors underlying recruitment risk, reportedly one of the most important obstacles for our firms' growth. This specifically refers to the availability of skilled personnel for hire.

The rest of the paper is organized as follows. Section 2 deals with the concept of risk management and its significance for newly established companies. Section 3 uses the data of the AEGIS survey to reflect on certain aspects of risk and risk management in new knowledge-intensive enterprises in the European Union. Section 4 proceeds to the empirical analysis on the basis of this data. Finally, Section 5 concludes.

## **2. CONCEPTS**

### **2.1. Risk management**

Risk management is the “identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities” (Hubbard, 2009). Managing risk responsibly means developing a framework that is not too far on either side of cautiousness or carelessness (see Culp, 2011). It also means considering risk an integral part of corporate strategy and financing. Risk cannot be eliminated; rather, it must be managed. Three fallacies must be avoided: (1) risk is always bad, (2) some risks are so bad that they must be eliminated at all costs, and (3) playing it safe is the safest thing to do. If risk is thought of along the lines of any one of these fallacies, or even in combination, the value of risk management is lost.

Risk is neither good nor bad. It just exists, and depending on how it is managed, the outcome *becomes* either a hindrance or a boon. Eliminating certain risks at all costs probably creates more complications than if the risk had been managed properly in the first place. According to Culp (2011), risk must be viewed within the context of probability of the event happening *and* its consequences. The benefit and costs of risk reduction must be equalized, or at least the benefit must come out ahead. Deciding on a risk management concept that is woven throughout a business will facilitate such cost-benefit analysis. Firm values and priorities will drive the conceptualization of risk management in the firm.

The Geneva-based International Organization for Standardization addresses the issue of risk management standardization. In 2009, it published a new standard ISO 31000: Risk Management-Principles and Guidelines. ISO 31000 is designed to be the international standard for enterprise risk assessment (ERM) and functions as a best management practices document (Baker, 2011). ISO 31000 highlights the need for a formal internal process for identifying risk and then ways to assign that risk with a value (essentially risk triage).

Figure 1 illustrates the model risk management process as prescribed by ISO 31000. Note that (most of) the arrows connecting the various parts of the diagram point in both directions. Additionally, the process of risk assessment is continuous, with communication, consultation, monitoring, and review throughout a firm's life. Risk management does not just identify risks, instead, it actively manages them.

[FIGURE 1 ABOUT HERE]

Criticism has followed quickly. Some have said that the system turns a multifaceted conceptual issue into a numbers-oriented process. Others see discussion on human and cultural factors as not specific enough. In his analysis of the impacts of ISO 31000:2009 Leitch (2010) tends to agree with many of these assessments. He finds many faults with the language used in the standard, citing them as too vague and not helpful for organizations seeking to improve upon their current risk management efforts. The consequences of risks can be *both* positive and negative and indeed the ISO 31000:2009 attempts to craft a definition that addresses both sides. While this is an admirable attempt, the process is considered less successful when it comes to risk treatment. According to Leitch, a central problem with the new reference is that while it acknowledges that each organization is unique, it is trying to standardize to a fault.

A well thought-out risk management plan can be critical to the future of either a current or forthcoming venture (Longenecker et al, 2010). The plan must concentrate on risk control – minimizing loss through prevention, avoidance and /or reduction. Learning from undesirable experiences is valuable to a venture's overall risk management plan. Showing progress in the way a firm thinks about and deals with risk (as evidenced by an updated risk management scheme) may attract more (and unique) investors (Ebben, 2005). The plan is one way to make a favorable impression on investors, who in turn may introduce entrepreneurs to their investor network (Haar et al 1988). This is of utmost importance when dealing with new entrepreneurial ventures.

## **2.2.New entrepreneurial ventures**

Even successful established entrepreneurs can be hesitant to invest in new ventures they consider risky. The perception of risks by all parties related to a venture (entrepreneurs, investors, customers, partners, etc.) can vary widely. These variations can prove to be troublesome for funding purposes. Janney and Dess (2006) argue that traditional measures of risk do not work for new ventures. Conventional measures create the illusion that the entrepreneur is a greater risk-taker than others, which can scare off potential investors. Forlani and Mullins (2000) found that entrepreneurs were less likely to choose ventures that had high levels of variability but were more willing than average to take a greater (perceived) risk for the projection of a greater reward.<sup>1</sup>

There is a widespread perception among investors that investing in early stage technology-based firms carries higher risks than investing in non-technology ventures.

