

Alma Mater Studiorum – Università di Bologna

DOTTORATO DI RICERCA IN

PhD in General Management

Ciclo XXVI

Settori Concorsuali di afferenza: 13/B2 – ECONOMIA E GESTIONE DELLE IMPRESE

Settore Scientifico disciplinare: SECS-P/08 – ECONOMIA E GESTIONE DELLE
IMPRESE

**The Impact Of Inward Licensing On New Venture's Performance
Is inward licensing a winning strategy?**

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Ai miei genitori,
a Giokila

Ora più di allora...

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CHAPTER 1.
INTRODUCTORY SECTION

1.1 INTRODUCTION

“Entrepreneurship plays a dynamic role in the country’s economic activity, and accurate information about new business development and sustainability is essential to establishing public and private programs that encourage new business development”
(Kauffman Firm Foundation, 2008)

1.1.1 Research Background

The dissertation studies the inward licensing phenomenon within the context of new ventures. The research idea stems from the following considerations.

As the traditional in-house R&D models have been replaced for Open Innovation paradigm (Chesbrough, 2003), thus for more collaborative and less integrated means through which manage innovation (Chesbrough, 2003; Laursen and Salter, 2006), the rate, at which markets for technology grow, has dramatically increased (Ceccagnoli & Jiang, 2012). Markets for technology are defined as *“virtual spaces where innovations are exchanged in the form of intellectual property rights, products and services”*(Arora, Fosfuri and Gambardella, 2001). The new model of open innovation requires firms to leverage on external technologies and on external sources in order to feed their innovation capacity and to unlock their internal R&D ability. In a context of knowledge transactions and exchange, licensing deals are acknowledged as one of the main tools chosen by firms to trade know-how and technologies (Anand & Khanna, 2000; Arora & Gambardella, 2010). Accordingly, licensing can be described as an arm’s length contractual deal, used by firms in order to trade know-how and intellectual property (IP) rights (Arora, 1995). As the innovation strategy of firms increasingly shifted to open innovation (Chesbrough, 2003) and firms actively transfer technology to other organizations (Lichtenthaler, 2007), the reliance on inward technology licensing became relevant.

Over the past twenty years, the number of inter-firm licensing agreements has grown faster (Arora & Gambardella, 2010). Streams of research (Gu and Lev, 2004, Arora et al., 2001a, Arora and Fosfuri, 2003, Vonortas, 2003 and Kim and Vonortas, 2006) suggest that licensing is the most used channel for the transfer of technological knowledge among firms, in particular in high-tech

industries. Thus, to gain an empirical understanding of the extent of the explosion in licensing activity, we quote a recent World Bank Survey. It states that “*global royalty and licensing fees have increased at a rate of 81% over the last two decades*” (World Bank report, 2012).

What is even more interesting about the stunning rates of licensing activities are the managerial implications of this trend. Since licensing is becoming a diffused practice in almost every industry, firms started perceiving licensing as an integral part of their business strategy, as a choice to be taken into consideration for their technology strategies. In other words, firms have adopted a new attitude towards licensing: strategic, and no longer, tactical attitude (Lichtenthaler, 2007). Licensing has shifted from an exclusive tool to a pivotal part of business development, of strategic planning and branding. The management of licensing deals, and more broadly of intellectual property, has evolved from a task involving only the legal office to a task involving several business units. Indeed, the role of legal office is to protect company’s intellectual properties, in every forms: patents, trademarks and copyrights. The firm’s business units view the legal right, object of intellectual property, in different ways according to their aims: for the technology office an intellectual property leads to the development of new products. This view is shared by the sale division and by marketing functions that consider intellectual property as a tool to gain and sustain an advantage over firm’s competitors. As a consequence, until recently companies not limited their licensing activities to technologies away from their core business, but they start license also core technologies to firms that were not direct competitors. Although knowledge outsourcing cannot completely replace firms’ internal research and development (R&D), licensing can be used as a complementary part of firms’ overall innovation efforts (Cassiman & Veugelers, 2006). The strengths of this strategy have already been supported continued growth, reduced time to market and created an innovation process that is successful overall. Licensing provides greater strategic flexibility and a larger number of feasible options for novel combinations as compared to solely in-house alternatives (Laursen, Leone, & Torrisi, 2010).

Despite the empirical evidence that the importance of licensing has substantially increased, the researchers have emphasized almost exclusively the supply-side of markets for technology, putting research efforts on the incentives and motives behind firms’ decisions to trade their technologies (e.g., Gans & Stern, 2003; Teece, 1986), overlooking the demand-side of technology transfer, the role of licensees.

We follow this recent trend on licensee’s perspective, transferring the analysis of licensing-in phenomenon within the scenario of new ventures. In other words, our analysis aims at investigating the characteristics and the potential consequences that a new venture has, when it is involved in a

licensing agreement as licensee. Liabilities of newness and smallness, experiential constraints, limited resources, several shortages, rapid technological obsolescence, dynamic environments, continuously changing market conditions, the need to complement and augment in-house activities, still at an embryonic stage, the need to keep up with a rapid rate of technological change and compete by creating innovative products, are factors that foster new ventures to license other companies' technologies (Zahra, 2005). While the benefits and the downsides of inward licensing phenomenon implemented by an established firms have already been investigated, an important issue still remains open: is a licensing-in strategy a winning choice for a new venture?

1.1.2 Overall aim of the thesis

The original idea of my thesis draws on interrelated assumptions: 1) among the tools used, in the markets for technology, for the acquisition of external knowledge, the licensing agreements are acknowledged as one of the most important contractual mechanisms (Anand & Khanna, 2000); 2) the liabilities of newness and the liabilities of smallness force new venture to strongly rely on external knowledge sources. Albeit the relevance of this topic, little attention has been paid so far to its investigation, especially in the licensing context; 3) nowadays there is an increasing trend in licensing practices, but the literature on markets for technology focuses almost exclusively on the incentives and rationales that foster firms' decisions to trade their technologies (Gans & Stern, 2003; Teece, 1986), under-investigating the role of the acquiring firm, the licensee, overlooking the demand side of the market.

Therefore, as already stated, the thesis investigates the inward licensing phenomenon within the context of new ventures.

The licensing-in decision entails the search, acquisition, integration, assimilation, exploitation of external technologies and the subsequent learning from them. Therefore, the main questions that new venture licensee has to address if it decides to undertake an inward licensing strategy, can be summarized as follows:

- 1) Is convenient for a new venture to choose, as initial technology strategy, the implementation of an inward licensing ?
- 2) Does this decision affect its survival probabilities?

- 3) Does the age, at which a new venture becomes a licensee, affect its innovative capabilities? Is it better to undertake a licensing-in strategy soon after founding or to postpone this strategy until the new venture has accumulated significant resources?

Hence, the analysis is mainly focused on the effects of the implementation of an inward licensing strategy on survival probabilities and on innovation performance. We choose to investigate the new venture's decision to acquire external knowledge, through a licensing deal, in the founding years, because we support the literature (Bamford et al., 1999; Aspelund et al., 2005) according to which early decisions have persistent effect and shape the firm's subsequent behaviors in the medium and long-term. We address such research questions using data from a sample of 4,928 US new ventures based on the survey conducted by the Kauffman Firm Survey, as explained in more detail in the next section.

In sum, this research project aims at disentangling the concept of inward licensing in the new ventures' context, at enriching our understanding of the variables that compose a new venture's boundaries and a new venture's technology strategy. We would like to contribute to the licensing literature, exploring the extent to which licensee firms may learn from licensed technologies. Moreover, we could contribute to new ventures growth literature by adding factors that are responsible for new born firms' success or failure. Understanding what influences profitability and growth of new high-technology ventures is of policy interest because of the role such firms play in economic dynamics. Moreover, we could give our contribution to the literature about the resource accumulation in new ventures. A major challenge for entrepreneurs is to decide how best to accumulate resources required for exploiting their opportunity. Early resource choices have significant impact on survival and growth of new ventures (Alvarez & Busenitz, 2001). Exploring the consequences of choosing an inward licensing strategy as a tool to increment initial resource stock in the founding year is a trigger issues.

1.1.3 Structure of the thesis

The thesis is organized as a collection of three papers. Each of them provides different insights of the same phenomenon - technology in-licensing within the context of new ventures – inserted in different theoretical frameworks of reference. With the exception of the first paper, that only provides descriptive analysis on the characteristics that distinguish a new venture licensee from a new venture non-licensee, they share the same methodology of analysis - regression analysis on

confidential data gained by the Kauffman Firm Foundation. However, the two empirical papers employ different econometric model specification according to their research questions.

The first paper, “**New Venture’s Inward Licensing: Who and What?**”, presents a general overview on the role of technology licensing in the markets for technology, providing empirical evidence of the intensity of licensing, its evolution, the characteristics, motivations and obstacles met by companies doing or willing to license (Zuniga and Guellec, 2009; Radauer and Dudenbostel, 2013). Since a license agreement involves two parties, the licensor who supplies the technology and the licensee who gets permission to use this technology, both the licensing-out and the licensing-in activities are wide spreading. Therefore, the researchers have been called for a deeper understanding of the demand-side of licensing agreements. (Arora et al., 2001; Cesaroni, 2004; Tsai and Wang, 2007; Arora and Gambardella, 2010; Leone and Reichstein, 2012; Wang and Li-Ying, 2012). We attempt to accommodate the recent trend on licensee’s perspective, providing further insights into the new ventures literature. Although literature, stressing the positive contributions of developing innovation with collaboration of external partners¹, proposes that especially new and small firms rarely have the resources and capabilities necessary to respond to the innovation demands (Yli-Renko et al., 2001), few studies have investigated the inward licensing phenomenon in the new venture context. We examine the characteristics of new ventures that decide to implement an in-licensing strategy.

In developing this research project, we rely on the comprehensive Kauffman Firm Database. The KFS is the largest longitudinal panel with an initial sample of 4.928 US firms that began operations in 2004, surveyed annually from 2004 to 2011. We will exhibit some descriptive statistics based on this sample, in order to highlight the characteristics of licensee new ventures as compared to the rest of the sample (for instance in terms of size, industry, financing method, firm’s origin). We do believe this is a necessary step in order to have a clearer understanding of the licensing-in phenomenon in the case of new ventures.

Our main findings are the following:

- The new ventures licensees come from the manufacturing industry, while their counterparts come from the professional, scientific, and technical services.
- The new ventures licensees are usually smaller than their counterparts.

¹ From the perspective of learning and innovation (Tsai et al., 2007), inward technology licensing is a particular type of external technology acquisition

- An higher number of new ventures licensees, compared to non-licensees, born as a purchase of franchise.
- The new ventures that make use of inward licensing are products- providers.
- Licensees have constantly higher level of debt and equity.
- New ventures that decide to be involved in a licensing agreement as licensee are products provider rather than services provider.
- The number of new ventures that in-license copyrights and trademarks is higher than those new ventures that in-license patents.

This study has an exploratory approach, therefore its limitations are straightforward. Future researches should assess in a more systematic and robust way the antecedents of the licensing-in choice, using more sophisticated econometric approaches. One of them could start from the most counterintuitive finding emerged from our analysis: new ventures are more likely to license-in copyrights and trademarks rather than a patent. Accordingly, first, future researches should be focused on a deep investigation of the rationale that makes a new venture more willing to acquire a copyright or a trademark, through a licensing agreement, rather than a patent. Second, since the database on which we work is entirely made of firms born in United States, it should be helpful to work out a study, similar to the one we are describing, but considering differences across countries. Third, the analysis could be completed by taking into account information about the tools by which licensors get in touch with licensees. This point is, according to us, relevant because the search of the right partner is a long and time-consuming process that for a new is even more challenging than for an established firm.. Fourth, the information about licensing deals at our disposal are exclusively linked to the probability that a new venture becomes a licensee or not. It would be more stimulating enrich the base of data adding details about the characteristics of the technologies exchanged and the commercial terms of the transactions.

In sum, this first paper has to be considered in light of some limitations and patterns on which develop future researches, but it still provides a rich insight into the specificities of new ventures adopting a licensing-in strategy. For this reason, the present study facilitates the interpretation of the results of the next empirical papers. A major outcome, indeed, regards the difficulty of directly comparing licensee vs non-licensee startups, given the presence of systematic differences between the two groups. This suggests the importance of adopting more sophisticated matching techniques, such as propensity score methods, in the analyses of the two groups. This is exactly the approach we will follow in our next chapter related to the survival chances of licensee firms.

The second and third papers focus on empirical issues.

The second paper, **“Effect Of Inward Licensing On New Venture’s Survival”**, deals with the impact of inward licensing on new born firm’s survival probabilities.

The several shortages deriving from the liabilities of newness and the liabilities of youngness, that characterize a newly established firm, constrain a new venture to strongly rely on external sources, in order to overcome those shortages. In spite of the relevance of this topic, the impact of external acquisition on new born firm’s longevity has not been investigated yet, especially in the licensing context. Based on arguments mainly from the resource based view theory and the literature on the relevance of initial conditions, we advance an hypothesis centered on a negative relationship between the decision of a new venture to be a licensee in its founding year and its likelihood to survive. This hypothesis is corroborated by the multinomial logit survival analysis: a new born firm, that chooses, as initial technology strategy, to acquire knowledge externally developed through a licensing agreement, has lower probability to survive than its non-licensees counterparts, as result of longer speed to market process.

Using the confidential version of panel data from the Kauffman Firm Survey, through propensity score matching procedure, we create a database of 260 new ventures, 130 licensees in their founding year and 130 non-licensees. Therefore, we compare the survival rate of a sample of 130 new ventures that decide to apply an inward licensing strategy in its first year of existence and the survival rate of a control group of 130 new ventures that, in its first year of existence, do not acquire external knowledge through a licensing agreement. We choose to analyze the implementation of this strategy exclusively in founding year because, embracing the (Bamford et al., 1999; Aspelund et al., 2005), we stand by the belief that early decisions adhere with the organization and engrave the firm in the long term. The results from our regression analyses show that the new ventures that decide to acquire a knowledge asset, externally developed, in its first year of existence runs the risk to be slower in reaching the market than a new venture that is not a licensee in early stage of its development. The higher the number of years until the first sale, could be one of the main cause for the lower survival probabilities.

This article contributes to the literature in several ways. First, it addresses the inward licensing phenomenon in the context of new ventures, assessing whether it enables the licensees to have a higher or lower probabilities of survival than non-licensees. Therefore, the present study advances the discussion on the role of inward licensing from a new venture’s viewpoint. Second, while prior

researches have mainly focused their attention to the investigation of the effect of owner characteristics and capabilities, grouped into the categories of human, social, and financial, on the likelihood of firm survival., this study adds a reason why a new venture is forced to stop its operation, a wrong initial technology strategy. Third, since we have chosen to evaluate the impact of an inward licensing strategy, applied in the first years of existence, on new venture's survival probabilities, our study could supplement existing literature on the effects of new venture founding conditions. Fourth, the present study contributes to the markets for technology literature: the literature on markets for technology has not determined whether in-licensing is a winning strategy for new ventures.

The paper has limitations related mainly to the nature of licensing agreements and patents. Due to the lack of data relatively to each licensing agreement and to the attributes of the parts involved in the agreement, we cannot control for the similarities or differences in the two parties' current knowledge base. In developing the present article, we have investigated exclusively on a single tool through which acquire external developed knowledge, the inward licensing, but the impact of other channels, different from licensing agreement, on survival could be an interesting issue to be analysed. Moreover, our approach centres its attention on inward licensing in one period of time and this remains a severe limitation of the study. However, with future researches, it will be possible to examine whether the being a licensee, not only in the founding year, changes over time its impact on survival rates.

Finally, in the third article,

“A Study Of The Influence Of Learning Sequences On New Venture's Innovation: The Moderating Effect Of Founder's Experience”, we employ the capabilities literature and the organizational learning literature to shed light on implications of learning sequences adopted by new ventures on their innovative performance. Our focus is on the effect exerted by age at which a firm starts learning, following an indirect pattern, on its ability to be innovative. In particular, we investigate the impact of two alternative initial learning paths: direct-indirect and indirect-direct learning respectively. Consistent with Schwab (2007), direct learning entails that a firm learns from its own background, while some indirect learning implies learning from others' course of actions (Ingram, 2002). In particular, the most investigated processes through which direct learning takes place are trial and error, experimental learning and improvisational learning, while the most investigated process through which indirect learning takes place is the vicarious learning, which occurs as firms observe actions implemented by other firms and then change their own behaviour

consequently (Haunschild and Miner, 1997). In vicarious knowledge acquisition, firms learn from the experience of others, by observing them in networks, or through licensing, strategic alliances or strategies of collaboration (Fletcher and Harris, 2012). The case we analyse in this study is vicarious learning through licensing. We postulate that the timing at which a firm chooses to start learning indirectly impacts on its innovative outcomes. Consistent with Fletcher and Harris (2012), we choose, as tool through which firms learn indirectly, the inward licensing strategy. Based on Kauffman Firm Foundation Enclave Database, we find that the new ventures that decide to rely later on the indirect learning process exhibit a better innovative performance than the new ventures that decide to learn indirectly in the first years of existence. This relationship is negatively moderated by prior entrepreneurial experience, in terms of industry and start-up experience. We will try to demonstrate whether and how the age at which a firm decides to rely on indirect learning approach has an impact on its capacity to be innovative. In order to achieve our objective, we analyse a sample composed by 276 new ventures, extracted from the 4,928 firms included in the Kauffman Firm Database. Among them, 140 follow the indirect-direct learning path and 136 follow the direct-indirect learning path. Rephrasing in light of timing at which the indirect learning starts, 140 new ventures decide to start learning indirectly in first two years of their existence applying an inward licensing strategy and they are labelled as “early indirect learners”, while 136 start rely on indirect learning approach, implemented an inward licensing strategy some years after their founding and they are labelled as “late indirect learners”. We measure the innovation output of the new ventures using information on patent filings and new product introduction included in the Kauffman Firm Foundation Enclave Database. The results of our regression analyses show that new ventures that decide to rely later on the indirect learning process exhibit a better innovative performance than the new ventures that decide to learn indirectly in the first years of existence. This relationship is negatively moderated by prior founder’s entrepreneurial experience, in terms of industry experience and start-up experience.

We find that being a late indirect learner is positively associated with an increase in firm patenting activity in the years subsequent to the licensing deal. That is to say, late indirect learners have higher probabilities to introduce innovation than early indirect learners. Indeed, firms that start their own operations in an autonomous way, relying on experiential and direct learning, build a better articulated system of internal capabilities and better developed “learning by doing” process. In so doing, a new venture avoids the risk of casual ambiguity and partial learning.