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<sup>1</sup> Essentially thus differentiating between uncertainty and risk, a “bad” and a “good” for business.

This could in turn translate into lesser funding potential for the former firms (Ben-Ari and Vonortas, 2007; Macmillan et al, 1985, 1987). If all the proposed value of a venture is contained in the head of one of its founders, prospective investors have a hard time projecting this knowledge into real profits.

In their analysis, Mason and Harrison (2004) argue that the perception of higher risks in technology-based ventures rests on the consideration of the following sources of risk:

- *Management risk*: technology entrepreneurs are likely to have excellent science/engineering credentials but be inexperienced in the commercial exploitation of technological innovations.
- *Agency risk*: Investors will encounter greater difficulties in undertaking due diligence and incur higher costs, on account of the newness and complexity of the technology, products and markets and, as a consequence, the greater scale of information gathering.
- *Market risk*: it is difficult for investors to assess the market potential for products that may not exist or which may create a new market.
- *Technological risk*: the technology is likely to be unproven and the application yet to be demonstrated; development may take longer than expected, it may not work or it may be superseded by competitors.
- *Valuation risk*: evaluation of new technology based firms may be difficult because it is heavily dependent on the potential value of soft assets, notably patents, trademarks and human capital. Traditional financial based valuation methods are likely to be inapplicable in such circumstances.
- *Project risk*: the speed of technological trajectories often requires rapid rate of commercial exploitation – and hence large injections of finance – before the advent of competitor products and/or redundancy.
- *Growth risk*: technology-based firms need to grow, internationalize and develop new products in a short time horizon. This places exceptional managerial, financial and technical demands on a new business.
- *Timing risk*: technology-based firms are often characterized by short ‘windows of opportunity’ such that they might be unsuccessful if they enter the market too late, or too early.” (Mason and Harrison, 2004: 317-318)

Some of these risks are more manageable (diversifiable) than others in the sense that they depend heavily on internal firm decisions. Such can be managerial risk, technology risk, and growth risk. Others depend more on external factors to the company and may be described as systematic such as market risk, project risk, and timing risk. To the best of our knowledge, no official classification exist reflecting the fact that a lot depends on the specific business of a company.

The interaction of various such sources of risk creates significant uncertainties about the outcomes of the new business (Gompers and Lerner, 2001) which leaves investors in technology-based firms facing high adverse selection risk. For instance, a combination of technology risk, project risk, and timing risk often proves deadly. Or a combination of agency risk and growth risk can leave a prospective investor aghast with a scale problem

of large costs of investment appraisal and monitoring (arguably a largely fixed cost) compared to the relatively small initial rounds of financing for new ventures.

Trying to diversify, investors will seek to invest a portion of their capital in seemingly high-risk ventures to capture “high risk, high reward” payoffs. Those entering the high-tech field are more likely to be risk-takers and willing to assume higher risk for greater reward (Agarwal et al., 2004). Entrepreneurial quality will play as big of a role as any other factor in considering the possibilities of success of a start-up high tech venture. Start-ups require the principal to invest time and resources into the product and push it through the market. Their entrepreneurial skill matters because successful strategies will differ between high and low-tech ventures (Katagi, 2003). A firm’s flexibility and ability to deliver product tailored to the client is a strong indicator of long-term survival. It is not a unique product that solely determines success. As globalization becomes more prevalent, the services attached to the product, unique or not, are the sought-after goods.

While there has been progress in thinking about business risk, however, its appraisal arguably remains more of an art than a science. Thus, in innovative ventures risk must be assigned at least partly subjectively. Reid and Smith (2008), for instance, suggest that mere categories such as “high”, “medium” or “low” may suffice. Moreover, risk appraisal must be customized: to some extent at least, risk should be conceptualized to match the specific firm in the specific sector.

In this paper we take an explorative step in attempting to use self-reporting information from a recent business survey to point out evidence of risk management efforts in young knowledge-intensive enterprises. We do not examine these efforts in any great detail.

### **3. DATA**

#### **3.1. AEGIS survey**

The data used in this paper comes from the AEGIS survey. The survey was launched in an attempt to identify motives, characteristics and patterns in the creation and growth of new firms which are based on the intensive use of knowledge and operate in both knowledge-intensive and low tech sectors. It was carried out during Fall 2010 and Spring 2011. The survey recovered 4,004 fully completed questionnaires (about 300 variables) from an equal number of newly-established knowledge-intensive enterprises (KIE) spread out in ten European countries (Croatia, Czech Republic, Denmark, France, Germany, Greece, Italy, Portugal, Sweden, and the United Kingdom). Both manufacturing and service sectors were covered, including fourteen high- and low-tech manufacturing sectors and four knowledge intensive business service sectors (KIBS).