Given that the aim of the study is to make evidence of the importance of learning sequences, and specifically of the impact of initial learning sequences, on firms’ innovation outputs, the main contribution of the present study is revealing whether there are convenient learning sequences and

how they differentially influence firm's innovative implications. Therefore, we would like to enrich the recent stream of research on "learning sequences" (Bingham et al., 2012) and the organizational learning literature within the context of new ventures. Related to the organizational learning literature, our findings challenge the "learning advantages of newness" thesis (Autio, Sapienza, and Almeida, 2000). While it suggests that the earlier the firm is committed in international activity, the higher the degree of success of its learning efforts, we find that, even if our framework is not applied in an international entrepreneurship framework, the older a new venture, the faster in learning and developing innovation. Moreover, since we choose to analyse the inward licensing strategy as a process through which follow an indirect learning pattern, we could also contribute to the licensing literature, investigating the role of new venture as licensee. We add novel insights on learning-by licensing as a relatively unexplored area in the literature on entrepreneurial firms. The literature stream on the demand side of markets for technology has largely ignored the fact that firms can use technology licensing-in as a learning mechanism connected to their overall innovation strategy. Therefore, this present study could fill this gap and contribute to the technology licensing research stream (Arora et al., 2001; Fosfuri, 2006; Laursen et al., 2010; Leone & Reichstein, 2012). The main limitations of the present study are mainly related to the need to examine learning sequences in a larger number of firms, within a wider range of industries, and to the variable used as indicator of innovation performance. We measure the firm's innovative capability relying on the raw count of patents, but other measures could be performed.

Each paper stands as a single independent chapter of the thesis. However, in order to get introduced in the flow of thought, the theoretical section comes first. A general overview of licensing literature is provided with the aim of identifying the research questions and to highlight the relevance of using the selected theoretical framework to investigate the same phenomenon from different angles. The three research papers are then developed in the subsequent chapters.

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1.2 LITERATURE REVIEW

This section aims at providing a general review of the literature on the licensing topic.

Given that each of the three papers, of which the thesis is composed, provide a distinct insights of the licensing phenomenon, analysing it from different angles and from different theoretical frameworks of reference, the current section is not processed in order to provide a comprehensive and exhaustive review of the topic we are investigating, the licensing.

1.2.1 The relevance of inward licensing strategy

This research project aims primarily at investigating the impacts of inward licensing strategy in the scenario of newly established firms. Specifically, attention has been paid to the effect that a licensing-in strategy exerts on survival performance and innovation outcomes. To achieve this objective, we proceed examining the consequences that the implementation of a licensing-in strategy, at a particular point in time, has on new venture's performance in terms of survival rate and innovative outcomes.

The relevance of the phenomenon is twofold: theoretical (1) and empirical (2).

(1) The constantly increasing rate of licensing practices has stimulated the interest of literature and boosted research production on this topic over the last few decades (Bessy, 2002). The growing trend in the licensing activities has addressed scholars' efforts on both economic and strategic determinants underpinning this pattern. In the theoretical investigations, the licensor's dilemma (Fosfuri, 2006), that consist in choosing whether to license out technologies or exploit them for internal activities, has been over-investigated, while exclusively a small number of previous studies have inspected the licensing phenomenon from the licensee's point of view (Atuahene-Gima, 1993; Atuahene-Gima and Patterson, 1993; Lowe and Taylor, 1998). Since a license agreement involves two parties, the licensor who supplies the technology and the licensee who gets permission to use this technology, both the licensing-out and the licensing-in activities are wide spreading. A survey of organizations in OECD countries (2004) verifies that both established and new firms have intensified their propensity to license-in and to license-out technologies. Nearly 60% of interviewers pointed out that they had direct experienced of a spread in both inward and outward patent licensing over the past years, and more than 70% foresaw inward licensing to enlarge further in the next 5 years. To gain a more complete understanding of the dynamics underlying the

licensing phenomenon, is imperative for researchers to take into account the demand side of licensing deals as well (Arora et al., 2001; Cesaroni, 2004; Tsai and Wang, 2007; Arora and Gambardella, 2010; Leone and Reichstein, 2012; Wang and Li-Ying, 2012) Even though, in the last years, scholars are shifting their attention to the investigation of licensee's role, the new venture as licensee is still an open issue to be explored (Atuahene-Gima, 1993; Zahra et al., 2005; Tsai et al., 2008). We would like to contribute to this recent trend on licensee's perspective, providing further insights into the new ventures literature, considering new venture as a licensee.

(2) Empirical evidence demonstrates that licensing agreements are becoming a well-established business tool and a diffused practice in every industry. Arora and Gambardella (2010) report some empirical data to demonstrate the increasing licensing activity: of the European firms interviewed and involved in licensing activities in 2006, approximately 45% showed a raise in revenues deriving from licensing or the number of licensing deals in which they are committed, although only 8% registered a substantial increase in either. Only 3% of the firms reported a decrease, with most (slightly more than 50%) indicating no change. Robbins (2006) appraises that technology licensing alone valued as much as \$60 billion of receipts by US corporations in 2002, and Athreye and Cantwell's (2007) analysis of World Bank data suggests substantial growth in international licensing. There is an increasing number of firms that perceive technology licensing as a fundamental part of firms' business strategy, as an integrated part of a longer term plan, that involves not only peripheral activities but also core business activities. As proof of this, we highlight some meaningful sentences reported from the survey conducted by Litchenthaler in 2012. "Licensing is not always an either-or decision. . . it often goes along with product innovation" (R&D manager, chemical firm). - "Basically, we have no choice. . . we have to cross-license technology to keep our competitive position in the product markets" (Innovation manager, electronics firm). - "Without cross-licensing many of our technologies, we could not successfully develop our products because our operating freedom would be strictly limited" (Head of R&D, semiconductors firm). - "The implementation of our licensing and cross-licensing agreements is critical for new product performance. . . and we often face problems that arise in transferring technology" (Head of R&D, electronics firm). - "Technology licensing is not a stand-alone activity. . . we strongly profit from related product development expertise" (Marketing manager, machinery firm). - "Without internally developing a product prototype, we would not have been able to license this technology" (Business development manager, automotive firm).

- “Our licensing revenues cover more than the costs of the licensing activities. . . the indirect benefits on product innovation may be even larger, but they are difficult to calculate” (R&D manager, chemical firm). - “One of our competitors achieves higher profits by closely coordinating product development and licensing” (Innovation manager, electronics firm).

In addition to those assessments, we report two examples from the pharmaceutical sector, in order to highlight the stunning rate at which licensing activities are expanding and their relevant importance for successful innovative outputs. Regarding to a technology recently licensed to develop drugs at the preclinical stage, the CEO of Iris Pharma affirms: “*Using this new device into our preclinical models will improve them greatly. We will be able for example to assess many other endpoints [...]*”. Reporting another example, the executive director of process science at *Boehringer Ingelheim* states that “*We will be able to leverage BaroFold's high pressure refold technology on a variety of proteins under development [...]*”. Those descriptions suggest that licensing-in is used by firms to gain access up to the minute technologies and advance in an efficient way their innovative capacities (Atuahene-Gima, 1993; Leone & Reichstein, 2012).

Licensing activities are wide spreading not only between different companies, but also between different continents, as suggested and demonstrated in a recent report, Patev (2013). The world’s biggest license payer is Ireland, at US\$38 billion a year. This data is the result of the special tax arrangements between Ireland and other countries. The biggest contributor in terms of licensing payments are East Asia and the Pacific region, followed by Europe. At the top of the rank of receiver of licence fees we find North America, with US\$109 billion for year. According to a survey conducted in 2007 by the Organisation for Economic Cooperation and Development, the European Patent Office and the University of Tokyo, Asian companies are more likely to take an active role in markets for technology, selling and buying their technologies, than European companies. Rephrasing this finding in mathematical terms, only the 31% of European firms are prone to share their intellectual properties compared to the 74% if Japanese companies that are used to deal with licensing agreements. This result reflects the extent to which the ‘not-invented-here’ syndrome is boundless in Europe.

Out of 3779 inter-firm agreements, from 1995 to 2012, reported by the SDC Platinum database, 1362 are licensing agreement among established and new firms. The increasing use of inward licensing among new-born ventures is demonstrated by data provided by Kauffman Foundation. On 4.928 new businesses founded in 2004, 493 implement an inward licensing strategy in their

founding year, of which 135 acquire from external sources patents, 177 copyright and 181 trademarks. All of this seems to suggest that the determinants and the effects of inward licensing on new venture's innovative and economic performance is a worthwhile issue for research.

1.2.2 Literature review

The literature has tended to separate analysis of the determinants, rationales according to which firms choose to license-out and license-in technology (Arora and Gambardella, 2010). We follow this division here. Studies on licensing activities and practices proliferated since the 1980s.

The propensity to licensing-out technologies is the most studied topic in the licensing literature. Several authors have provided insights on the factors affecting the likelihood of licensing-out decisions. Our starting point is the analysis of the rationales underlying the decision to licensing-out, placing ourselves from the licensor's perspective.

In trying to understand the determinants of the licensing strategy, we highlight some general characteristics of licensors. Gallini (1984:931) stated that *"in contrast to previous model in which R&D activity deters entry into the product market, firms are encouraged into the product market – via licensing – as a way of deterring them from R&D activity"*. To wit, the author affirmed that an incumbent firm has two alternative strategic choices in order to maintain its dominant position, gaining an advantage over its rivals, and to avoid that new entrants erode its market shares: 1) to create barriers to potential entrants by inventing a new technology slightly earlier than would its rivals (Gallini, 1984; Kats and Shapiro, 1987), exploiting the benefits of a first mover advantages; 2) to license its old technology to its competitors before they commit their internal R&D activities toward a new technology. In both cases, the driving forces to license-out correspond to the licensor's willingness to reduce the threat of new entrants and to prevent the potential depletion of its firm's market position by its competitor's discovery of a better technology. This strategic incentive to license-out reduces licensee's forces to develop internal R&D capabilities.

An alternative motivation would be to license innovation to rivals in order to expand the scale of use of the new technology. Moreover, by licensing their rivals, incumbent firm could achieve a fundamental outcome: the establishment of its technology as a de-facto standard (Arora et al., 2001), allowing to build reputation and reinforce customer's commitment. By contrast, an economic incentive for licensor derives from rents in the form of royalties from licensing. Thus, while

strategic incentive could significantly discourage R&D investments, by hindering the technological progress in the long-run, economic incentives, instead, could enhance it, by empowering the innovation race among competitors.

In case of licensing agreement, bargaining firms could face the double-side moral hazard problem (Arora et al., 2001). It is so called because it refers to the fact the both licensor and licensee have some incentives to behave opportunistically in agreeing on know-how clauses.

On one hand, licensor may license its technology without providing the required know-how to exploit it, on the other hand, licensee, given the possibility of moral hazard on its counterpart, will make the payments after being convinced that the whole technology, as well as the tacit part, has been transmitted. In 2011, Gordanier and Miao posited that the transfer of knowledge is unchangeable: as soon as obtained, it is intricate for the innovator to retreat the knowledge from a licensee (Caves et al., 1983). This corresponds to say that a licensee may be able to make an efficient use of a licensed asset even after the license has expired. Conceptually, if we think of a technology as embodying both tangible assets and intangible know-how, we can conclude that the expire of a license contract may cease the use of tangible assets by past licensees, but it is impossible to prevent licensees from utilizing the learnt technological know-how. The authors label this phenomenon as “technology leakage”. It represents a potential drawback for short-term licensing contracts.

Consistent with Teece’s seminal work (1986) in which it is argued that licensing propensity increases if the innovator could benefit from strong patent protection, Arora and Ceccagnoli (2006) stated that “the propensity of licensing-out technologies depends on the interplay between the appropriability regime and the presence of complementary assets”. Arora and Fosfuri (2003) elaborate a framework in order to understand the rationales that encourage firms to sell their technology, and the extent to which external market conditions, in particular product market and technology market competition, influence this decision. In selecting whether to license or not, the licensor has to place in equilibrium the amount of revenue earned from licensing and the rent-dissipation effect produced as a consequence of the higher level of product-market competition, produced by the licensing agreement. As a result, factors that enhance licensing revenue or that reduce rent dissipation will encourage licensing.

The licensor’s reputation of being a reliable and guaranteed technology provider (Lichtenthaler and Ernst, 2007), the stock of technological knowledge of the provider, the company’s prior experience with licensing, the strength of IPR protection, and the nature of the technology and thus the

fragmentation of downstream markets (Gambardella and Giarratana, 2007) are found to be important stimuli for the propensity to sell technology through licensing agreements (Kim and Vonortas, 2006).

To sum up, if we adopt the licensor's perspective, we can label the majority of researches in 2 categories:

- 1) Determinants of propensity to license out (Lowe and Taylor, 1998; Kim and Vonortas, 2006; Arora and Ceccagnoli, 2006; Fosfuri, 2006; Lichtenthaler 2007; Motoahshi et al., 2008; Grimpe and Hussinger, 2011)
- 2) Optimal form of licensing contracts and payment scheme (Bessy et al., 2002; Dutu and Julien, 2007; Gordanier and Miao, 2011)

Despite the fact that at each licensor corresponds a licensee that chose to in-license external technologies for financial motives that could be to escape from the R&D risks, or strategic motives that could be gain access to technologies otherwise not developable in-house, licensing decision of the licensee has been under-investigated (Atuahene-Gima and Patterson, 1993). Since little examination has been dedicated to the investigation of licensee's perspective, some academics (Caves et al., 1983; Atuahene-Gima, 1992, 1993; Atuahene-Gima and Patterson, 1993; Lowe and Taylor, 1998; Arora et al., 2001; Cesaroni, 2004) began to put the emphasis on the necessity to take into account also the demand side of technology transfers. In 1979, Parry and Waston examined the characteristics of 67 firms that had licensed-in technology from unaffiliated firms. They found a positive relationship between the extent of inward licensing and firm size, R&D expenditure, and number of R&D personnel.

Caves, Crookell and Killing (1983), in their "*The Imperfect market for technology Licenses*", provided the first empirical investigation of the fact that much less is known about the licensee compared to what is known about the licensor. The authors analyzed the determinants of imperfection that characterize licensing deals.

Analyzing these imperfections, it is possible to derive different classes of behavioral predictions (Caves et al., 1983), to determine the circumstances under which it results convenient license-out, the circumstances under which potential licensees will enter such contracts.

Their findings suggested that the obvious advantage that licensee has to enter licensing agreement is to "*secure technology at a cost lower than by developing it afresh*" (Caves et al, 1983; 265). However, their work suggested that licensing-in may be acknowledged as a tool to attain a

privileged channel to technologies according to firms' diversification strategy in which they make use of other already usable assets.

Some years after, Cesaroni (2004) demonstrated, in the following assessment, its willingness to take the opposite perspective, usually taken by other scholars, in studying the influence of market for technology on firm's corporate strategy: "Scholars have mostly explored the supply side of markets for technology. In this study we take the opposite perspective" (Ibidem, 2004: 1547). His findings can be stated as follow: the more easily technologies can be traded on the markets, the higher the probability that internal technological constraints that prevent firm from entering into new product markets can be overcome.

Some other works have provided theoretical and empirical useful insights on the licensing decision of the licensee firm. They investigate different motives and incentives associated to the licensee's behavior. Atuehene-Gima (1992, 1993) investigated some factors affecting the firm's intention or propensity to adopt a technological inward licensing strategy. Those factors are labeled into four groups: firm's characteristics, management characteristics, benefits and costs of inward technology licensing and external factors. Based on four items (the more or less high degree of urgency of the need to license-in; the propensity the firm will in-license in the coming two years; the probability that the licensee will penetrate new markets with new product; the possibility that licensee will enlarge their current product portfolio by licensing rather than by relying on internal development), the inclination to implement an inward technology licensing referred to the firm's aptitude towards inward technology licensing. Amongst other, the most stimulating finding he highlighted was about the effect exerted by the lack of internal new product development capabilities, by the satisfactory inward technology licensing experience and by the felt benefits of the inward technology licensing on firms' propensity to adopt inward technology licensing. Specifically, the lowest the level of their capabilities, the higher the level of perceived benefits from the license and the higher the satisfaction tied with the previous licensing experience, the higher the firm's propensity to license-in.

Following the same logic, Athuene-Gima and Patterson (1993) dedicated their attention to the examination of individual-level factors, and in particular on the perceptions of managers in their decisions to license technology from independent organizations according to their new product development strategy. The main objective of their work was to understand which benefits, costs and risks are involved and which ones have the greatest impact on the firm's decision to license. The study revealed that firms use licensing to acquire new products mainly to meet the more immediate need to gain competitive advantage in the short run rather than having access to future technology.

Lowe and Taylor (1998) found that the two strategies, involved in the licensor's dilemma of developing internal R&D or technology acquisition strategy decision, are complementary rather than substitute. Therefore, the use of licensing requires complementary assets to be already available. This result conducts to twofold relevant consideration. First, licensing is recognized as a strategy to open up the potential of internal capabilities, while the licensee firms apprehend in a passive way. Second, the consequential complementarity-relation presupposes that licensing may not be a relevant diversification strategy if firms deviate too much from their internal existing core businesses (Lowe and Taylor, 1998).

Finally, a further alternative to consider licensee's perspective has been proposed by Ziedonis (2007). He provided interesting insights on the determinants of the licensee's choice. Indeed, after having demonstrated a positive relationship between the level of technological uncertainty and the firm's propensity to purchase an option agreement before licensing, he analyzed the effect of firm characteristics on the level of technological uncertainty. According to the author, a firm makes its decision following the real-option logic. In this respect, recalling the absorptive capacity argument (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998; Zahra and George, 2002), he suggested that both firm's ability to evaluate external technologies, based on its extant technological knowledge base and the degree of familiarity between firm's knowledge base and licensed technologies, declines the possibility to purchase an option before involving in a licensing agreement. This is a consequence of the lower level of uncertainty related to the licensing agreement.

While the researchers have mainly studied the firm's propensity to sell their technologies, the strategic and economic determinants for licensing-in practices are still under-investigated.

More recent works (Leone and Reichstein, 2012; Mulotte et al., 2012; Wang and Li-Ying, 2012; Tsai and Wang, 2009, Laursen Leone and Torrisi , 2010) dedicated attention to licensee's perspective, but the results about the effects of inward licensing strategy are controversial. Among the studies focused on licensee's point of view, the established firms' licensing activities have been investigating. Specifically, the majority of research efforts is addressed to the analysis of the impact of inward licensing on innovation performance. Leone and Reichstein (2012) state that in-licensing fosters invention and, in particular, time to invention is longer for licensees that sign license agreements that contain a grant-back clause compared with licensees that sign license agreements with no grant-back clause. In showing that licensees are faster at inventing, the authors measure the time to invention in months extracted by considering license date as the onset of risk, and date of application for first patent filed after the signing of the license agreement as the transition time. Muloitte et al.(2012) report that the use of in-licensing for initial entry to a business domain can

detract from the performance of subsequent autonomous endeavors in the domain, as a result of superstitious learning and overconfidence produced by the partial learning from in-licensing and ensuing causal ambiguity. The results support this prediction. Firms that relied on pre-entry licenses gained lower sales in their next independent ventures than those that straightway opt for an independent entry. Reporting another recent work, Wang et al. (2012) in demonstrating the empirical implications of “learning-by licensing” concept (Johnson, 2002), take into account the impact of specific licensed-knowledge features, as moderators, on the innovative outcome of licensee firms. The authors measure the innovation results as the cumulative number of patents applied for by the firm within the 5 years after the year in which the licensing deals has been agreed. Cockburn et al. (2010), examining the link that connect fragmented intellectual property rights and the firm’s success in innovative terms, found that firms operating in more fragmented intellectual property contexts have a higher probability of in-licensing. The authors found that the relation between intellectual property dissipation and innovative performance is negative, but exclusively for firms that involved in in-licensing.

Among the few studies on licensee’s perspective, even less have investigated the new venture’s licensee perspective. We try to fill this gap, shedding light on the effects of inward licensing in the context of new ventures.

1.2.3 New Ventures And Licensing

The liabilities of newness and its consequential resource, financial, organizational constraints, experiential biases of which a new venture suffers, are a double-edged sword. On one hand, due to these aspects, a young firm is forced to rely on external sources, on the other, these constraints represent the conditions under which the benefits provided by an inward licensing strategy could be partially suppressed.

Inward licensing can support newly established ventures to accurately advance their products (Kotabe et al., 1996); to overcome weaknesses in their product designs, manufacturing and marketing skills (Killing, 1977); to build the skills necessary for speedy product commercialization (Teece, 1986; Allen, 2003) because they often are in deficit of the complementary technologies required to make their innovations ready for the market (Zahra, 1996). Licensing allows young firms, characterized by several constraints, to gain a privileged entryway to asset developed by other companies, rather than making investments in undetermined R&D activities that may not generate these capabilities; it also enables new ventures to escape from costly investments in

technologies with uncertain futures and, instead, concentrate on those activities that differentiate their products from those of their rivals. The experience biases in assembling resources and capabilities, the limited manager's capacity to develop all the skills needed and quickly commercialize their technologies, several constraints, the need for flexibility, time compression diseconomies in capability building (Dierickx and Cool, 1989) and the uncertainty that surrounds internal R&D suggests that new ventures should seek licensing and other external sources to augment their internal capabilities, would encourage them to rely on other companies' technologies through a licensing agreement.

Although license technologies from other companies offers several benefits, some conditions may suppress the positive effects of these practices. In particular, the downsides of inward licensing materialize primarily because efforts at acquiring and absorbing external knowledge are sometimes unsuccessful. To fully exploit the opportunities extractable from external sources, startups depend on their organizational and managerial resources and capabilities (Almeida et al., 2003) and the advantage from the linkages to outside sources requires a substantial investment of resources (Dyer and Nobeoka, 2000), but a newly established firm suffers from liabilities of newness and smallness, that prevent them to exploit the licensing-in benefits. Among new ventures, the impact of inward technology licensing on innovation activity has been emphasized by few scholars (Zahra et al., 2005), but empirically this relation has been measured by Tsai and Wang (2009).

Zahra et al. (2005), through an empirical study of 361 US new ventures, concluded their work stating that industry characteristics and competitive strategy condition the new ventures' choice to apply an inward licensing strategy or not. The main driving force that promote the utilization of a licensing-in strategy is the acknowledgement of licensing-in as a tool of decreasing costs and maintaining strategic elasticity while building their capabilities. Tsai and Wang (2007) show that inward technology licensing does not significantly improve new venture's innovation performance, nor does the interaction of inward technology licensing and internal R&D. The authors assume that the results of their study provide both good and bad news for the role of inward technology licensing on firm performance. After controlling the extraneous factors, the positive outcome of this evaluation is that, when the effect of internal R&D efforts is accounted for, inward technology licensing has a significantly positive contribution to the acquiring firm's performance. Put differently, the results suggest that internal R&D efforts introduce a positive effect on the impact of inward technology licensing on firm performance. Tsai and Wang (2007) set out to investigate the extent to which the investment of inward technology licensing by firms affects their performance. In this study, firm performance, is measured, in line with its economic aspect, by value added as

the major purpose of inward technology acquisition for a firm in general is to enhance value added through product or process innovation. Value added in the dataset is estimated by sales from output less cost of material input.

From the perspective of learning and innovation (Tsai et al., 2007), inward technology licensing is a particular type of external technology acquisition, representing a firm's efforts to use technological knowledge that formally lay outside its boundaries. Due to the important role young firms play for economic and technological development, innovation in the context of new ventures received much interest in external knowledge acquisition literature (Jones et al., 2000; West and Noel, 2009), describing both positive and negative implications for newly established firms. Literature, stressing the positive effects of developing innovation with external partners, proposes that especially new and small firms rarely have the resources and capabilities to respond to the innovation demands at any given time (Eisenhardt and Schoonhoven, 1996; Yli-Renko et al., 2001). Thus, the combination of internal and external sources makes possible for resource-scare firms to dilate their capacity of producing innovations and delivering them to the market. Resulting, the probability of successful innovation enhances, in turn, the higher level of cash-flow (Zahra and Bogner, 2000).

Conversely, other literature challenges the benefits of developing innovations through external collaborations. Some of the most frequent pains in collaborating with external partners are the great complexities with regard to coordination efforts, protection of intellectual property, appropriation of rents (Kelley et al., 2009). Moreover, in order to benefit from external collaborations, firms need to have experience in the domain, but, especially in comparison to their larger counterparts, new ventures might be suffering from the experiential shortfall in managing external collaborations.

Moreover, new firms might face hostile terms in collaborative strategies, at least in initial years of their lives, due to the liability of smallness and liability of newness: a young firm lacks the legitimacy and, thus, can be expected to suffer from dominance of external innovation partners. Since new and small firms generally have few development projects, their dependence on the success of these projects is high.

While in the external acquisition literature, the relationship between innovation rate of a new venture and external sources is documented, in the licensing literature, this relationship has not been largely developed and even more under examined is the impact of the adoption of an in-licensing strategy on survival probabilities.

Inward licensing gives the new venture easy and fast access to new knowledge, offsetting the limitations of their inexperience and newness, but scarce attention has been paid to the long term effects of in-licensing on firm's rate of innovativeness and on firm performance.

The few authors, involved in investigating the new venture's inward licensing strategy, have been primarily engaged in explaining the conditions and determinants that affect licensing's propensity, under-studying the impact of inward licensing on short and long term innovative and survival performance. We would like to fill this gap in the new venture's inward licensing literature, by investigating the impact that the in-licensing strategy exerts on long-term innovation and economic outcomes.

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CHAPTER 2.

RESEARCH PAPERS

2.1 NEW VENTURE'S INWARD LICENSING: WHO AND WHAT?

ABSTRACT

Much is known about intensity of licensing, its evolution, the characteristics, motivations and obstacles met by companies doing or willing to license. Less is known about the inward licensing strategy among new ventures' licensee. We try to do a first step in this direction, identifying the factors that distinguish a new born firm, that decide to acquire an asset externally developed through a licensing agreement, from a new born firm that prefer not apply this kind of strategy. In so doing, we rely on confidential version of the Kauffman Firm Database. This study only provides a descriptive analysis on the characteristics that distinguish a new venture licensee from a new venture non-licensee. Therefore, its main purpose is to explore the database at our disposal.

Our main findings suggest mainly that 1) new ventures licensees come from the manufacturing industry, while their counterparts come from the Professional, Scientific, and Technical Services; 2) new ventures licensees are usually smaller than their counterparts and they are product- provider; 3) an higher number of new ventures licensees, compared to non-licensees, born as a purchase of franchise; 4) new ventures have constantly higher level of debt and equity. Even more surprisingly, we find that the number of new ventures that in-license copyrights and trademarks is higher than those new ventures that in-license patents.

Keywords: licensing-in; licensing-out; new ventures; patents, copyrights, trademarks

INTRODUCTION

The high and uncontrolled level of competition, the not so long life-cycles of products, the heterogeneous and extended technological opportunities force firms to be innovative at a more rapid pace. To get this purpose, a firm has not divert its attention from R&D expenditures, hence requiring rapid access to complementary new knowledge. Therefore, innovative firms are increasingly dependent on external sources of knowledge rather than conducting in-house research. This reliance on knowledge developed outside firms' boundaries has further increased the number of technological transactions and incremented the development of markets for technology. A market for technology is related to transactions for the use, diffusion and creation of technology (Arora et al., 2001). Since the publication of the book 'Markets for technology' (Arora, Fosfuri, & Gambardella, 2001), more relevant are becoming the theoretical and empirical studies that started inquiring the role of technology licensing, as channel through which gain access to knowledge and, at the same time, sell knowledge in the market for technology.

Research engagement in technology licensing field is centred on the implications of licensing both at industry and at firm level. Many contributions focused on the determinants of firms' licensing strategy, namely which factors promote firms to sell their technologies to external partners. At an industry level, attributes such as the industry structure, the product market differentiation and the appropriability regime are recognized as the principal stimuli of firms' licensing behaviour (Arora & Ceccagnoli, 2006; Fosfuri, 2006; Lichtenthaler, 2008). At a firm level, the lack of control over complementary assets is recognized to have an impact on firms' aptitude to licensing phenomenon, explaining the rising of small technology-based firms (Gans & Stern, 2003).

Among these studies the characteristics of new venture's licensee have been underexplored. We try to identify the circumstances under which a new born firm decides to gain an asset externally developed through a licensing agreement. In order to do so, we exploit the Kauffman Database, including information on 4,928 new ventures founded in 2004 in Us. Therefore, this study has the primary objective of presenting in greater detail the data source at the base of this dissertation, and providing a descriptive overview of the diffusion of licensing-in phenomenon in the context of new ventures. It also aims at highlight some key characteristics of the new ventures implementing a licensing-in strategy, as compared to the rest of the sample. In order to disentangle differences between licensees and non-licensees, we have adopted some dimensions along which conduct these preliminary analysis. Among the chosen dimensions, we include: size, industry, financing method and origin. The aim of this work is therefore exploratory, and it should be interpreted as an attempt to obtain a clearer understanding of the licensing-in phenomenon in the context of new ventures.

Coherently with this objective, we first briefly summarize the most recent empirical literature on the determinants that encourage and foster an established firm to adopt a licensing-in strategies. Therefore, before proceeding with the investigation of the peculiar elements that characterize a new venture licensee, we provide a descriptive summary of the most recent empirical surveys aimed at analysing the and rationales underpinning a licensing-in strategy, from licensee's point of view.

According to the report elaborated by Radauer and Dudenbostel (2013)², the most convincing motive to in-license patents is to guarantee freedom to operate. The need to 'close technical gaps and blind spots for the firm's core technology' came after. The third factor is 'enabling rapid time to market' as well as 'access to complementary know-how to develop the core technology further' as well as expanding the business or R&D according to new trajectories. Interestingly, escaping from costs and risks related to R&D is among the factors that play, on average, less of a role. Even more surprisingly is the deduction that 'learning-by-licensing' is classified on average as a scarcely influential factor. It is outstanding that those firms which have intentions to in-license patents, but currently do not do so, have a more "pro-active" list of motives. Enabling rapid time to market (Leone and Reichstein, 2012) is the preeminent factor followed by filling the technological gaps and gain access to complementary technology to support the development of the core technology (Laursen et al., 2010). The group of currently in-licensing firms seem to be, by contrast, more in a "reactive" trend, where ensuring freedom-to-operate and keeping away from patent disputes plays much more of a role to engage in in-licensing strategy. Rising from the survey is the result that, in the first category, "pro-active", are included the small and medium size firms, that tend to have more frequently pro-active motives to in-license, while, in the second category, are included the large firms that have reactive motives: ensure freedom-to-operate and avoid litigation are prevailing as basis for in-licensing.

The report attests the obstructions to in-licensing as well. The most implicative obstacles to an inward licensing strategy are unacceptable terms of the licensor and the refusal of the potential licensors to grant licenses at all. These outcomes indicate that, on average, low appositeness is given to aspects such as 'lack of experience with in-licensing' or 'lack of model contracts'. The barriers have to be explored on the supply side of technologies: too high prices charged by the

² This report has been elaborated by consortium consisting of Incentim – KU Leuven Research and Development, KITeS - Università Bocconi and Technopolis Consulting Group as subcontractor to perform a study on the 'Measurement and analysis of knowledge and R&D exploitation flows, assessed by patent and licensing data'. Part of the study was the execution of a survey on patent licensing behavior of European firms. This part of the study, performed by Technopolis and executed between March 2012 and April 2013, is the subject of the report we are analysing.

licensor, as well as unconditional refusal of the potential licensor to grant a license or no need/interest to license in.

Some other obstacles have to be added: the ‘not-invented-here’ syndrome, whereby knowledge created outside the boundaries of the firms is evaluated as less worthy than know-how created within the firms. One comment was that in-licensing would decrease own creativity and create more dependence on external organisations, as suggested by Muloitte et al. (2012). Some answering firms purvey some supplementary annotations to the motives that prevent the implementation of an inward licensing strategy: being approached by an unsuitable licensor: “A barrier is non-understanding of the licensor of our business. Sometimes, the technology is ok but does not fit into our needs.”

Firms which are not in-licensing and they are not planning to do so simply state as most important barrier that they do not want or need to in-license patents. For large firms, a justification could be that these firms possess a sufficiently extensive patent pipeline cover their technology needs, whereas, in the case of small and medium firms, it could be that these firms are so extremely specialised in their areas, and the respective technology less reliant on other/complementary technologies, that there may be slightly a compulsion for in-licensing.

We would like to extend these main findings, assessing their validity in the scenario of new ventures as licensees and, consequently, investigate the behaviour of new born firms that decide to in-licence a patent. In so doing, we rely on confidential version of the Kauffman Firm Database.

DATA ANALYSIS: Kauffman Firm Foundation

Entrepreneurship plays a dynamic role in the country’s economic activity. This is the main reason why accurate and detail information about new business development and sustainability is essential. Relying on them, it is possible to establish public and private programs that encourage new business development. However, obtaining accurate information on new firm dynamics is not always easy. The pivotal tool to get these information is the survey, but surveys of new businesses tend to be hard to implement and typically have produced low response rates because of the difficulty of obtaining new business owners’ cooperation. Consistent with its mission to advance

entrepreneurship and the study of new business creation and development, the Ewing Marion Kauffman Foundation³ sponsored the Kauffman Firm Survey (KFS).

As part of an effort to gather more data on new businesses in the United States, the Ewing Marion Kauffman Foundation sponsored the Kauffman Firm Survey (KFS), a panel study of new businesses founded in 2004 and tracked over their early years of operation. In detail, the firms are tracking over the first 8 years of their existence. The KFS' main objective is to address the informational gaps related to the study of entrepreneurship.

The Kauffman Foundation contracted with Mathematica Policy Research, Inc., (MPR) to design and conduct a rigorous survey to understand entrepreneurial patterns by gathering information from newly formed businesses. The KFS collects data about the nature of new business formation activity; characteristics of the strategy, offerings, and employment patterns of new businesses; the nature of the financial and organizational arrangements of these businesses; and the characteristics of their founders. Two initial actions were employed to inform the design process and test the validity of the assumptions in the proposed research: (1) a review of business and other relevant literature, that included about sixty articles and related surveys that focused on business statistics and the dynamics of business formation (2) consultation with an advisory group composed of probable KFS data users. In particular, this review included survey instruments from the Economic Census, the Survey of Small Business Finance, and the Panel Study of Entrepreneurial Dynamics MPR developed questions on business characteristics, strategy and innovation, business characteristics, strategy and innovation, business organization and human resource benefits, business finances, and work behaviours and demographics of owner-operator(s).

For what regards the methodology of data collection, a random sample of 32,469 businesses was released for data collection on the Baseline Survey, which was conducted between July 2005 and July 2006. The research team completed interviews with principals of 4,928 businesses that started operations in 2004, that corresponds to a 43 percent response rate. A self- administered Web survey and Computer-Assisted Telephone Interviewing (CATI) were used to collect data, and KFS respondents were paid \$50 to complete the interview. CATI completes accounted for 3,781 (77 percent) and Web completes accounted for 1,147 (23 percent) of the interviews. The results across sampling strata show that 2,034 interviews were completed in the two high- technology strata,

³ Founded in the mid-1960s by the entrepreneur and philanthropist Ewing Marion Kauffman, the Kauffman Foundation is based in Kansas City, Mo. It is among the largest private foundations in the United States.

whereas the remaining 2,894 interviews were completed among non-high-tech businesses. Therefore, the First Follow-Up Survey sample consisted of the 4,928 businesses that completed the Baseline Survey. The First Follow-Up was conducted between June 2006 and January 2007, and 3,998 interviews were completed—an 89 percent response. The KFS dataset provides researchers a unprecedented chance to conduct research on a panel of new businesses from start-up to sustainability, with longitudinal data centring on topics such as financial method; the products, services, and innovations these businesses possess and develop in their early years of existence; and the characteristics of those who own and operate them.

Figure 2.1 provides a breakdown of our sample by industry. The KFS procures industry information by two-digit North American Industry Classification System (NAICS) level. As illustrated, the most common industry sectors, for all the new ventures included in the raw database, are professional, management, and educational services; retail trade; administrative, support, waste management, and remediation services; and construction.

Figure 2.1 - Business Distribution by Industry

Industries	Number of firms	Percentage
54. Professional, Management, and Educational Services	1,229	17%
44-45. Retail trade	484	14%
56. Administrative and Support, and Waste Management and Remediation Services	396	11%
23. Construction	353	11%
81. Other services (except Public Administration)	434	9%
31-33. Manufacturing	881	6%
42. Wholesale Trade	198	5%
53. Real Estate, and Rental and Leasing	176	5%
52. Finance and Insurance	152	4%
62. Health Care and Social Assistance	114	3%
51. Information	163	3%
48-49. Transportation and Warehousing	97	2%
71. Arts, Entertainment, Recreation	110	2%
72. Accommodation and Food Services	88	2%
11. Agriculture, Forestry, Fishing, and Hunting	45	1%

Source: Kauffman Firm Survey, Baseline Data;
 Tabulations by Mathematica Policy Research, Inc

The primary purpose of the survey commissioned by the Kauffman Foundation, is to deeply understand entrepreneurial activity and the logics and dynamics of business development in the United States, addressing attention on two levels of analysis: the owner and the business level. In so doing, it has been possible to close the informational gap related to new business development. Therefore, in the light of the purposes for which this database was created, it has been used by several scholars (Coleman S., Cole R., Crawford C., Berman R.) involved in the entrepreneurship and new firms' formation literature. In order to get access to the confidential version of data, researchers are called to apply for a Kauffman-sponsored seat through the Kauffman Foundation. To apply for a Kauffman-sponsored seat, the applicant has to exhibit a study proposal that outlines research project and the need for using the confidential data, as opposed to the public use version available for download on Kauffman website. We adhered to this process and we obtained the access to the confidential version of the Kauffman Firm Database, submitting the embryonic ideas on which this dissertation is built.

EMPIRICAL ANALYSIS: A Descriptive Overview Of Licensing-In Strategies By New Ventures

Our purpose, in developing this article, is twofold: explore the database on which we rely for the dissertation; understand the distribution of new ventures that implement an inward licensing strategy and comprehend the intensity of this phenomenon in the scenario of newly established firms. Although the thesis is especially devoted to study the technology-based licensing agreements, that, therefore, deal with patents as object of exchange between firms, in the present research project we also include the inward licensing of copyrights and trademark. In so doing, we have the chance to elaborate a comprehensive framework on the licensing-in phenomenon in its wholeness.