The population of companies in these preselected sectors was created from the Amadeus business database with additional criteria of allocation among the 10 countries in rough

accordance to their relative size and income.<sup>2</sup> The starting population of 338,725 firms was allocated among high tech manufacturing (4.9%), low tech manufacturing (19.1%) and KIBS (76 %). Multiple screenings left us with a sample of 12,824 companies that satisfied all criteria. All were contacted by telephone and completed the questionnaire online in their local language under the tutelage of expert interviewees. Of those contacted, the overall achieved response rate was 31.3% (4,004 companies) which varied from 19.5% in Sweden to 63.9% in Croatia. Table 1 shows the final distribution of responding companies across the ten countries within the major sector groups. Table 2 shows the frequency distribution of the companies across sectors. These 4,004 companies were very young at the time of the survey, established between the years 2002 and 2007.

[TABLES 1-2 ABOUT HERE]

### **3.2 First brush with data**

About two-thirds of the founders were employed in another company just before establishing the one surveyed in AEGIS. Their previous employer was in the same sector with a factor 2:1. In other words, about 40% of the founders in the surveyed companies brought with them fresh and directly relevant experience.<sup>3</sup> Large majorities considered market knowledge, technical/engineering knowledge, and networks built during their previous career highly important. No fewer than half of the company founders reported technical and engineering knowledge as their main area of expertise. An additional quarter reported general management as the main area of expertise. When asked about the factors that prompted them to establish the companies in question, more than four-fifths graded work experience in the current activity field as of high or very high importance, while three quarters graded market knowledge similarly, and more than two-thirds graded technical/engineering knowledge and networks built during previous career similarly.

Experience seemed, then, an obvious risk management procedure: many entrepreneurs were establishing companies in fields in which they had had significant prior experience. We run t-tests comparing the average growth of sales (2007-2009, end of 2010) between firms whose owners' last occupation before the establishment of the company in question are still in existence and firms led by a first time entrepreneur. Table 3 indicates that sales growth of the former firms is higher on the whole than that of firms established by a new owner (statistically significant).

[TABLE 3 ABOUT HERE]

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<sup>2</sup> In order to avoid  $\frac{3}{4}$  of the sample coming just from three large countries, a minimum of 200 responses was set for Croatia and the Czech Republic, about 330 responses for each of Denmark, Greece, Portugal and Sweden, and 570 responses for each of France, Germany, Italy, and the UK.

<sup>3</sup> The average professional experience prior to establishing the companies in the AEGIS survey was 12 years. Seven out of ten founders were over 40 years old when establishing the firm.

Interviewees reported funding the new ventures by and large with own financial resources: more than nine in ten using own resources extensively. Pointing at the perception of high risks by external investors, very few of the surveyed entrepreneurs accessed venture capital (5%) or bank funding (28%), public funding (7%), or funding from EU sources (3%). Yet, in those relatively few companies that benefited from them, venture capital made up 45% of all available funds and bank funds made up 52%.

About 60% of the respondents reported having many business competitors, compared with 34% reporting few competitors and 7% reporting no competition. Innovation was considered key: about half responded that a company in their sector can succeed only if it is able to launch new products and/or services frequently. Competition comes in terms of both quality and price: almost two-thirds of the respondents considered quality competition prevalent; more than half answered similarly for price competition. When rating the different factors that shape competitive advantage, the clear winner is capacity to adapt products / services to customer needs. It is followed at close distance by product / service quality and novelty.

Market risk / uncertainty was perceived as an important obstacle to company growth: three quarters of the respondents opined it is at least of moderate importance and at least two-fifths that it is of great importance. Market risk was followed by two other factors, funding difficulties and difficulties in recruiting high-skill employees: 60% of respondents thought each of these obstacles as of moderate importance for company growth, with 40% considering them of high importance. Interestingly, lack of technological know-how and technology risk / uncertainty were the two factors at the bottom of the obstacle list: only about 15% of respondents considered them of high importance.

Moreover, a slew of externally determined factors were considered important barriers for operating the company, including taxation, bureaucracy, and legislation for competition and property rights. Listed in terms of importance: frequently changing taxation regulations, high tax rates, bureaucracy for permits and licenses, poorly enforced competition legislation, and weak intellectual property protection.

Simple tabulations and t-tests of self-reported information of relatively young entrepreneurial KIEs across sectors and several European countries indicate:

1. Market risk is viewed as the most important obstacle for company growth and must be reflected clearly in the risk management plans of new KIEs. Securing external funds for growth and recruiting skilled employees also rank very high.
2. Important operating risks relate to taxation, government bureaucracy, and legislation for competition and intellectual property protection. These are all externally determined.

3. Competition risk tends to be high. Both quality and price competition are present and must be dealt with. Adaptation to customer needs and product / process novelty underline competitive advantage.

We build our empirical model in the next section on the basis of these findings.

#### **4. EMPIRICAL MODEL**

In order to manage risk effectively, it is important for the KIE to sense technical and market opportunities and to seize them strategically. That is, a KIE can manage risk through (a) actively observing and adopting best practices; (b) responding rapidly to competitive moves; (c) changing practices based on customer feedback; (d) actively and regularly considering the consequences of changing market demand in terms of new products and services; and (e) being quick to recognize shifts in the broader market (e.g. competition, regulation, demography). All these factors were reflected in the survey. A quite extensive and diverse literature has extensively referred to these issues and offered advice for accessing the requisite capabilities (e.g., Culp, 2011; Ebben, 2005; Nocco and Stulz, 2006; Perez-Luno and Cambra, 2013). Extant literature has by and large focused on large incumbent companies, however, leaving much to be desired in terms of systematic empirical evidence addressing young small companies (Verbano and Venturini, 2013).

Another way of managing risk may be networking with other firms. Through networking, a firm can obtain the necessary complementary assets/resources and valuable information that are required to manage risk effectively. The KIE can form networks with other firms through strategic alliances such as R&D agreements, technical cooperation agreements, licensing agreements, subcontracting, marketing/export promotion, and/or research contract-out. A large volume of literature on alliances and networks has arisen over the past three decades but interest in small business and start-ups is much more recent. On the whole, this literature indicates cooperative agreements and network strategy as a critical element in determining survival and prosperity of young and small companies (Colombo et al., 2006; Street and Cameron, 2007; Schoonjans et al., 2013).

##### **4.1. Model Specification**

We run probit models for internal risk management and networking where the dependent variable is a binary construct.

$$\text{Strategy}_i / \text{Network}_i = \beta_1 + \beta_2 \text{Technology risk}_i + \beta_3 \text{Market risk}_i + \beta_4 \text{Financial risk}_i$$

$$\begin{aligned}
& + \beta_5 \text{Operation risk}_i + \beta_6 \text{Competition risk}_i + \beta_7 \text{IPR risk}_i + \beta_8 \text{Timing risk}_i \\
& + \beta_9 \text{Recruiting risk}_i + \beta_{10} \text{Firm size}_i + \beta_{11} \text{Firm age}_i + \beta_{12} \text{Education}_i + \epsilon_i \\
& , \\
& \text{for } i = 1, \dots, N \text{ firms}
\end{aligned}$$

The error term is assumed to be normally distributed.

#### 4.1.1. Dependent variables

(i) **Strategy.** The firm was asked to indicate to what extent it agrees or disagrees with the strategic actions to sense and seize opportunities. *Strategy* is coded as 1 if the firm uses at least one type of strategy above: (a) actively observing and adopting best practices; (b) responding rapidly to competitive moves; (c) changing practices based on customer feedback; (d) actively and regularly considering the consequences of changing market demand in terms of new products and services; and (e) being quick to recognize shifts in the broader market (e.g. competition, regulation, demography). *Strategy is coded as 0 otherwise.*

(ii) **Network.** The firm was asked to indicate the types of formal agreements it has engaged in. *Network* is coded as 1 if the firm has often or very often participated in at least one of the different types of formal agreements mentioned earlier including: R&D agreements, technical cooperation agreements, licensing agreements, subcontracting, marketing/export promotion, and/or research contract-out. *Network is coded as 0 otherwise.*

#### 4.1.2. Independent variables

**Technology risk.** The technology is likely to be unproven and the application yet to be demonstrated. Development may take longer than expected, may not work, or may be superseded by competitors. Respondents were asked to indicate to what extent technology risk and uncertainty has been an obstacle to setting up and operating the company. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”).** Higher values represent higher levels of perceived financial risk.

**Market risk.** It is difficult for investors to assess the market potential for products that may not exist or which may create a new market. Respondents were asked to indicate to what extent market risk and uncertainty has been an obstacle to setting up and operating the company. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”).** Higher values represent higher levels of perceived market risk.