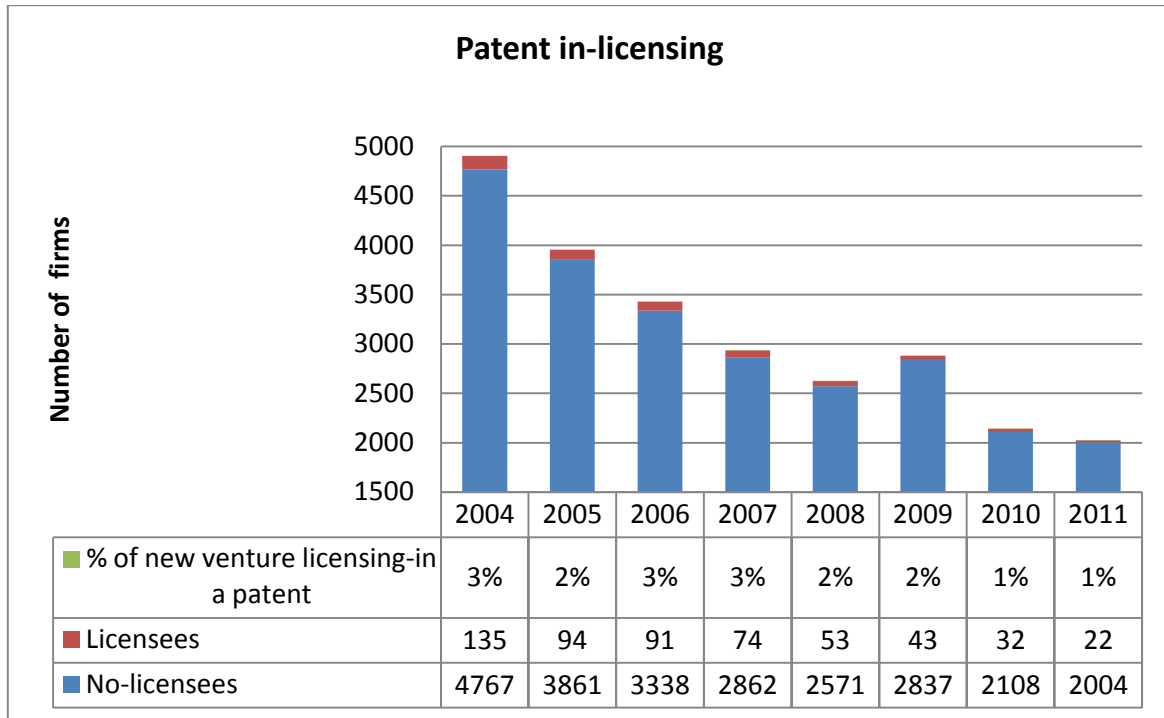
The rising employment of inward licensing among new-born ventures is confirmed by data provided by Kauffman Foundation. On 4.928 new businesses founded in 2004, 493 carry into effect an inward licensing strategy in their founding year. 493 firms of which 135 acquire from external sources patents, 177 copyright and 181 trademarks. These data suggest that inward licensing represents a relevant strategy among new ventures, considered as licensees.

We are interested in assessing the evolution over the new venture's life-cycle of the recourse to acquire a patent, a copyright or a trademark through a licensing agreement. As shown in Figure 2.2,

the plenty of new ventures that decide to get hold of a patent is almost constant over the first 8 years of existence, exhibiting a slight decrease in the last years of analysis.

This result indicates that the timing at which a new venture puts into practice an inward licensing strategy is ordinarily at its initial development stages, in early years of its existence. The reason, underpinning this option, is to be found in the urgent need to overcome the constraints and shortages that characterized a new venture, as consequence of liabilities of newness and liabilities of smallness. In other words, an inward licensing strategy is undertaken by a newly established firm as one of the first alternatives on which build its technology strategy, defined as the sum of a firm's choices on how to develop and exploit its technological resources (Zahra, 2000). Indeed, in so doing, it can not only reduce resources and experiential constraints and shortages caused by being, by definition, young and small, but also broaden its knowledge base and its set of technology assets. As stated by Zahra (2000), technology, the sum of a firm's knowledge and skills, performs a primary role in determining the advancing of new ventures and size up the ability of new ventures to offer the products (services), gain market acceptance, survive, and achieve financial success.

Figure 2.2 – New ventures declaring a patent in-licensing



Patents are accepted as one of the basic tools for the inter-firm transfer of knowledge through licensing-in. The application of patent information and patent statistics as measure of innovation have extensively spread in the investigation of innovation outcomes. Recently, some reports (Patlice Survey, 2013) have been commissioned against the increasing relevance of patents, as pointed out by the rising number of patent applications (more than 50% increase in yearly applications at the EPO by comparison to 10 years ago) (EPO 2012) and a much wider employment of patents today purposes other than preserving intellectual properties.

Since the definition of markets for technology entails not only patents but also the most generic intellectual property, we include in our analysis the licensing-in of copyrights and trademarks, respectively Figure 2.3 and Figure 2.4. To the best of our knowledge, no antecedent studies have investigated the acquisition of copyright and/or trademarks through a licensing agreement, even if, as displayed in the two upcoming figures, new ventures are likely to apply for a licensing deal whose object of exchange is a copyright or a trademark. To be precise, in the database we are relying on, a copyright is defined as “The legal right granted to authors, composers, artists and publishers to protect their thoughts and ideas for exclusive publication, reproduction, sale and distribution of their works”, while a trademark is “Words, names, symbols or devices, or any combination of these used to identify the goods of a business and to distinguish these goods from the goods of others”.

Figure 2.3 – New ventures declaring a copyright in-licensing

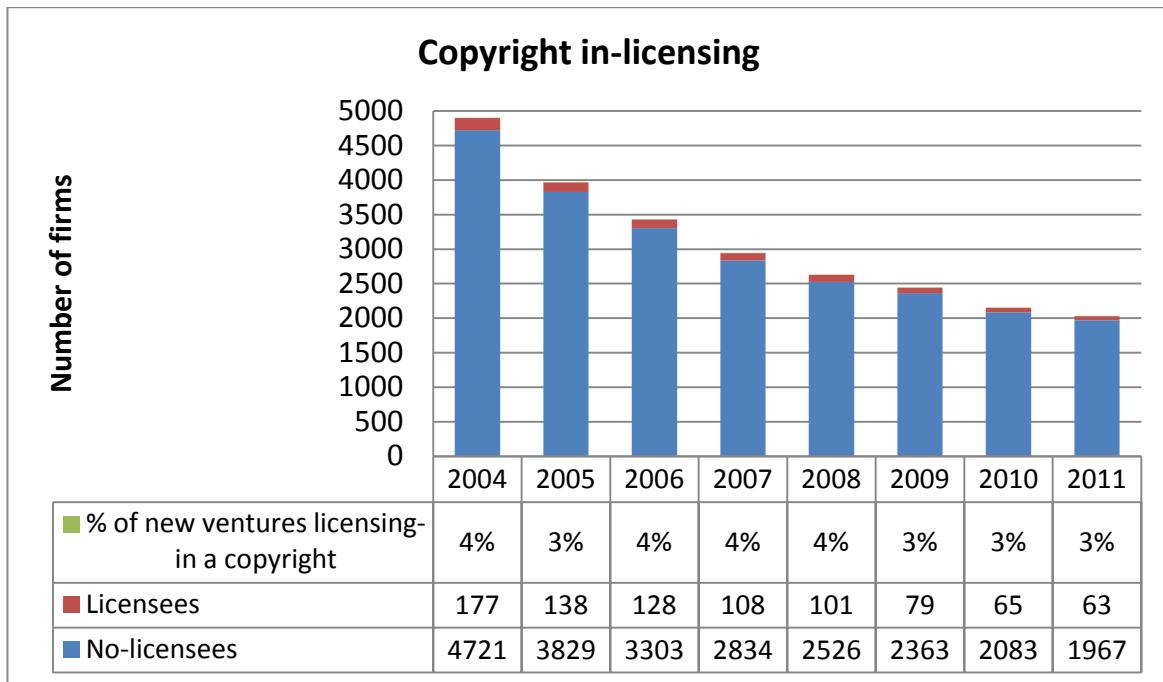
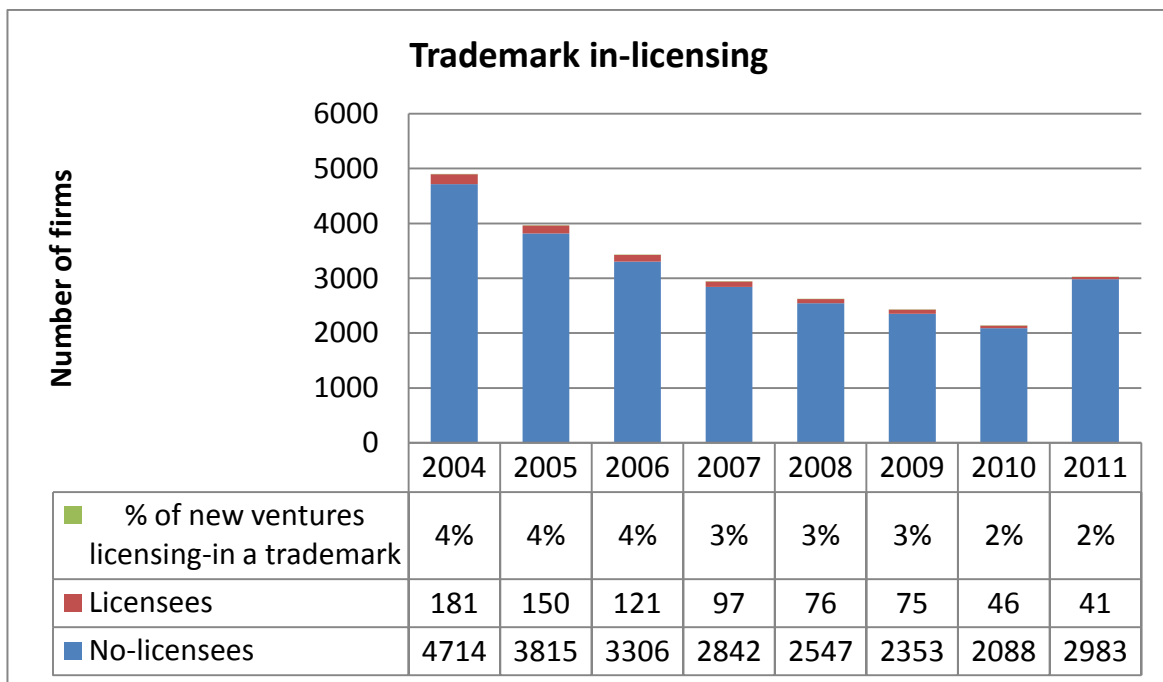
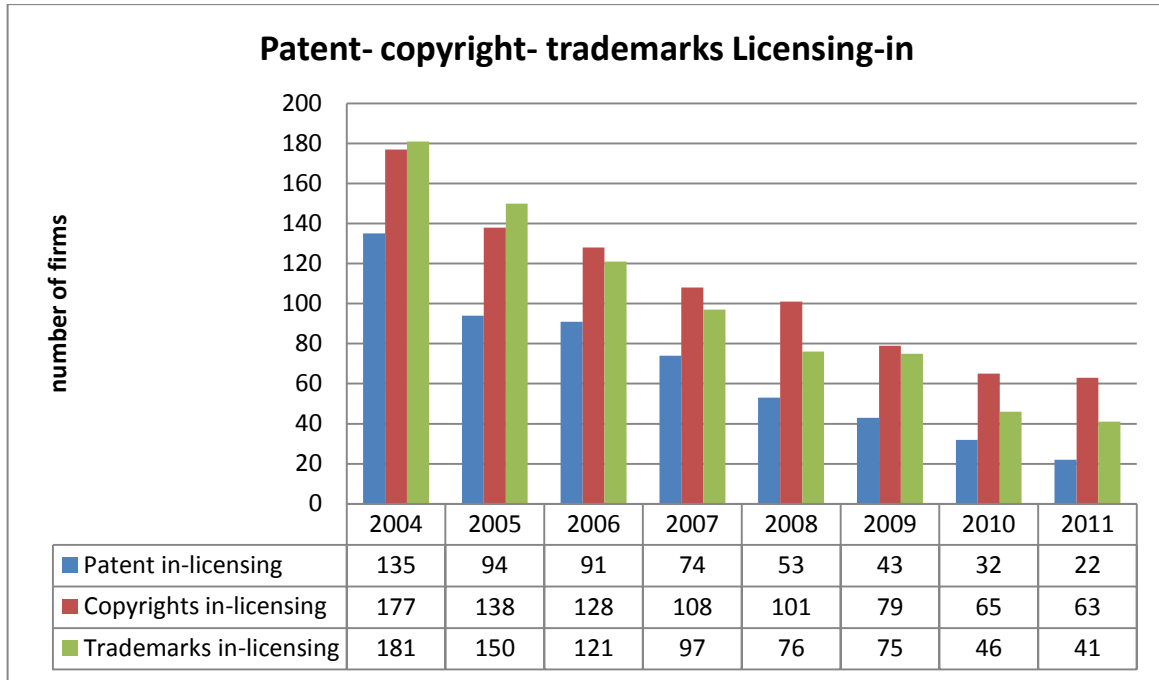


Figure 2.4 – New Ventures declaring a trademark in-licensing



The next graph, Figure 2.5, reveals an unexpected evidence: a new venture is more likely to acquire through a licensing agreement a copyright or trademarks rather than a patent. This result could be counterintuitive.

Figure 2.5 - Patent, copyrights and trademarks in-licensing



As anticipated, the Figure 2.5 reports the amount of new ventures that, all over the period of analysis, namely from founding year (2004) to 2011, lay hands on a copyright/trademark/patent through a licensing agreement. What is foreseen is that the sum total of new born firms that try out for a deal whose object of trade is copyright/trademark is constantly higher than those that choose to be a patent licensee.

This result could be interpreted as the need for a new venture to make use of inward licensing not only to close the technological gaps, but also to build a strong reputation. Relying on already known words, names, symbols or devices, or any combination of these used to identify the products is the same as take part of a consolidated network, appear reliable and accountable, establish relationships with external stakeholders, thereby overcoming the liability of underdeveloped social ties.

Since this dissertation deals mainly with technology –based licensing agreement, the following analysis, we will be exclusively conduct on patent in-licensing. The features and dimensions we have adopted in order to highlight the dissimilarities between new ventures that decide to become licensee and new ventures who do not opt for this choice, are mainly related to business characteristics and the following: industry, final outcomes offered by the firm (service or product), size, origin, financing patterns.

The first dimension along which we conduct our analysis in order to outline the dissimilarities between a new venture that decide to be a licensee and a new venture that choose the opposite decision is the industry in which the two groups operate in their first year of existence, in 2004. As exhibited in the next figures, Figure 2.6 and Figure 2.7, the most determining dissimilarities between the two groups, licensees and non-licensees, is that the majority of new ventures licensees come from the manufacturing industries, defined by North America Industry Classification system as “a sector that comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products”, while their counterparts come from the professional, Scientific, and Technical Services defined by North America Industry Classification system as “a sector that comprises establishments that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services”.

Figure 2.6 - Distribution of No patent licensees by industry in year 2004

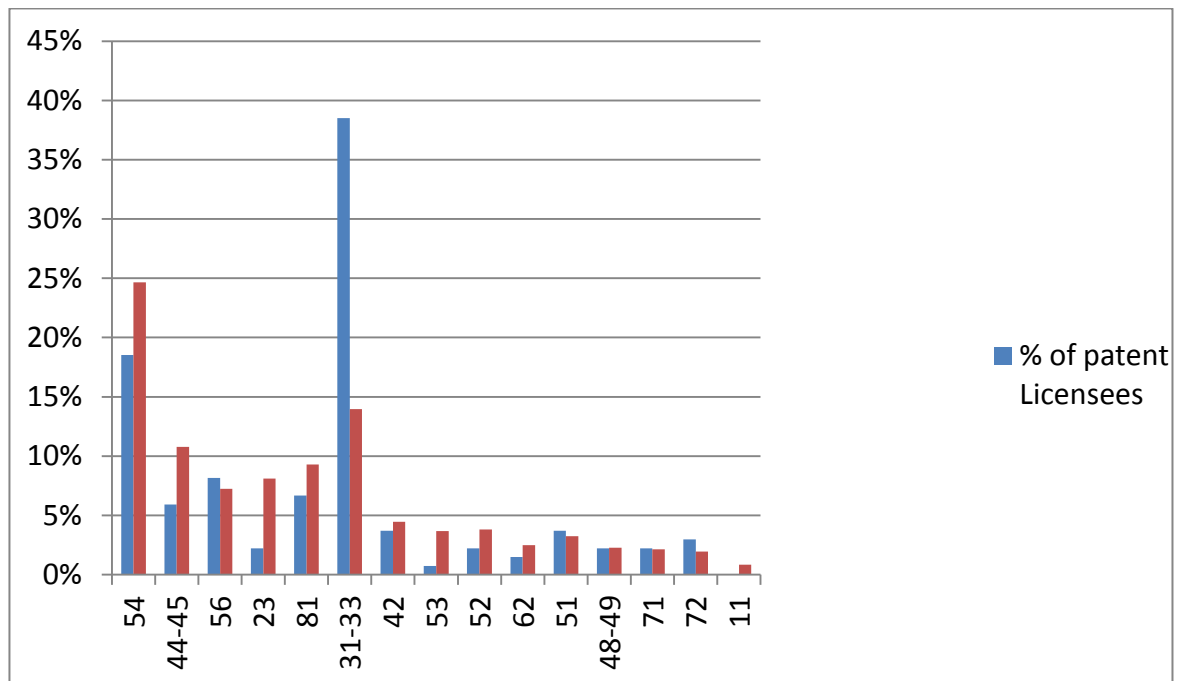
Industries	Number of firms	% of no patent licensee operating in each industry
54. Professional, Management, and Educational Services	1175	25%
44-45. Retail trade	514	11%
56. Administrative and Support, and Waste Management and Remediation Services	345	7%
23. Construction	386	8%
81. Other services (except Public Administration)	443	9%
31-33. Manufacturing	666	14%
42. Wholesale Trade	212	4%
53. Real Estate, and Rental and Leasing	175	4%
52. Finance and Insurance	182	4%
62. Health Care and Social Assistance	119	2%
51. Information	155	3%
48-49. Transportation and Warehousing	108	2%
71. Arts, Entertainment, Recreation	102	2%
72. Accommodation and Food Services	93	2%
11. Agriculture, Forestry, Fishing, and Hunting	40	1%

Figure 2.7 - Distribution of patent licensees by industry in year 2004

Industries	Number of firms	% of patent licensee operating in each industry
54. Professional, Scientific, and Technical Services	25	19%
44-45. Retail trade	8	6%
56. Administrative and Support, and Waste Management and Remediation Services	11	8%
23. Construction	3	2%
81. Other services (except Public Administration)	9	7%
31-33. Manufacturing	52	39%
42. Wholesale Trade	5	4%
53. Real Estate, and Rental and Leasing	1	1%
52. Finance and Insurance	3	2%
62. Health Care and Social Assistance	2	1%
51. Information	5	4%
48-49. Transportation and Warehousing	3	2%
71. Arts, Entertainment, Recreation	3	2%
72. Accommodation and Food Services	4	3%
11. Agriculture, Forestry, Fishing, and Hunting	0	0%

To make the reading of the data, just reported, clearer, we created a histogram, in figure 2.8, that highlights the differences in the industries in which the two groups of new ventures, licensees and no-licensees, operate.

Figure 2.8 - Distribution of patent licensees and patent no-licensee by industry in 2004



Complementary to the industry, is the variable that classify a new venture according to its final outcomes. Strictly speaking, we try to answer to the question: is patent licensing-in more frequent among new ventures that provide products or among new ventures that provide services?