**Financial risk.** Fears of losing significant amounts of money on the part of prospective investors in a new company results in unwillingness to provide funding. Respondents were asked to indicate to what extent difficulty in finding the necessary funding has been an obstacle to setting up and operating the company. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”)**. Higher values represent higher levels of perceived financial risk.

**Operation risk.** Operation risk relates to external factors that operate as barriers to setting up and operating the company. Respondents were asked to indicate to what extent changing taxation regulations, high tax rates, time consuming regulatory requirements for issuing permits and licenses, rigid labor market legislation, and corruption (government officials’ favoring well connected individuals) were felt to create such barriers. Responses for each item were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”)**. Responses to the various items were combined to create this variable. Higher values represent higher levels of perceived operation risk.

**Competition risk.** The presence of many business competitors with uncertain behaviour creates difficulties for the firm. Respondents were asked to indicate to what extent the activities of their competitors are unpredictable and competition is very intense. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“completely disagree”) to 5 (“completely agree”)**. Higher values represent higher levels of perceived operation risk.

**IPR risk.** Having appropriate legislation property rights protection in the books does not suffice to appease entrepreneurs when enforcement is lagging. Respondents were asked to indicate to what extent poorly enforced property rights, copyrights and patent protection operate as barriers to setting up and operating the company. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”)**. Higher values represent higher levels of perceived IPR risk.

**Timing risk.** KIEs are often characterized by short ‘windows of opportunity’ such that they might be unsuccessful if they enter the market too late, or too early. Our assumption here was to approximate the window of opportunity with the product cycle. Respondents were asked to indicate whether in their core industry the life cycle of products is typically short. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“completely disagree”) to 5 (“completely agree”)**. Higher values represent higher levels of perceived timing risk.

**Recruiting risk.** It is quite frequently argued by industry, and small knowledge-intensive companies in particular, that a major problem is to locate well qualified personnel. Respondents were asked to indicate to what extent difficulty in recruiting highly-skilled employees has been an obstacle to setting up and operating the company. Responses were weighed through a **five-point Likert-type scale ranging from 1 (“not at all”) to 5 (“to a great extent”)**. Higher values represent higher levels of perceived recruiting risk.

### 4.1.3. Control variables

**Firm size.** The number of workers measures firm's size. This variable controls for the possibility that bigger firms might have different attitude toward risk management.

**Firm age.** The number of years since the firm's establishment. This variable controls for the unobserved firm characteristics because firms that have survived long in the market may be qualitatively different in terms of managing risk from those that have not.

**Education.** The first founder's educational attainment with higher values indicating higher levels of education is included (i.e. elementary = 1, secondary = 2, bachelor = 3, postgraduate = 4, Ph.D. = 5). This variable controls for the possibility that the educational attainment of the entrepreneur may be associated with decisions to behave strategically and the decision to participate in networks when the KIEs perceives risk.

**Sector and Country dummy** variables are included to control for potential sector and country specific effects.

Table 4 shows the descriptive statistics for the independent variables and controls. Table 5 presents the econometric results.

[TABLES 4-5 ABOUT HERE]

## **4.2. Discussion**

### 4.2.1. Strategically sensing and seizing opportunities

The results of this analysis are presented in column 1 of Table 5. Both technology risk and operation risk affect the firm's propensity to act strategically positively. That is, the higher the perceived technology and operational risk, the higher the firm's incentive to actively try manage it by adopting good practices, responding rapidly to competitive moves, reacting to customer feedback, and/or observing and reacting quickly to changing market conditions.

In contrast, the coefficients on market risk, competition risk, and IPR risk are negative and statistically significant. They indicate that higher market uncertainty, strong perceived competition and inability to break through competitors' practices, and poor IPR protection are inversely related to active risk management efforts. In the presence of such factors firms may become more conservative and defensive of established strategy.

The positive and statistically significant coefficient on firm size indicates that relatively bigger firms are more likely to manage risk strategically. Given that the companies in our sample are all on the smaller side – established in the past 2-8 years – this result

essentially shows a rapid increase in awareness as companies evolve from micro to small to medium size.

#### 4.2.2. Networking

The results of this analysis are reported in column 2 of Table 5. The perceived technology risk, market risk, financial risk, and recruiting risk positively affect the likelihood of the firm engaging in networks. High technology, market, financial, and recruiting risk will increase the general level of uncertainty in the market. Firms will try to check these risks and overcome such market uncertainty by entering into collaborative agreements of various kinds.