Figure 2.9 - Distribution of licensees by service

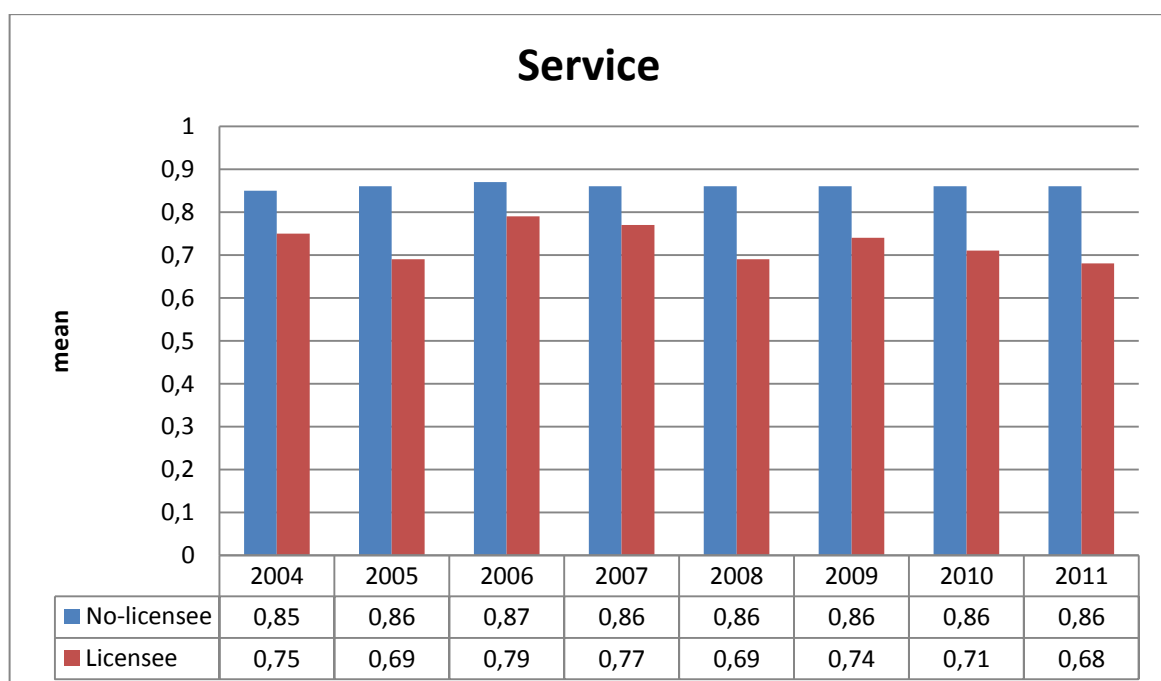


Figure 2.10 - Distribution of licensees by products

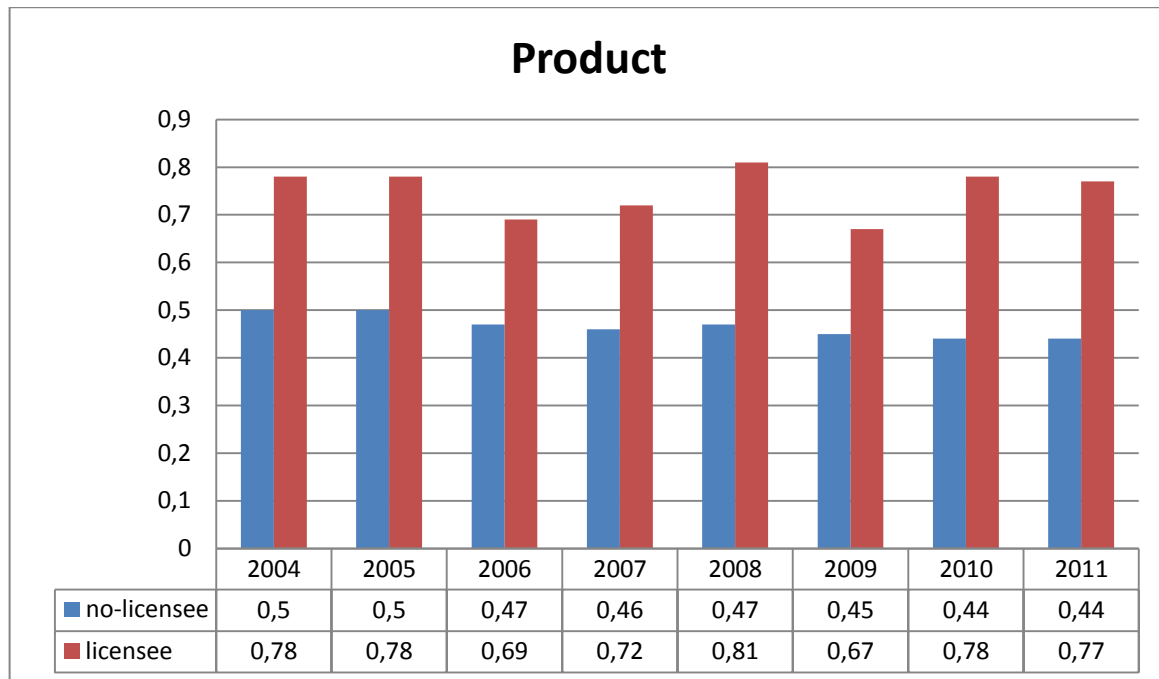


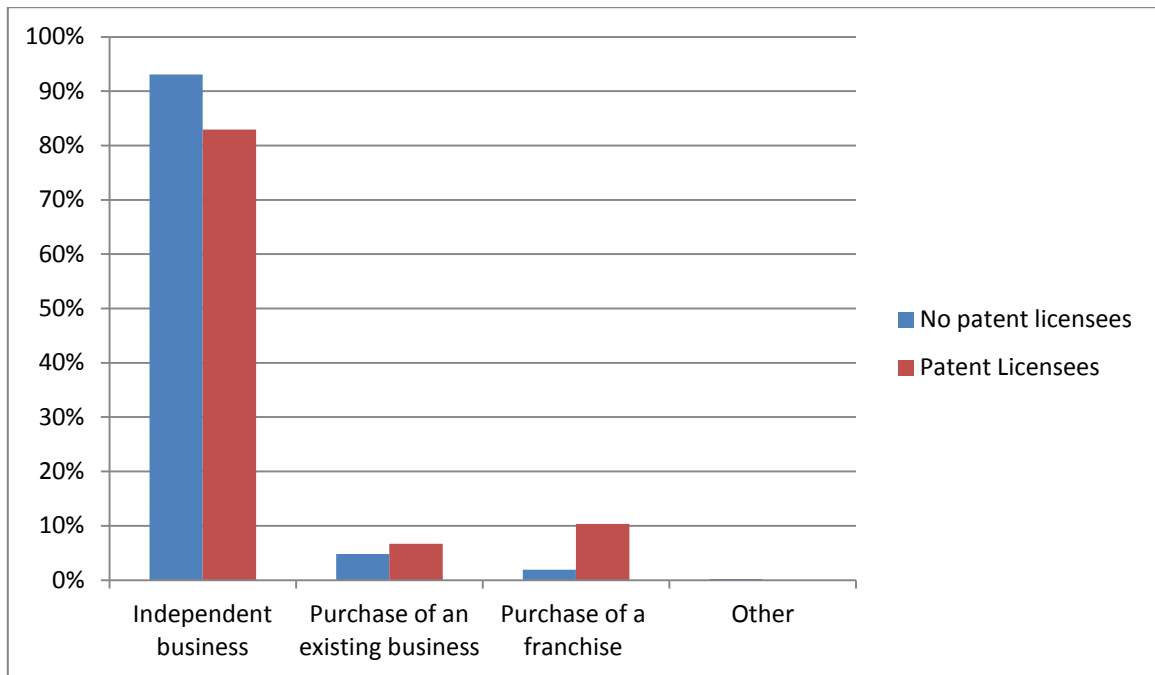
Figure 2.9 and Figure 2.10 are empirical evidences supporting the idea that patent licensees are more likely to provide products, while those new ventures that settle to not acquire external assets through a licensing agreement, are mainly services providers. We perform econometric test, that confirms this results ($p\text{-value} < 0.05$). More specifically, we run an independent-sample t-test. It compares the difference in the means from the two groups to a given value (usually 0). Put differently, it tests whether the difference in the means is 0.

The business origin is interrelated to the decision to license in or not. Indeed, the origin of a new venture can define the boundaries of its knowledge base, its amount of tangible and intangible resources and consequently, its competencies. Then, the origin can influence the choice of going outside firm's boundaries and rely on external sources, adopting a strategy such as patent in-licensing. We examine and verify for some descriptions of how a business can get started. According to the way in which new ventures are founded, they diverge regularly in their competences and abilities to collect and take advantage of resources in building matchless organizational capabilities (Miller & Camp, 1985) that can produce differences in their achievement (Shrader & Simon, 1997; Zahra, 1996). The question associated to the way in which a new venture has been established is the following: "Which of the following best describes how [NAME BUSINESS] was started. Was it

1. A new business, branch or subsidiary owned by an existing business
2. A business inherited from someone else
3. A new, independent business created by a single person or a team of people
4. The purchase of an existing business
5. The purchase of a franchise
6. An organization designed for social and charitable objectives and legally established as “not-for-profit”
7. the business started some other way? (SPECIFY)”

Figure 2.11 shows signs of a slight disparity between the two groups. The 93% of non-licensees are started up as new and independent business, as well as licensees. The main discrepancy is in the percentage of business originated as purchase of franchise. 10% of new venture licensee born as purchase of franchise, only 2% of new venture licensee born as purchase of franchise. This settlement could be justified by the awareness of the firms, born as purchase of a franchise, of what they need to build assets, and resources complementary to those that they already have. The presence of a knowledge base already structured entails an higher level of absorptive capacity, necessary to exploit the patent acquired through a licensing agreement.

Figure 2.11 - Distribution of patent licensees and no patent-licensees by origin



Adding on the origin and the industry, we take into consideration the variable “firm size” as well. Consistent with Almeida and colleagues (2003), we propose that larger firms have more chances to reach external knowledge because of the increased number of interconnection to the outside environment. We measure the firm size as the amount of employees involved in undertaking the firm’s activities. We labeled our sample in 4 groups according to the number of employees (Rauder and Dudenbostel, 2013):

Micro: less than 10 employees

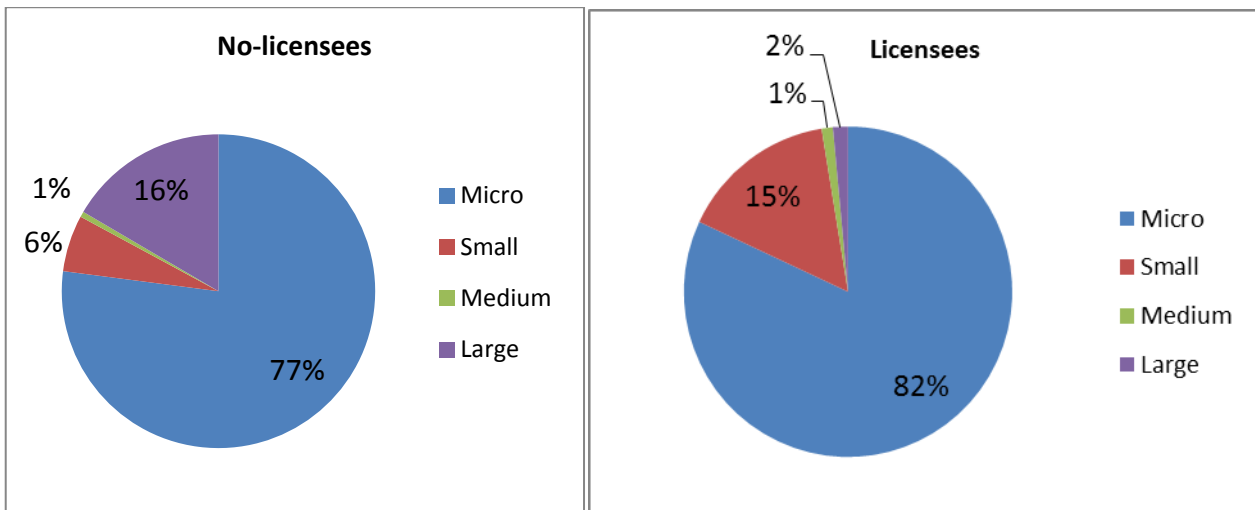
Small: less than 50 employees

Medium: less than 100 employees

Large: more than 100 employees

Contrary to our hypothesis, we remark upon the graphs, Figure 2.12, stating that the larger the firm, the higher probability of being a non-licensee.

Figure 2.12 - Distribution of patent licensees and no patent licensees by size



We continue our analysis, on the representative attribute of a new venture licensee, cross-examining its financial structure. One distinguishing element of a licensing agreement is the payment of fees or royalties to the licensor. Put together this last assessment to the financial constraints that characterized a new venture, we can infer that the financing method is of remarkable interest.

We perform a preliminary analysis on the raw Kauffman Firm Database, that offers the coming highlights. Approximately 44 percent of newly born firms indicates to not have debt financing in the course of their first year of activities. Various businesses were launched with a hardly any degree of debt financing—17 percent started with \$5,000 or less; around 11 percent began with \$100,000 or more. Closely to 80 percent of new ventures registered a net positive equity investment in their initial period if operations. Almost 10 percent invested \$100,000 of equity into their businesses, while another 33 percent made an investment between \$10,001 and \$100,000. Round about one quarter of startups invested less than \$5,000. The greater number of equity invested derived from the business owners themselves. Only 10 percent of the businesses in the Kauffman Firm Survey employed external equity sources in their earliest year of advancement.

Going in depth, we weigh the two groups of new ventures, licensee and non-licensee according to their debt and equity trajectories. The data on which we are relying, comprehend information about the range of debt and the range of equity. To each new ventures is asked to indicate which of the following listed 9 level of debt or equity, they belong:

- 1) \$500 or less
- 2) \$501 - \$1,000

- 3) \$1,001 - \$3,000
- 4) \$3,001 - \$5,000
- 5) \$5,001 - \$10,000
- 6) \$10,001 - \$25,000
- 7) \$25,001 - \$100,000
- 8) \$100,001-\$1,000,000
- 9) \$1,000,001 or more

The next figures, Figure 2,13 and Figure 2.14, demonstrate that the licensees have higher level of both debt and equity. This result is consistent with the initial condition in which a new venture lives: shortages of capital and necessity to pay royalties accorded to the licensing agreement.

Figure 2.13 - Distribution of patent licensees and no patent-licensees by range of debt

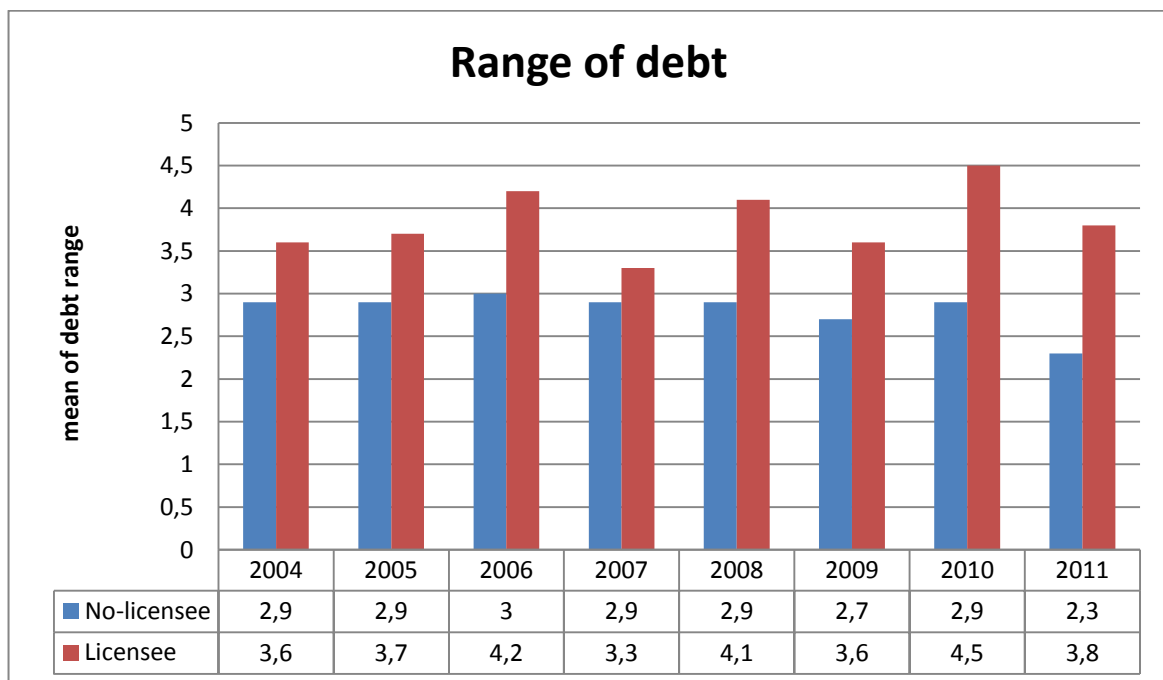
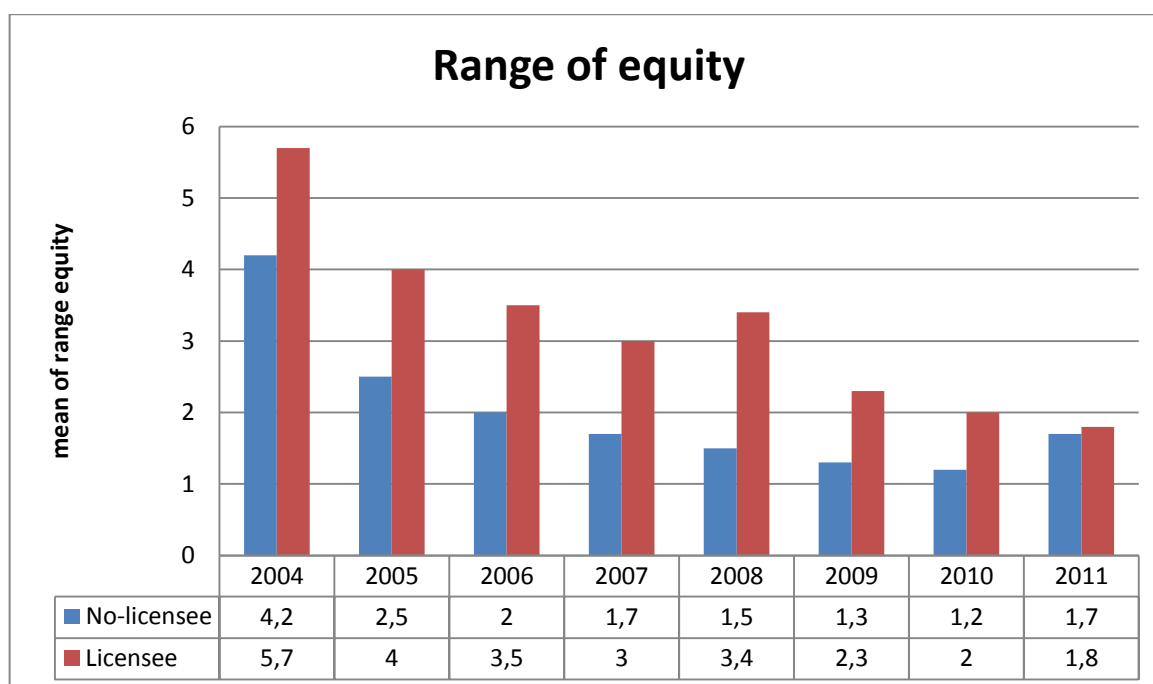


Figure 2.14 - Distribution of patent licensees and no patent licensees by range of equity



CONCLUSIONS and FUTURE RESEARCH

This report has pointed the way to manifold findings with regard to patent in-licensing performed by newly founded U.S. firms, using releases of the Kauffman Firm Survey. Ambition of the present paper is to apprehend innate characteristics of those new born firms that arranged to be involved in a licensing deal, as licensee. This aspect has not been elaborated yet in licensing literature. The prominence of licensing has intensified over the last times, as made evident by the majority of firms implicated in a licensing agreement. Indeed, they have disclosed an increasing licensing revenues over time and their willingness to be part of a growing number of licensing deals. Albeit this evidence, the licensing phenomenon within new venture context is still an open point in question. At best of our knowledge, the single research attempt, concretely addressed in this direction, has been done by Zahra and colleagues in 2005. The authors studied the rationales that encourage a new venture to be a licensee, but the authors focused exclusively on exogenous factors: industry dynamism and competitive strategy. Moreover, while the authors consider inward licensing as a tools of decreasing costs and preserving strategic elasticity and adaptability while building their capacities, we recognize the role of inward licensing as a mean through which defeat the liabilities, that a new venture suffers, stemmed from being young and small.

We try to add enrichment to the inward phenomenon in the new ventures' framework, designating the common features that differentiate a licensee from a non-licensee. The chiefly breakthroughs about the characteristics of a new venture that decide to in-licensing a patent are the following:

- The new ventures licensees come mostly from the manufacturing industry, while their counterparts come from the professional, scientific, and technical services.
- The new ventures licensees are usually smaller than their counterparts
- An higher number of new ventures licensees, compared to non-licensees, born as a purchase of franchise.
- The new ventures that make use of inward licensing are products- providers.
- Licensees have constantly higher level of debt and equity.
- New ventures that decide to be involved in a licensing agreement as licensee are products provider rather than services provider.
- The number of new ventures that in-license copyrights and trademarks is higher than those new ventures that in-license patents.

The most unexpected finding is about the “what” new ventures are used to in-license.

New ventures are more likely to license-in copyrights and trademarks rather than a patent.

We provide evidence that, in general terms, new ventures are more likely to license-in copyrights and trademarks rather than a patent. Inward licensing is, therefore, not only used to close technological holes and reduce time to market, but also to build a reputation relying on consolidated and reinforced symbols or devices, or any aggregation of these used to identify the goods of a business and to distinguish these goods from the goods of others.

This study has only an exploratory approach, therefore its limitations are straightforward. Future research should therefore assess in a more systematic and robust way the antecedents of the licensing-in choice, using more sophisticated econometric approaches. In any case, it provides a rich insight into the specificities of new ventures adopting licensing-in strategies, therefore facilitating the interpretation of the results of the next empirical papers. A major outcome, indeed, regards the difficulty of directly comparing licensee vs non-licensee startups, given the presence of systematic differences between the two groups. This suggests the importance of adopting more sophisticated matching techniques, such as propensity score methods, in the analyses of the two groups. This is exactly the approach we will follow in our next chapter related to the survival chances of licensee firms.

Many issues remain to be investigated in more depth by future research. This study should also be considered in light of some limitations, that are patterns on which develop future researches. First, according to us, the most important point to be investigated in depth is the logic according to which

a new venture is more prone to take possession of a copyright or a trademark than a patent. Second, we rely on the information base yielded by the Kauffman Firm Foundation. Forasmuch as, our sample is exclusively composed by firms born in United States, it should be constructive to work out the same studies taking into account the differences across countries. Third, the analysis could be brought to fullness introducing information about the channels by which licensors get in touch with licensees, since a new venture, being new and small, has difficulties in searching the right partner. Fourth, the acquired facts about licensing deals at our disposal are related merely to the likelihood that a new venture is a licensee or not. It would be interesting to enlarge the base of information adding details about the patent exchanges.

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2.2 EFFECT OF INWARD LICENSING ON NEW VENTURE'S SURVIVAL

ABSTRACT

The liabilities of newness and the liabilities of smallness constrain new venture to strongly rely on external sources, but the contribution of external acquisition on new born firm's longevity has not been explored yet. Albeit the relevance of this topic, little attention has been paid so far to its investigation, especially in the licensing context. In light of increasing licensing activities and practices, we dig into the inward licensing phenomenon in new ventures context. Employing the confidential version of panel data from the Kauffman Firm Survey, we compare the survival rate of a new venture that decide to implement an inward licensing strategy in its first year of existence with the survival rate of a new venture that, in its first year of existence, do not get access to external knowledge through a licensing agreement. We choose to analyze the implementation of this strategy exclusively in founding year because, embracing the literature on the relevance of initial conditions (Bamford et al., 1999; Aspelund et al., 2005), we support the idea that early decisions adhere with the organization and engrave the firm in the long term.

Unlike witnessed by the majority of stream of research, we expect a negative relationship between the decision of a new venture to be a licensee at its inception and its likelihood to survive. The econometric results support this hypothesis: a new born firm, that chooses, as initial technology strategy, to acquire knowledge externally developed through a licensing agreement, has lower probability to survive than its non-licensees counterparts, as result of longer speed to market process.

Keywords: inward licensing; survival; time to market; new ventures

INTRODUCTION

New ventures are characterized by liabilities of newness (Freeman et al., 1983, Bruderl and Schussler, 1990) and liabilities of smallness (Stinchcombe, 1965) and they undergo resource, financial, experiential and organizational constraints and biases. They fall short in terms of the resources and capabilities mandatory in dynamically changing and high-speed industries (Zahra et al., 2005). These conditions compel new venture to deeply rely on external sources. The necessity for elasticity and adaptability, the requirements for capability building (Dierickx and Cool, 1989), the uncertain contingency that encircle internal R&D and the shortfall of the complementary technologies essential to commercialize their innovations (Zahra, 1996), propose that new ventures should delve for external sources to augment their internal capabilities. Faced with inadequate facts and data for learning from their own experience, companies can collect technology and knowledge, from outside environment, developed by others' experiences to cover their deficits (Baum et al., 2000).

Although it is extensively accepted among practitioners and academics that inward licensing is one of the most prevalent tool for the attainment of technological assets externally developed (Arora and Fosfuri, 2001; Kim and Vonortas, 2006; Athreye and Cantwell, 2007) and one of the most well-defined method for the inter-firm transfer of technological knowledge (Anand and Khanna, 2000; Gu and Lev, 2001), the role played by this strategy in the environment of new ventures has not been explored yet.

Moreover, since the remarkable pace of licensing activities has animated the concerns of scholars and promoted research production in this area over the last few decades (Bessy, 2002), the researchers have been solicited for an improved comprehension of the demand-side of licensing agreements (Caves et al., 1983; Atuahene-Gima, 1992, 1993; Atuahene-Gima and Patterson, 1993; Lowe and Taylor, 1998; Arora et al., 2001; Cesaroni, 2004). Some up-to-date works (Leone and Reichstein, 2012; Mulotte et al., 2013; Wang and Li-Ying, 2012; Tsai and Wang, 2009) bring into focus the licensee's side among mature and established firms, but still overlooking the study of cases in which new born firms are involved as licensee.

Indeed, regardless the licensee's role is advancing in terms of general esteem among scholars, little inspection has been paid to new ventures as licensee, with only few exceptions by Atuahene-Gima, 1993, Zahra et al., 2005 and Tsai et al., 2009. They span different features associated to the licensee's behavior. Enlightenments on the licensing decision of the licensee firm have been introduced by Atuehene-Gima (1992, 1993). He investigated some factors affecting the firm's intention or propensity to adopt technological inward licensing. Those factors are labeled into four

groups: firm's characteristics, management characteristics, benefits and costs of inward technology licensing and external factors. Based on four items (the degree of urgency to license-in; the possibility the firm will in-license in the subsequent two years; the expectation the licensee will penetrate new product markets through licensing; the chances that licensee will displace their actual product markets by licensing rather than by internal development), the inclination to exploit inward technology licensing naming the firm's aptitude towards inward technology licensing. Amongst other, the most intriguing outcome he found was about the impact of the shortfall of internal new product development abilities, the satisfying inward technology licensing background, and the felt advantages of the inward technology licensing on firms' likely to make use of an inward technology licensing. Particularly, licensee firms were found to be more predisposed to select an inward technology licensing if : the lowest the level of their capabilities, the higher the level of perceived benefits from the license and the higher the satisfaction tied with the previous licensing experience. Following the same reasoning, Athuene-Gima and Patterson (1993) focused their attention on the examination of individual-level factors, and in particular on the perceptions of managers in their decisions to license technology from independent organizations according to their new product development strategy. The main objective of their work was to understand which benefits, costs and risks were involved and which ones have the greatest impact on the firm's decision to license. The research displayed that firms make use of licensing in order to yield new products. In so doing, the firms have the chief purpose to satisfy their more paramount urgency to gain competitive advantage in the short run rather than gaining access to potential technology.

This finding is in line with the classic driving force of technology licensing: firms, through a licensing deal, are admitted to ready and consolidated technology by decreasing their financial vulnerability (Roberts and Barry, 1985; Chatterji, 1996). This justification reveals the habitual short-run purpose promoting the prospective licensee's decision. Coupled with the described work by Athuene-Gima (1992, 1993), Zahra and colleagues state that industry characteristics and competitive strategy condition the new ventures' choice to apply an inward licensing strategy or not. The main driving force that promote the utilization of a licensing-in strategy is the acknowledgement of licensing-in as a tool of decreasing costs and maintaining strategic elasticity while building their capabilities. Tsai and Wang (2009) show that inward technology licensing does not significantly improve new venture's innovation performance, nor does the interaction of inward technology licensing and internal R&D. The authors assume that the results of their study provide both good and bad news for the role of inward technology licensing on firm performance. After controlling the extraneous factors, the positive outcome of this evaluation is that, when the effect of internal R&D efforts is accounted for, inward technology licensing has a significantly positive

contribution to the acquiring firm's performance. To wit, the results imply that internal R&D efforts entail a positive effect on the impact of inward technology licensing on firm performance. Inward licensing gives the new venture easy and fast access to new knowledge, compensating the restrictions produced by their inexperience and newness, but insufficient attention has been paid to the long term effects of in-licensing on firm's rate of innovativeness and on firm performance.

In sum, Atuahene-Gima (1992) designated the constituents that promote a firm to licensing-in and recollected these constituents in the previous inward technology licensing experience, felt relative costs and benefits of inward technology licensing, consciousness of inward licensing opportunities, and the firm's internal new product development and R&D capabilities. Zahra et al. (2005) found that the degree of new ventures' practice of inward licensing emulates the demands of their industries and competitive strategies. Empirically, the repercussions of inward technology licensing on innovation activity has been evaluated by Tsai and Wang (2009). The authors expose that inward technology licensing does not significantly upgrade new venture's innovation performance, nor does the interplay of inward technology licensing and internal R&D. The few scholars, engaged in investigating the new venture's inward licensing strategy, have been primarily engrossed in explaining the conditions and determinants that affect licensing's propensity, under investigating the impact of inward licensing on performance and its different aspects.

Across these studies, the impact of inward licensing phenomenon on new born firm's survival probabilities is still an open matter. Consequently, this study sets out to fill in the research gap by analyzing the relationship between inward licensing at founding year and survival rate. The motivation why we analyze exclusively the new born firms that apply an inward licensing strategy at their founding year is because we are in line with the literature that stating initial resource management decisions are of special significance, as these decisions stick with the organization in the long run (Aspelund et al., 2005). As suggested by Bamford et al. (1999), early decisions and founding conditions have lasting effects which: affect the firm's long lasting behavior, restrict its strategic array, and continue to impinge on its long-term performance. In these opening operations, the entrepreneurs fixes an initial strategy basing its decision on bundling of the resources at disposal and those they can practically procure.

To verify these theorization, we use the confidential version of Kauffman Firm Database. The KFS is the largest longitudinal panel with an initial sample of 4.928 US firms that began operations in 2004, surveyed annually from 2004 to 2011. Through propensity score matching procedure, we

create a database of 260 new ventures, 130 licensees in their founding year and 130 non-licensees, drawing on a panel of data collected from the founders of young firms as part of the Kauffman Firm Survey. The results from our regression analyses show that the new ventures that decide to acquire a knowledge asset externally developed in its first year of existence runs the risk to be slower in reaching the market than a new venture that is not a licensee in early stage of its development. The higher the number of years until the first sale, could be one of the main cause for the lower survival probabilities.

This research could add enrichment to the literature in the following ways. First, we aim at disentangling the concept of inward licensing in the new ventures' context, enriching our understanding of the variables that compose a new venture's boundaries and a new venture's technology strategy. Second, whereas a number of previous articles have examined the effect exerted by owner, firm, and industry characteristic on firm's survival, we consider the initial technology strategy choice a factor that could affecting the likelihood of survive. Therefore, we could add augmentation to new ventures growth literature by adding elements that are responsible for new born firms' success or failure. Third, we could give our contribution to the literature about the way in which a new venture starts accumulating resources (Maritan & Peteraf, 2011). A major challenge for entrepreneurs is to decide how best to accumulate resources required for exploiting their opportunity. Early resource choices have significant impact on survival and growth of new ventures (Alvarez & Busenitz, 2001). Exploring the consequences of choosing an inward licensing strategy as a tool to increment initial resource stock in the founding year is a trigger issues.

The remainder of the article is structured as follows: in the next section we present the theoretical background and hypotheses. Then, our data and method are presented. Next, we present and discuss the empirical results. Finally, we make discussion regarding some theoretical and managerial implications based on our findings. The limitations of this study will also be addressed to guide future research directions.

THEORY AND HYPOTHESES

New companies have to deal with the liability of newness and smallness, which often result in a resource shortfall.

In a seminal paper on the origins and role of new organizations, Stinchcombe (1965) argued, as a general rule, that young organizations have a higher propensity to die than old organizations. The majority of existing studies on firm survival shares the liability of smallness notion, according to

which the probability of survival is positively determined by new venture size at entry (Hannan and Freeman, 1984; Freeman, Carroll and Hannan, 1983; Aldrich and Auster, 1986). Indeed, several scholars (Hannan and Freeman, 1984; Freeman, Carroll and Hannan, 1983) have recounted that the size of an organization influences its likelihood of survival and, subsequently, the mortality rate fades with increased size.

The liability of smallness originates from the conviction that the motives why small firms do not act as well as large firms and experience higher failure rates are due to difficulties in gathering capital, attracting, selecting highly skillful workers (Aldrich and Auster, 1986), and legitimacy problems with external stakeholders (Baum and Oliver, 1996). Differently, large firms have a lower degree of reliability on external resources (Baum and Oliver, 1996), and higher number of opportunities to access to market power than small firms.

Smallness is often coupled with newness. Freeman et al. (1983) found that increased size reduces the liability of smallness but that there is still liability of newness when they control size. They deduce that size cannot remove alone the problems deriving from liability of newness. Therefore, the effect of smallness and newness have both an impact on performance, but the effect of newness is usually stronger (Freeman et al., 1983). Some of the motives provided by Stinchcombe (1965) in giving an explanation of the liability of newness are the succeeding: new ventures are pendent on new roles and tasks that have to be assimilated at some costs; social interplays and a regular normative basis or informal information structure may be absent; solid links to clients, supporters are not yet installed when an organization begins to establish its activity (Freeman et al., 1983; Bruderl and Schussler, 1990).

Liabilities of newness is principally associated to the difficulties that young firms encounter in acquiring resources, capital stock, authority, and legitimacy. New organizations typically are characterized by limited access to capital, material, and labor markets. Lack of resources confines the amount of power that an organization can exercise over market and competitive conditions. Legitimacy for the a new venture is restricted because it had no time to demonstrate success and has had no time to establish stable and solid exchange relationships (Hannan and Freeman, 1984). As Zahra (1996) states, it is not possible for a new firm to compensate for its resource shortage, internally, that may be overcome by drawing on external sources. The constraints and the liabilities new ventures experience in accumulating and assembling resources and capabilities, the limited manager's capacity to develop all the skills needed and quickly commercialize their technologies,

inexperience, limited resources, rapid technological out of fashion and perpetually alternating market status quo often would foster them to license other companies' technologies (Zahra, 2005). Inward licensing agreement is defined as a contractual arrangement whereby one firm, a licensee, has the freedom to take advantage of the licensed technology, typically in the form of patents, trademarks and manufacturing, marketing and technical expertise, developed by another organization, a licensor (Atuahene-Gima,1993). In most cases, the licensor will still maintain the ownership of the licensed technology, while the licensee needs to pay a lump sum and/or royalty based on the sale of a product to compensate the licensor's investment in technology (Arora et al.,2001). The lack of cooperation between licensor and licensee and the willingness to reach different objectives are the main factors that distinguish a licensing agreement from other type of strategic alliances, defined as defined as "cooperative agreements of any form aimed at the development, manufacture, and/or distribution of new products" (Zollo et al., 2002:701). Namely, a licensing agreement is different from a strategic alliances mainly because it does not entail collaboration between the parties involves. As a consequence, the licensor may impose restrictions on use or areas of the technological asset licensed.

The use of inward licensing has strategic benefits, such as avoiding the high costs of internal development , achieving fast growth (Capon and Glazer, 1987), and even gaining access to state of the art technology. Inward licensing can help newly established ventures to make an improvement of their products (Kotabe et al., 1996); to beat failings and deficiencies in their product designs, manufacturing and marketing skills (Killing, 1977); to compose corresponding technologies essential to commercialize their innovations (Zahra, 1996) and consequently the skills necessary for speedy product commercialization (Teece, 1986). Licensing gives young firms, characterized by several constraints, access to other companies' capabilities, instead of investing in ambiguous and undetermined R&D that may not reproduce these capabilities (Atuahene- Gima, 1993; Roberts and Berry, 1984). That is to say, it empowers new ventures to evade costly investments in technologies with uncertain futures and, instead, converge on those activities that differentiate their products from those of their rivals (Zahra et al., 2005). In such way, by inward technology licensing, the firm may pile up its technological knowledge (Cohen and Levinthal, 1989) and fortify its technical capability from the search and use of external technology (Chatterji, 1996) and then it accomplishes considerable performance through product or process innovation.

These reasoning, elaborated following the conventional literature on the benefits of inward licensing, lead us to state that:

H1. Inward licensing is positively related to licensee's speed to market.

By relying on a technology acquired through a licensing agreement, new born firms can get access to technological assets externally developed, but gaining this access through a licensing agreement does not automatically ensure that a firm can successfully deploy the technology in the market and consequently perform better. The downsides that a new venture has to face when decide to be involved in a licensing agreement as licensee in its founding year are several and they could negatively impact market performance rate and subsequently survival probabilities.

Inward licensing may lead to benefits. These benefits must be evaluated on the basis of the additional costs, risks and uncertainties that a licensing-in decision invariably will give rise to. Indeed, there are also pains involved in drawing on inward licensing strategy (Grimpe and Kaiser, 2010).