The coefficients on competition risk and timing risk are negative and statistically significant. Severe and unchecked competition and commercial success perceived to be highly dependent on market timeliness raise uncertainty and make companies less likely to cooperate under fear they might lose their competitive advantage and not be able to move quickly.

The positive and statistically significant coefficient on firm size and education indicates that bigger firms as well as firms with better educated entrepreneurs are more likely to participate in networking.

#### **4.3. Summing up**

The findings reported above can be summarized as follows:

1. Technology risk is positively related with both strategic reaction to mitigate risk and with networking.
2. Competition risk is negatively related with both cases strategic reaction to mitigate risk and with networking.
3. Market risk, financial risk, and IPR risk are negatively related with strategic reaction to mitigate risk while they are positively related with networking.
4. Timing risk is positively related with strategic reaction to mitigate risk while it is negatively related with networking.
5. Firm size is positively related with both cases strategic reaction to mitigate risk and networking.
6. Education of the entrepreneur is positively related to networking.

The clearest message comes with technology risk: companies treat it as unsystematic (diversifiable) and, consequently, manage it actively and try to decrease it through

networking. Timing risk is also diversifiable and thus actively managed. On the other hand, competition risk, market risk, financial risk, and IPR risk as defined herein appear to be considered systematic and do not lend themselves easily to management. Networking emerges as a tool companies use in trying to defend against them, with the exception of excessive and unchecked competition.<sup>4</sup>

## 5. CONCLUSION AND POLICY IMPLICATIONS

“Innovation without risk is paradoxical because the process by which risk is most naturally addressed quite often *is* innovation – replacing the old with the new often makes the world a safer place” (Culp, 2011). A better place too, we would add. Entrepreneurs enter the market with innovative ideas and products designed to fix a problem or make something better or make something altogether new. To ignore risk is foolhardy and for those who consider themselves able to think outside the box, embarrassing. Starr et al (2003) and IBM (2011) discuss the global links that make a firm resilient. Having a sound risk management strategy goes a long way toward the long-term success of a venture, especially a new one.

The literature provides little specific information on risk management in new entrepreneurial ventures. This paper addressed this topic and presented an attempt to empirically relate the influence of various types of risk on risk mitigation strategies of young knowledge-intensive enterprises (KIEs). The analysis was based on a new extensive database of KIEs spanning ten European countries and eighteen sectors. The KIEs in question had been formed within the 8-9 years prior to the undertaking of the extensive survey that provided extensive detailed information on 4,004 of them. Some of the important results are worth recounting here.

An obvious risk reduction procedure was the establishment of new companies in areas in which the entrepreneur has had significant experience prior to establishing the company. More than four-fifths of the surveyed entrepreneurs graded prior work experience in the current activity field as of high or very high importance, while three quarters graded market knowledge similarly, and more than two-thirds graded technical/engineering knowledge and networks built during previous career similarly.

They funded the new ventures by and large with own financial resources: more than nine in ten using own resources extensively. Few of the surveyed entrepreneurs had accessed venture capital or bank funding. The large majority reported having strong competition in terms of both quality and price. Competitive advantage was created by the capacity to adapt products / services to customer needs, followed by product / service quality and novelty. Market risk / uncertainty was the most important perceived obstacle to company growth, followed by funding difficulties (funding risk) and difficulties in recruiting high-

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<sup>4</sup> To the best of our understanding, there is no broadly accepted distinction between diversifiable and systematic risks in the literature. Our distinction in this paper is based on the regression results reported in Table 5 regarding company efforts to actively manage.

skill employees (recruiting risk). Lack of technological know-how and technology risk / uncertainty were the two factors at the bottom of the obstacle list.

A slew of factors were considered important barriers for operating the company, including taxation, bureaucracy, and legislation for competition and property rights. Listed in terms of importance: frequently changing taxation regulations, high tax rates, bureaucracy for permits and licenses, poorly enforced competition legislation, and weak intellectual property protection. These make up systematic risks that must be considered in the business plan.

Interestingly, then, our empirical analysis associates the clearest message with the factor that interviewed entrepreneurs considered the easiest risk to deal with: technology. Companies treat technology risk as unsystematic (diversifiable) and, consequently, manage it actively and try to decrease it through networking. Timing risk is also diversifiable – depends largely on company circumstances – and is, thus, actively managed too. On the other hand, competition risk, market risk, financial risk, and IPR risk seemed to be considered systematic – largely depending on external factors – and, consequently, do not lend themselves easily to management. There was an inverse relationship between this set of four risks and active risk management. One should observe here that market risk and financial risk were placed (in that order) at the top of the list of the obstacles to a successful operation. Networking appears to be a way companies try to defend against them as well as against IPR risk.