These drawbacks could be more pertinent for a new venture than for an established firm: new born firms grapple with several impediments when they want to gain avail from external knowledge, such as limited absorptive capacity, lack of joint research experience (Van Gils and Zwart, 2004), lack of a structured R&D process.

Moreover, to fully draw upon the external sources and capitalise on their opportunities, a firm rests with its organizational and managerial resources and competences (Almeida et al., 2003), on its extant knowledge base, on its prior experience with external partners (Dyer and Nobeoka, 2000), but, as stated before, a newly established firm is severely constrained by a shortage of internal resources and competencies, by inexperience, by limited knowledge base. Therefore, the liabilities of newness, the resource, financial, organizational constraints, experiential biases of which a new venture suffers, are a double-edged sword. On one hand, due to these aspects, a young firm is forced to rely on external sources, on the other, these constraints represent the conditions under which the benefits provided by external sources could be partially suppressed.

Since resource- based view and knowledge-based view arguments imply that whether inward technology licensing benefits or hurts a firm's performance depends not only on gaining access to a technology, but also on whether a firm can integrate externally sourced technology with internal processes, we focus on the factors that could be an obstacle in integrating the external knowledge and in leveraging it in the marketplace.

As main factor, we highlight the role played by absorptive capacity. Although the construct of absorptive capacity has been given considerable academic attention over the past 20 years (Lane et al., 2006; Easterby-Smith et al., 2008), few scholars have examined it in the context of small and medium enterprises (Liao *et al.*, 2003; Gray, 2006; Muscio, 2007; Zahra *et al.*, 2009) and even less in the setting of newly established firms (Deeds, 2001; Hayton and Zahra, 2005).

It is widely endorsed that absorptive capacity evolves cumulatively, is path-dependent, and builds on extant knowledge (Cohen and Levinthal, 1994). According to Cohen and Levinthal (1990), established organizations are inclined to have assembled a large knowledge base, which improve a company's capacity to absorb knowledge, but a new venture, by definition, cannot take advantage of these elements. Moreover, on account of the fact that absorptive capacity is expanding over time through R&D investments and new ventures lack a well-structured and developed R&D units, younger companies by nature, possess a lower degree of absorptive capacity than their older counterparts. Whereupon, they are not able to take advantages of the gathered knowledge as efficiently and easily as incumbents. A recent study by Luo and Deng (2009) infers that older firms have more absorptive capacity and thus, can learn from their strategic partners how to be more competent. On the opposite side, a new born firm has less absorptive capacity and thus it cannot learn from its external partners in an efficient manner.

Following Flatten et al. (2011), we take into account the multi-dimensionality of the absorptive capacity construct, make a distinction between four stages: acquisition, assimilation, transformation, and exploitation (Zahra and George, 2002). According to Lewin *et al.* (2011), the absorptive capacity ability mostly depends on internal and external routines, thus routines are decisive constituents for all absorptive capacity process steps. The first step, acquisition, pertains to the identification and acquisition of new external information relevant to a company's operations. Assimilation, the second process step, stands for the incorporation, adaptation and transformation of the acquired information (Cohen and Levinthal, 1990). During the third process step, conversion, current knowledge base and new knowledge are merged. The last process step, exploitation, is related to the appliance of knowledge to commercial ends (Cohen and Levinthal, 1989). The four steps employs implicitly that the licensee is equipped by well-structured system of routines but a new venture, that decide to be a licensee in its early year of existence, has not had enough time to build the required routines and capabilities that facilitate the conversion and internalization of knowledge (Zahra and George, 2002). Not only firm's routines and firm's ability to intensify and improve the routines that make possible the firm to add new knowledge into its operations (Lewin *et al.*, 2011) impinge on absorptive capacity construct, but also prior investment and prior knowledge bear on these steps (Cohen and Levinthal, 1990; Zahra and George, 2002). Due to their

nearly short company history, young companies lack prior investment and prior knowledge, as well as experience in searching for the right partners: indeed, they are not yet entirely familiar with the market circumstances and with the players operating in it. Since they have not yet had the chance to build up a company reputation, the arrangement and development of relationships with third parties turns out to be fairly demanding (Gruber, 2004). Hence, the search for the right partners and the identification of partner's value is very time- and cost-consuming (Hannan and Freeman, 1984). All these elements negatively influence the four steps. To combine the licensed technology with standing business processes, a new venture should elaborate and handle all dimensions of absorptive capacity simultaneously (Zahra and George, 2002). This task is complicated to be achieved by a new venture that is characterized by lacks of routines, organizational structure, limited organizational members' capabilities, not well developed knowledge base.

Another issues to be considered is that the inward licensing allows the transferring of knowledge that is difficult to be codified, because tacit.

Taking into account that there is often information in the licensor's control that is essential for the licensee to effectively practice the whole technology but not fully covered by the licensed technology, inward technology licensing may result in licensee dependence on the licensor for improvements and new developments of the licensed technology. Such dependency has the potential to interfere with the internal skills and capabilities development of the licensee. Although a licensee will attain some knowledge about a licensor's activities, most learning that takes place about these activities will be indirect and incomplete, through observation rather than hand-operated involvement (Zollo and Singh, 2004). Since the knowledge to be exchanged is many times partly inarticulate in part because the knowledge is largely based on empirical observation and experience, rather than understood through general principle (Arora and Gambardella, 2010), the notion of partial learning is originated in work by scholars such as Pavitt (1998) that discern between activities dedicated to the understanding (knowledge of technology) and activities dedicated to the practical applications of the technology to products. For that reason, licensees do not execute the tasks linked to the development of technologies incorporated in the licensed products. In turn, organizational separation between licensor and licensee restricts the introduction of licensees to the scientific and technological knowledge underpinning the independent operations in the domain. Henceforward, in-depth comprehension of the licensed technology is likely to be incomplete and partial. A new venture will be in difficult in codifying and systematizing it since it has not an enough extended knowledge base, still no well-developed competencies and skills.

The hurdles arising in transferring the tacit part of knowledge are even more challenging in the case of technologies licensed at an embryonic stage. As a general matter, when a technology is licensed, it is transferred at a particular point in time. When this point in time corresponds to first stages of development of the technology subject of licensing agreement, the potential applications or likely success of the technology are more uncertain and the technologies licensed requires much more effort in internal R&D and much more experimentation in trials.

Early stage technologies pose extra demanding tasks for licensees: they entail greater uncertainties, this will worsen the transactional issues licensees have about committing toward the licensor's technology. Because they are underdeveloped, early stage technologies require more time to dedicate to experiments and trials, which licensees would be urged rushed to do without determinative assistance from the licensor. Licensees may to a greater extent be subject to licensor on ex post support and cooperation for commercial success (Jensen and Thursby, 2001).

Furthermore, as we stated before, when a firm licenses-in a technology asset, the licensor may inflict limitation on its application in some areas as trading, procurement of raw materials, expenditures, production borders. The most frequent kind of restrictions are territorial and related to the field of use. The license should describe the physical/geographic places in the world in which the licensee may use the rights granted in the license. The territory may be very large or very small, but it should nonetheless be explicitly stated to avoid disputes over potentially valuable markets. In addition to the territory restrictions, technology licenses may contain field of use restrictions that limit the licensee's practice of the technology within certain defined fields of use or applications. Additionally, inward technology acquisition may comprise transactional costs and hazards such as costly and lengthy agreement. Disputes about issues such as payment, services transferred, quantity and quality of the technology and delivery have been reported by licensees as recurring problems in their relationships with licensors. These problems may make the assimilation and exploitation of the acquired technology a slow and costly process. Necessary investments in specialized assets to develop the new technology exposes the new venture face cash constraints that limit their bargaining power.

Following these assumptions, we can therefore declare that

H1a. Inward licensing is negatively related to licensee's speed to market.

Generally though, shortened time to market, or high speed to market, is acknowledged to be connected with higher probabilities of survival and with lowered costs. Getting products to market

quickly allows firms to reduce costs through experience effects (Kessler and Chakrabarti, 1996), it allows for the inclusion of the most up-to-date components possible from technology markets, meaning that products will be more prevailing and thus be recognized as being of higher quality (Kessler and Bierly, 2002). Also, having a shorter development cycle allows for more recent customer feedback to be considered, allowing for greater customer responsiveness and adding to customers' perceptions of quality (Brucks, Zeithaml, and Naylor, 2000). Furthermore, being the first to market consents to firms to root industry standards and set pricing prospects, thus reaching higher margins, customer fidelity, well- established and durable marketplace positioning, and a reputation as a leader (Calantone et al., 2003; Carbonell et al, 2004; Kessler and Bierly, 2002). Reduced speed to market leaves for an extended period of product sales, and time to develop efficiencies in manufacturing (Chen et al., 2005). Products that are late to market have been shown to have considerably lower profits (Carbonell et al, 2004). Even preferred goods can only infrequently overcome the harm to profitability brought by product procrastination or retardation (Menon et al., 2002). Beyond the harm to profitability, product dalliance has also been viewed as the cause of the important decrease in the market value of the firm (Hendricks and Singhal, 1997). For all these reasons, a longer time to market leads to a lower probabilities of survival.

A relevant argument to be added is the one posited by Batterink (2009): licensing-in appears to be a beneficial way to acquire external knowledge, but the competitive advantage of licensing-in seems to be temporary and transitory, probably because the graded and regulated knowledge or technology is accessible and ready on the market, and thus also available to competitors.

Combining these aspects, we state that

H2. Licensees have a lower survival's rate than non- licensees.

DATA AND METHOD

This section presents the empirical setting and data, the matching procedure, the variables and measures used in the analysis, and the econometric technique employed.

Data

Empirically, we only consider patent license agreements because they function as channels for knowledge propagation (Shapiro, 1985), thereby guaranteeing a minimum transfer and promulgation of knowledge from licensor to licensee. To demonstrate our hypotheses, we draw data from the Kauffman Firm Survey (KFS). The KFS is the most extensive longitudinal study of new ventures in the world. The KFS public version comprehend data over the 2004–2011 interval of time on 4,928 firms that began operations in 2004 and this panel has been created by using an arbitrary sample of new businesses. KFS, coupled with Mathematica Policy research (MPR) developed questions on business characteristics, strategy and innovation, business structure and benefits, financing, and demographics of the principals, using a number of previous business surveys. An arbitrary sample of 32,469 businesses was disseminated for data collection on the Baseline Survey, which was carried during the period between July 2005 and July 2006. The research team made entire surveys with active owners of 4,928 businesses that established operations in 2004, which reflects a 43 percent response rate. A self-administered Web survey and Computer-Assisted Telephone Interviewing (CATI) were made use of in order to collect data, and KFS interviewers were recompensed by \$50 at the end of each interview. CATI completes accounted for 3,781 (77 percent) and Web completes accounted for 1,147 (23 percent) of the interviews.

The sample is traced periodically each year and frames a wide set of specific questions that screen a 25 range of topics such as the background of the founders, the sources and amounts of financing, firm strategies and innovations, the outcomes (such as sales, profits, and survival), the business start and the presence of formal legal status.

Since we have at our disposal the confidential version, we can rely on data from 2004 to 2011 and more detail industry codes, geographical codes (zip code, metropolitan statistical area, and state), and many additional continuous variables (in addition to categorical variables). The KFS oversampled the high-technology businesses based on the intensity of employment in research and development in the businesses' primary industries.

To test our hypotheses, we selected from the broader sample of Kauffman Firm Database companies the small subset of companies which declare to adopt an inward licensing strategy in their first year of existence. More precisely, the question, inherited to licensing activities, asked to newly established firms at their founding year is: "In calendar year 2004, did [NAME BUSINESS] license in any patents?". Operating in this way, we were able to identify 135 companies declaring to undertake an inward licensing in founding year. After having created the group of 135 licensees, we

have relied on a propensity score matching procedure in order to create the control group composed by comparable firms that are not licensees in their first year of existence. The matching has been validated for 130 firms out 135 licensees. Therefore, our final sample includes 130 new ventures licensees and 130 new ventures non-licensees at their founding year.

Matching procedure

The matching procedure identifies a substantial number of potential matches for each licensee.

We created a control sample of comparable non-licensees in order to investigate whether our sample of licensees have had higher or lower prospects of survival than they had not licensed-in. We applied propensity score matching and exact matching procedures to obtain this comparable matched sample. The propensity score matching technique is based on the likelihood that an observation would be a licensee conditional on observables (Rosenbaum and Rubin, 1983, 1984). We used logit regression specification to estimate the conditional probabilities of being a licensee and allowed non-licensees to be matched with a licensee, running the procedure with the one to one matching.

Since matching procedures tend to be invalidated if there are too many regressors (Dehejia and Wahba, 2002), we employed a limited number of variables on which match the two samples. We, hence, aimed to obtain a control sample of non-licensees with the same initial conditions of the licensees. Specifically, we employed number of employees, industry, the business origin, the years of founder's experience in the industry in which the firm competes, the financing method (debt vs equity). The variables on which we made the matching are at the founding year, 2004.

Therefore, our sample is the sum of the treatment group, composed by 130 new ventures that decide to be a licensee in the first year of their lives and the control group, composed by 130 new ventures that do not be a licensees in their first year of existence.

Independent Variable

Licensing-in activities are provided in the form of binary information and measured in the KFS database as a dummy variable. The question asked to newly established firms at their founding year is: "In calendar year 2004, did [NAME BUSINESS] license in any patents?" We create a cohort of firms that at inception decide to acquire from external sources a patent through a licensing agreement. The independent variable is labelled as LIC-IN.

Dependent Variable

In the first hypothesis, we would like to test the effect of acquiring a patent in the first year of life through an inward licensing strategy on speed to market. To construct this variable we rely on the answer to the following question: “Did [NAME BUSINESS] have any sales or customers?” Then, we count the number of years used to reach the market for the first time. Operating in this way, we create the measure for the speed to market, labelled as Speed to market.

For the second hypothesis, the dependent variable is built on the following question: “What is the main reason [NAME BUSINESS] is out of business?”. The variable Failure takes 1 if the firm is sold to another business or merged with another business (outcome 1), 2 if the firm stopped its operations temporarily or permanently (outcome 2). Hence, we introduce a distinction between voluntary firm closure in the form of merger or acquisition and compulsory firm closure in the form of failure/permanently closed operations. A firm that “disappears” due to a merger or acquisition is more likely to be a successful firm, or at least one that still has value and potential in the marketplace. In contrast, a firm that permanently closes operations is one where there is a mismatch between the resources and capabilities for the firm and owner and the opportunities available in the marketplace.

Control Variable

In each of our model specification we control for the matched variables:

Firm size measured as the sum of employees (**EMPLOYEES**).

As previously suggested by Mata et al. (1995), initial size has continuing and enduring positive influences on survival later in the life of the firm. Audretsch and Mahmood (1995) pointed out that size can impact survival positively. The question related to the firm size is the following: “Not counting owner(s), on December 31, 2004, how many people worked for [NAME BUSINESS]?”

Entrepreneurial Experience measured as the number of years of experience the owner has in the same industry in which the firm competes (**EXPERIENCE**).

Several studies have found that a firm’s pre-entry knowledge and experience improve its long-run performance and survival (Dencker et al., 2009)

Organizations need a certain level of technological knowledge before they can benefit from technologies discovered by other firms. Specifically, organizations need a certain level of technological knowledge before they can benefit from indirect learning. For a new venture, its prior knowledge corresponds to its founder's knowledge and founder's experience. The role of entrepreneurial experience is important in order to increase the absorptive capacity of the new venture, namely existing stocks of knowledge facilitate the accumulation and integration of new knowledge, shape a firm's ability to comprehend and apply new information, and shape its reactions to new situations, to reduce the casual ambiguity about the factors that lead to a superior performance and to overcome the experiential constraints a new venture suffers from. The question related to the entrepreneurial experience is the following: "How many other new businesses (have/has) (you/[OWNER B-J]) started besides [NAME BUSINESS]?"

Industries controls. We use 2 digit NAICS code to identify the sector in which new ventures operate (**INDUSTRY**). We created 7 categories according to the definitions of each industry provided by Naics: 1) utilities and construction; 2) manufacturing; 3) trade; 4) transportation and warehousing; 5) business support services; 6) social services; 7) other.

Audretsch (1991) considers the influence of industrial variables on survival and detected that survival rates differ across industries. Audretsch indicates that industry's specific technical surroundings as well as industry's demand are important determinants of survival rates. The question related to declaration of industry is the following: "As of December 31, 2004, our records indicate the principal activity of the business was [D&B NAICS CODE DESCRIPTION]. Is that correct?"

Financing Method. We control for the sourcing of financing and measured this variable using the total ranges of equity and trade (**DEBT-EQUITY**).

Empirical evidences report that higher debt decreases the probability of survival. Huynh et al. (2009) found that firms with high level of leverage (debt to value ratio measured debt over assets) face an increasing failure risk with an increase in leverage. Huynh et al. (2008) find that the higher the debt to asset ratio is at initial stage, the lower the life expectancy of the firm. The likelihood of survival is diminishing with leverage and it seems that debt is a negative driving force to survival.

The question related to the amount of debt and equity is the following: “ range of Total Debts from owners and from other business”; “ range of Total Equity from owners and from non-owners”

Firm Origin. We control for some descriptions of how a business can get started (**ORIGIN**). According to the way in which new ventures are founded, they differ in their capacity to gain and assemble resources in building matchless organizational capabilities (Miller & Camp, 1985) that can result in performance dissimilarities (Shrader & Simon, 1997; Zahra, 1996). The question related to the way in which a new venture has been established is: “Which of the following best describes how [NAME BUSINESS] was started. Was it

1. A new business, branch or subsidiary owned by an existing business
2. A business inherited from someone else
3. A new, independent business created by a single person or a team of people
4. The purchase of an existing business
5. The purchase of a franchise
6. An organization designed for social and charitable objectives and legally established as “not-for-profit”
7. the business started some other way? (SPECIFY)”

Research and Development. We measure for internal R&D as expenditures in research and development (**R&D**). To enhance its performance, and consequently its probabilities of survival, a new venture licensee has not only have the ability to acquire and assimilate external knowledge, but also has to exploit the new knowledge translating it into products and processes (Murray and Peyrefitte, 2007). It has been stated that not only firm’s internal efforts create new knowledge, but they also encourage the use of external knowledge sources and increase the firm’s ability to take advantages of these sources. Thus, the most relevant the firm’s internal capabilities, the most relevant are the contributions of external knowledge acquisition strategies on firm’s performance. The question related to the R&D activities is: “Did [NAME BUSINESS] spend any money on research and development of new products and services during calendar year 2004?”

Econometric technique

In our first hypothesis, our dependent variable is the speed to market, measured by the number of years used by the new venture licensee to get the market for the first time.

Given that we measure the time to market as the number of years taken by the firm until its first sale, our dependent variable is a count variable. The model used to conduct the empirical analysis had to appropriately accommodate non-negative integer count values. Moreover, prior studies have indicated that modeling count variables requires using a regression approach that deals with many zeros (Sampson, 2007; Ziedonis, 2004). We considered as first step the option of using a Poisson model as it is one of the simplest choices in dealing with count data (Hausman, Hall, & Griliches, 1984). However, the Poisson distribution is based on the main assumption that the variance is proportional to the mean, $r(Y) = E(Y) = \mu$. If this assumption is not respected, the coefficients will be estimated consistently, but underestimated standard errors might be shown counterfeiting significance levels (Cameron & Trivedi, 1986). The test for overdispersion provided evidence against using a Poisson model and in favor of a model that allows the variance of the dependent variable to exceed its mean.