The only risk category that did not give us statistically significant results regarding risk management was recruiting risk which had been reported as one of the most important obstacles in the survey. Positive signs for the coefficients were the expected ones – the risk is diversifiable and, thus, positively manageable. But the companies apparently attributed part of their difficulties in the absence of qualified personnel for hire, a problem they could not rectify on their own easily. Seemingly, this risk led them to more cooperative agreements.

Finally, within this population of relatively small companies, growing size is associated with higher/better risk management and, in conjunction to better educational background of the entrepreneurs, increases the likelihood of networking.

Important policy implications arise from this analysis. They are predicated on the view that the public sector (a) concentrates on the gaps/weaknesses of the private sector and (b) selects areas of intervention for maximum impact. Three clear messages emerge:

- The government should primarily concentrate in assisting young entrepreneurial companies with factors that create systematic risks, i.e., risks that the companies cannot hedge or diversify.

These include financial risk and IPR risk. In particular, setting up an efficiently functioning financial system that allows young entrepreneurial companies access to various sources and types of financing is key. Moreover, setting in place a transparent

and well functioning intellectual property protection regime is instrumental for knowledge-intensive enterprises.

On the other hand, market risk and competition risk, while also perceived by companies as systematic, do not lend themselves easily to government intervention. This is because the public sector is notoriously incapable of assessing the market potential of new products (beyond those that it itself utilizes such as for defense). It is also difficult to see how the government can alleviate competition risk for a company without falling back into practices of picking winners. Of course, there is a lot of legitimate role for public policy in maintaining well functioning markets and healthy competition.

- Seemingly there is little room for direct government intervention in alleviating technology risk for young KIEs.

Such risk appears the easiest for individual companies to deal with: they treat it as unsystematic, manage it actively, and decrease it by networking. Needless to say, there is a very important role for the public sector in supporting the scientific and technological context within which firms pursue their specific goals.

- The government should also concentrate on the factors underlying recruitment risk, reportedly one of the most important obstacles for our firms' growth.

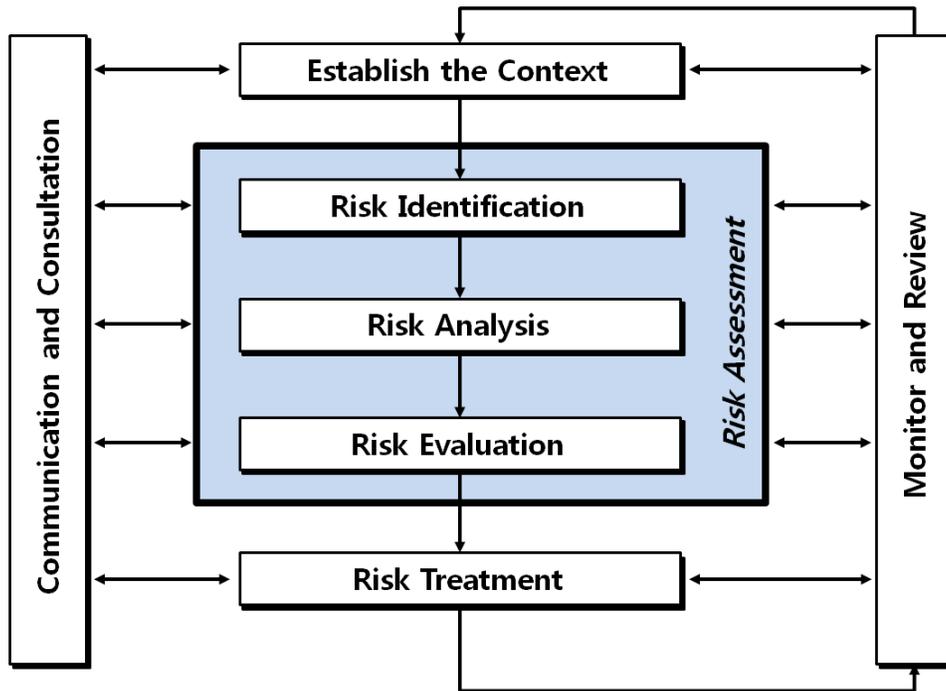
Availability of skilled personnel is key. This points at the necessity of well functioning educational systems at all levels, also including vocational and other professional training.

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**Figure 1.** The risk management process of ISO31000:2009 (Purdy, 2010)



**Table 1.** Frequency distribution of surveyed firms, by aggregate sector and country

Country	Sector			Total
	High-tech	Low-tech	KIBS	
Croatia	35	115	50	200
Czech Republic	25	92	83	200
Denmark	34	69	227	330
France	68	196	306	570
Germany	67	160	330	557
Greece	22	184	125	331
Italy	57	316	207	580
Portugal	31	170	130	331
Sweden	34	108	192	334
United Kingdom	47	192	332	571
<b>Total</b>	420	1602	1982	<b>4004</b>

**Table 2.** Frequency distribution of surveyed firms, by sector

<b>Industry<sup>a</sup></b>	<b>Number of sample firms</b>
<b>High-technology manufacturing sectors</b>	
Aerospace	1
Computers and office machinery	20
Radio-television and communication equipment	35
Manufacture of medical, precision & optical instruments	67
<b>Medium to high technology manufacturing sectors</b>	
Manufacture of electrical machinery & apparatus	45
Manufacture of machinery and equipment	201
Chemical industry	51
<b>Medium to low technology manufacturing sectors</b>	
Basic metals	31
Fabricated metal products	214
<b>Low-technology manufacturing sectors</b>	
Paper and printing	618
Textile and clothing	209
Food, beverages and tobacco	297
Wood and furniture	233
<b>Knowledge Intensive Business Services (KIBS)</b>	
Telecommunications	24
Computer and related activities	518
Research and experimental development	71
Selected business services activities	1,369
<i>Total</i>	<i>4,004</i>

Notes: <sup>a</sup>OECD classification based on R&D intensity

**Table 3.**Two sample t-test: Comparison of mean of average growth of sales (2007-2009, end of 2010)

[2 decimals are enough]

	<b>Mean (sales growth, 2007-2009)</b>	<b>Mean (sales growth, 2010)</b>
<b>Owner still in existence</b>	42.80	19.53
<b>New owner</b>	13.48	-8.62
Diff	29.32 t = 2.14 P >t = 0.02**	28.15 t = 1.50 P >t = 0.05**

Note: \*\*: Significant at 5% significance level.

**Table 4.** Descriptive statistics of the variables

<b>Variables</b>	<b>Mean (Std. Dev.)</b>
<b>Dependent Variables</b>	
<i>Strategy</i>	.98 (.13)
<i>Network</i>	.85 (.3)
<b>Independent and Control Variables</b>	
<i>Technology risk</i>	2.28(1.21)
<i>Market risk</i>	3.23 (1.20)
<i>Financial risk</i>	3.02 (1.50)
<i>Operation risk</i>	.90 (.30)
<i>Competition risk</i>	3.29 (1.27)
<i>IPR risk</i>	2.33 (1.39)
<i>Timing risk</i>	2.62 (1.51)
<i>Recruiting risk</i>	2.99 (1.42)
<i>Firm size</i>	10.90 (37.73)
<i>Firm age</i>	7.12 (2.17)
<i>Education</i>	

Note: \*\*\*, \*\*, \* : Standard errors are in parentheses.

**Table 5.** Econometric results

<b>Estimation Method</b>	<b>(Column1) Probit</b>	<b>(Column 2) Probit</b>
<b>Dependent Variable</b>	Strategy	Network
<i>Technology risk</i>	.113* (.0662)	.0859*** (.0244)
<i>Market risk</i>	-.1813*** (.0679)	.0679*** (.0229)
<i>Financial risk</i>	-.0868* (.0459)	.053*** (.0182)
<i>Operation risk</i>	.5444** (.2763)	.0598 (.0857)
<i>Competition risk</i>	-.285* (.1571)	-.2279*** (.0529)
<i>IPR risk</i>	-.2478*** (.0609)	.0237 (.0205)
<i>Timing risk</i>	.0388 (.0491)	-.0467*** (.0167)
<i>Recruiting risk</i>	.0547 (.055)	.0298* (.0182)
<i>Firm size</i>	.0119* (.0068)	.0032** (.0015)
<i>Firm age</i>	-.0325 (.0346)	-.0087 (.0118)
<i>Education</i>	-.0707 (.0615)	.1282*** (.0221)
<b>Constant</b>	1.832 (.8843)	-7.2527 (.57)
<b>N</b>	3917	3917
<b>Pseudo R-Squared</b>	.1319	.0533

Note: \*\*\*, \*\*, \* : Significant at 1%, 5% and 10 % significance levels. Standard errors in parentheses. Coefficients on sector and country dummies are not reported.