In our case, the data are not over-dispersed: the mean (1.2) is close to the variance (0.55). The appropriateness of Poisson model is also witnessed by the `poisgof` command: a significant ($p < 0.05$) test statistic from the `gof` indicates that the Poisson model is inappropriate. In our case, the `gof` test is not significant ($p\text{-value} = 1.000$). We run the analysis one more time, this time using negative binomial regression. The likelihood ratio test in the negative binomial regression controls for the overdispersion. When the overdispersion parameter is zero the negative binomial distribution is equivalent to a Poisson distribution. In our case, α is not significantly different from zero ($\chi^2 = 0.00$) and thus reinforces one last time that the Poisson distribution is appropriate.

In conclusion, as indicated by econometric tests, run to check for the most appropriate model between Poisson and negative binomial distribution, we use the Poisson model in order to validate our first hypothesis.

To demonstrate our second hypothesis, we use duration (survival) analysis. Survival analysis is a collection of methods for analyzing time-to-event data. Time-to-event data reflect the observation of the time from a specified time origin (new venture's founding year) to a particular endpoint, a certain event of interest (exiting). The Kauffman Firm Survey data procure us with records of the event of interest (firm exiting), as well as the type of event measured from a specified time origin, voluntary or compulsory closure. In our sample, the endpoint consists of two mutually exclusive events of interest, voluntary or compulsory closure, that create a competing risks situation.

In addition to the explanation of the reason why we are using a competing risk model, we have to pay attention to the fact that our dependent variable in the second hypothesis is associated with a set

of explanatory factors: it takes 2 values (1 if the firm voluntary stopped operations, 2 if the closure is compulsory). We have also used the option "base" to indicate the category we would want to use for the baseline comparison group.

In sum, since our dependent variable, in the second hypothesis, assumes more than one value, we have to use a multi-category response model, a model that is suitable for examining the lifetime outcomes in which a firm is at risk to more than one event type. Hence, to analyze our duration data, the most appropriate model to be run is the multinomial logit.

In sum, for each firm, we observe the time-to-event and the type of event. In addition, the occurrence of one type of event removes the business from risk of the other event types, i.e. businesses that close are not at risk of being a target for a merger or acquisition. The KFS provides us with the year in which the firm went out of business. Thus, our measurement of event time is discrete, because the survey data are provided on a yearly basis and therefore the duration lengths are positive integers. The hazard function is a time to failure function that gives the instantaneous probability of the failure, given that it has not yet occurred.

RESULTS

Validating the matching procedure

Before starting the analysis, we confirmed that our matching procedure provided comparable licensees and non-licensees. We ran t-tests across all variables and a logistic regression to explain the likelihood of having signed a license agreement in the first year given the conditional variables used in the matching procedure. Table 2.2.1 reports the results. Given that the matching variables are considered appropriate, we can conclude that the matching procedure is successful in terms of providing comparable non-licensees for the analysis of sales and survival. These results, however, also indicate the need to include these as controls in the analysis

[Insert Table 2.2.1. Here]

Descriptive Statistics

Among the 260 firms studied, 5-6 years is the longest period to reach the market and exclusively some of new ventures that decide to be a licensee in their first year of existence take 5-6 years to reach the market. The higher number of years taken by a no-licensee to get to the market is 3 years,

and the majority of them takes just 1 year. The majority of licensee take 1 year but as said some of them entail 5 or 6 year to the first sale. These results show that licensees take more year to get the register a first sale. The t-test is positively significant (p-value 0.000).

Furthermore, we find that the licensees are usually established by an higher number of individuals than their non-licensees counterparts. The difference in the number of owners between licensees and non-licensees is statistically significant: on average, 6 owners for licensees and 3 for non-licensees. Another statistically significant difference between the two groups of our sample is related to the number of employees dedicates to R&D activities: the licensees exhibit higher number of employees in R&D than non-licensees. Interesting is the result about the propensity to in-license not only patents but also copyrights and trademarks: the licensees in our sample are more inclined in acquire also copyrights and trademarks compared to their corresponding non-licensees. It is even more important to notice that there is no statistically significant difference in licensing-out patents, copyrights and trademark among the firms composing our sample.

Table 2.2.2 presents the descriptive statistics for the explanatory and control variables, and the associated Pearson correlation coefficients

[Insert Table 2.2.2 Here]

Running t-test for the probability of survival, the majority of no-licensee still operate in the market and the number of licensees that fail is higher than the number of no-licensees that fail, as suggested by the statistical significance of t-test. Before proceeding to survival analysis, we look at the Kaplan-Meier curves for all the categorical predictors. This will provide insight into the shape of the survival function for each group and give an idea of whether or not the groups are proportional. The group treatment 0 is composed by those firms that are not licensees, while treatment 1 corresponds to licensees sample.

[Insert FIGURE 2.2.3. Here]

Table 2.2.4. presents the results of the Poisson regression used to test HY1 and HY1a and the multinomial logit to test failure time regressions (HY2). Models I–II investigate the speed to market, measured as number of years required for licensees and non-licensees to reach the market until the first sale, considering the control variables only (Model I), including the licensee dummy (Model II). Models III–IV indicate the failure hazard rate for licensees and non-licensees, considering the control variables only (Model I), including the licensee dummy (Model II). Outcome 2 corresponds to the case in which the closure is compulsory: the firm stopped its operations temporarily or permanently.

The licensee variable in Model II exhibits negative estimates significant, suggesting that new venture licensee take an higher number of years until its first sale than non-licensees. This supports Hy1a and consequently Hy1 is not validated by econometric results.

Hypothesis 2 also finds support in Model IV. Model V E VI indicate the hazard rate of voluntary closed operations for licensees and non-licensees, considering the control variables only (Model V), including the licensee dummy (Model VI). Voluntary closed operations corresponds to the case in which the firm is sold to another business or merged with another business: outcome 1. All the models exhibit significant chi-square values, which suggests validity.

We also added the dummy for each year: year dummies should work as year fixed effects. They are important to reduce concerns that the effect that we observe are due to period effects.

[Insert Table 2.2.4 here]

ROBUSTNESS CHECK

To confirm also our assumption according to which the implementation of a licensing-in strategy at founding years lead to a longer process until the first sale, we rely on the following question: “Did [NAME BUSINESS] have any customers or sales in calendar year 2004?”. We check for the answer to this questions for all the years of observations. In so doing, we investigate as much as we can, the long term new ventures licensee and non-licensee performance. Since we are dealing with a dummy variables, we use both the probit and the logit model to test whether there is difference in the sales gained by the new ventures. For all the analysed years, the regression analysis show a coefficient negatively and strongly statistically significant (p-value less significant is equal to 0.03).

This result validates our assumption on the relationship between having sale and being involved in a licensing agreement: new ventures licensees have constantly over the 8 years of observation, from 2004 to 2011, less sale than their non-licensees counterparts.

CONCLUSIONS AND FUTURE RESEARCH

This paper addresses the inward licensing phenomenon from the new venture licensee's viewpoint, investigating whether licensing-in of technologies enables the licensees to have a higher or lower probabilities of survival than non-licensees. The survival rates are directly connected to the time taken by firms to reach the market. Following the conventional literature on licensing, we should expect that a new venture, that decide to be part of a licensing agreement as licensee in its founding year, has a higher life expectancy than a non-licensee. Counter intuitively, we hypothesize that a new venture licensee, that acquire a patent in its first year of existence, has lower likelihood to operate in the market longer than its non-licensee counterparts.

Based on a model that includes matched samples of licensees and non-licensees, we find support for the hypotheses that licensees survive less than their non-licensee counterparts. The results suggest that licensing-in involves not only gains but also pains. This is particularly true for new ventures. Although the compelling effect of inward licensing on new product development is widely recognized, we warn that this possible positive effect should not be taken for granted if we are working in the new venture's context.

Even if technology in-licensing is acknowledged to be for new ventures licensee a fundamental way of entrance in technological learning (Johnson 2002; Lin 2003; Tsai and Wang 2009), our findings suggest that inward licensing strategy is not a winning strategy for a newly established firm that decide to implement this strategy in first year of its existence. We started by asking whether the decision to implement an inward licensing strategy by a new venture in its first year of existence has a positive or negative impact on survival. We expect, differently from what the literature is used to state, a negative impact of being licensee on survival probabilities, as a consequence of speed to market: new ventures that used inward licensing at founding year, achieved later the market than the new ventures that do not used inward licensing at founding year. The results support this prediction.

The study suggests that new ventures, that decide to be licensees at their inception, have lower probabilities to survive than their non-licensees counterparts. We choose to analyse the consequences of the implementation of inward licensing strategy in a new venture's first year of

existence because we know from prior work that a firm's founding conditions have long lasting effects on its survival and growth (Mata et al. 1995, Audretsch and Mahmood 1994, Huynh et al. 2008, Geroski et al. 2010).

The present study therefore advances the ongoing discussion on the factors impacting new venture survival, as well as the more specific stream of research on the role of inward licensing in new venture's context. A number of articles examine the effect of owner characteristics and attributes to find that certain qualities and capabilities increase the likelihood of firm survival. These capabilities can be grouped into the categories of human, social, and financial capital. The majority these studies are in accord with the resource-based view of the firm which is still debating about that the assignment of the entrepreneur is to gain and make efficient use of resources that will provide an advantage over its rivals and higher probabilities of survival (Brush et al., 2001). A tool that an entrepreneur can use in acquiring an external resource is inward licensing strategy, overlook the downsides that this choice could have on its market performance and subsequently on its survival rate. New ventures have both limited resources and numerous investments needs including R&D, organizational building, market development. Therefore, the allocation of their limited resources is a critical decision an entrepreneur makes.

Our study tries to be inserted in this stream of literature, adding another reason why a new venture could stop its operation, a wrong initial technology strategy.

Moreover, in line with Aspelund et al. (2005), we suggest that considerable research effort should be focused on investigating antecedents and the consequences of those initial strategic and market decisions made by new firms. Indeed, the technological strategy developed initially is therefore likely to establish a path dependency. Our study could supplement existing literature on the effects of new venture founding conditions.

Arora et al. (2001) identify the urgency to identify the factor that lead to both inefficiencies and efficiencies in markets for technology. Therefore, the present study contributes to the markets for technology literature: the literature on markets for technology has not determined whether in-licensing is a winning strategy for new ventures. We show that obtain a knowledge asset externally developed, through a licensing agreement, is not an appropriate initial decision for a new born firm. Thus, although firms may choose to in-license technologies to overwhelm entry barriers, to attain access to the newest technologies, the implication of this choice for speed to market and survival is not neutral. The managerial implication of our work is that inward licensing may provide a jump start in resource but the several constraints of which a new venture experiences can hinder the firm's ability to integrate the external knowledge and consequently to develop the new resources and the internal capabilities it needs to operate effectively. Clearly, firms have incentives to

undertake an inward licensing strategy; nonetheless, such a strategy may inhibit the understanding and control that a firm needs to develop the full suite of resources required for being successful and fast on the market. This impacts on firm's survival prospective (Mulotte et al., 2013).

The paper has limitations related mainly to the nature of licensing agreements and patents. Overthrown these limitations could be reflected in developing future research directions. Since we have no data relatively to each licensing agreement and to the firms characteristics of the parts involved in the agreement, we cannot control for the similarities between the acquired patent and the licensee's current knowledge base. Moreover, it would be useful to investigate cases in which firms do not in-license patents, but products or component technologies. Another future research challenge is to analyse the impact of other channels, different from licensing agreement, through which acquire external developed knowledge on survival. Our approach focuses on inward licensing in one period of time and this remains a severe limitation of the study. However, with future researches, it will be possible to examine whether the being a licensee, not only in the founding year, changes over time its impact on survival rates.

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APPENDIX A

Table 2.2.1. Matching procedure

	t-test mean values		Matching model	
	No-licensees	Licensees	Estimate	Std. err
R&D	0.33	0.44	0.00	0.18
Industry	3.6	3.7	0.03	0.00
Origin	3.1	3.2	0.00	0.17
Experience	15.4	13.9	0.64	0.00
Employees	7.1	10.1	0.26	0.00
Debt	3.6	3.6	0.85	0.02
Equity	3.1	3.5	0.00	0.03
_Cons			0.63	0.00
Numb. obs			4722	
Log-Likelihood			-544.63	
Pseudo R2			0.08	

Table 2.2.2

Descriptive Statistics and Correlation Coefficient

Variables	Mean	S.D	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1] Failure	0.12	0.46	1.000									
[2]Speed to market	1.2	0.74	-0.03	1.000								
[3] Lic-in	0.48	0.49	0.073*	0.199*	1.000							
[4] R&D	0.38	0.48	-0.051	0.167*	0.112*	1.000						
[5]Industry	3.7	1.6	0.001	-0.083*	0.014	-0.178*	1.000					
[6] Origin	3.2	0.5	0.059*	-0.059*	0.049	-0.190*	0.137*	1.000				
[7]Experience	14.7	11.4	-0.060*	0.070*	-0.064*	0.047	-0.055	-0.147*	1.000			
[8]Employees	8.5	43.8	-0.027	0.020	0.033	0.072*	-0.056	0.085*	0.006	1.000		
[9] Debt	3.6	3.4	-0.030	-0.028	-0.007	0.068*	-0.110*	0.128*	-0.018	0.113*	1.000	
[10] Equity	3.3	3.4	-0.045	0.076*	0.065*	0.230*	-0.100*	-0.007	0.013	0.058*	0.190*	1.000

Figure 2.2.3
Failure Outcome 2: firms stopped its operations temporarily or permanently

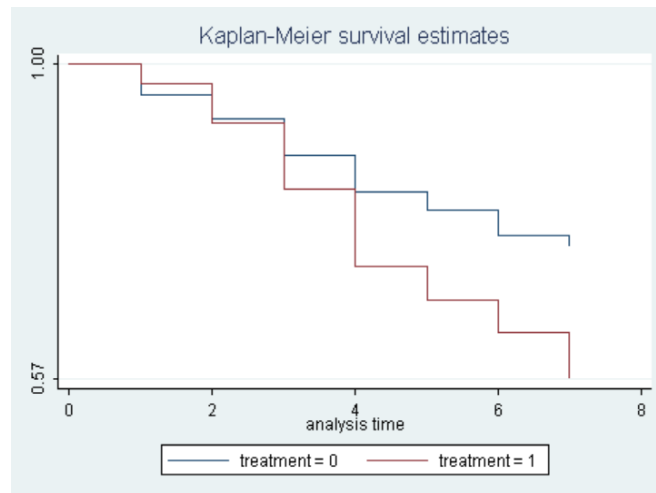


Table 2.2.4. Regressions Analysis

	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V	MODEL VI
		<i>Dep. Variable</i> Speed to market		<i>Dep. Variable</i> Failure (Outcome 2)		<i>Dep. Variable</i> Failure (Outcome 1)
<i>Ind. Variable</i>						
Lic-in		0.197*** (0.0291)		0.822* (0.372)		0.211 (0.469)
<i>Control Variables</i>						
R&D	0.133*** (0.0359)	0.119*** (0.0350)	-0.354 (0.390)	-0.383 (0.388)	-0.580 (0.538)	-0.600 (0.555)
Origin	0.0260 (0.0247)	0.0142 (0.0263)	0.475 (0.255)	0.480 (0.258)	0.479 (0.269)	0.465 (0.299)
Experience	0.00188 (0.00134)	-0.00247 (0.00132)	-0.0276 (0.0153)	-0.0235 (0.0162)	0.00742 (0.0195)	0.00790 (0.0196)
Employees	-0.0000 (0.0003)	0.0000 (0.0003)	-0.145* (0.0577)	-0.153* (0.0612)	0.00138 (0.00168)	0.00137 (0.0197)
Debt	-0.00835 (0.00509)	-0.00725 (0.00498)	-0.0244 (0.0476)	-0.0230 (0.0481)	-0.0287 (0.0682)	-0.0291 (0.0680)
Equity	0.0127* (0.00584)	-0.0109 (0.00565)	-0.0971 (0.0623)	-0.0977 (0.0602)	0.149 (0.0892)	0.147 (0.0877)
Year						
0 year	0	0	0	0	0	0
1 year	0.0690 (0.0538)	0.0619 (0.0527)	0.113 (0.556)	0.119 (0.559)	0.00661 (0.987)	0.00146 (0.990)
2 year	0.0927 (0.00556)	0.0835 (0.0546)	0.704 (0.513)	0.692 (0.513)	1.330 (0.808)	1.316 (0.799)
3 year	0.150* (0.0607)	0.147* (0.0590)	-0.0219 (0.626)	0.0439 (0.629)	1.595 (0.825)	1.590 (0.825)
4 year	0.126* (0.0592)	0.121* (0.0577)	-0.289 (0.794)	-0.279 (0.794)	0.738 (0.984)	0.725 (0.980)
5 year	0.184** (0.0635)	0.181** (0.0617)	0.381 (0.656)	0.414 (0.660)	0.911 (1.022)	0.907 (1.019)
6 year	0.165* (0.0656)	0.166** (0.0634)	0.0775 (0.711)	0.133 (0.717)	1.611 (0.918)	1.611 (0.917)
Industry						
1	0	0	0	0	0	0
2	0.167* (0.0665)	0.0841 (0.0695)	0.612 (0.792)	0.306 (0.827)	14.00** (0.454)	14.31** (0.480)
3	0.0521 (0.0639)	0.00470 (0.0695)	0.546 (0.811)	0.398 (0.817)	13.63** (0.591)	14.00** (0.588)
4	0.185 (0.108)	0.108 (0.0997)	0.980 (1.076)	0.840 (1.038)	-0.375 (0.427)	-0.299 (0.428)
5	0.0506 (0.0589)	-0.0138 (0.0636)	0.0330 (0.733)	0.197 (0.748)	13.82** (0.346)	14.18** (0.350)
6	-0.0775 (0.0686)	-0.121 (0.0762)	0.358 (1.023)	0.220 (1.041)	13.91** (0.733)	14.38** (0.735)

7	-0.149*	-0.219**	0.551	0.396	0.0592	0.136
	(0.0684)	(0.0757)	(0.867)	(0.864)	(0.535)	(0.326)
_cons	-0.0861	-0.0790	-4.130**	-4.486***	-20.50***	-20.86***
	(0.103)	(0.105)	(1.215)	(1.298)	(1.292)	(1.284)
N	1140	1140	1140	1140	1140	1140
R-sq						
Adj. R-sq						

2.3 A STUDY OF THE INFLUENCE OF LEARNING SEQUENCES ON NEW VENTURE'S INNOVATION: THE MODERATING EFFECT OF FOUNDER'S EXPERIENCE

ABSTRACT

We employ the capabilities literature and the organizational learning literature to shed light on implications of learning sequences adopted by new ventures on their innovative performance. In particular, we investigate the impact of two alternative initial learning paths: direct-indirect and indirect-direct learning respectively. We postulate that the timing at which a firm chooses to start learning indirectly impacts on its innovative outcomes. Consistent with Fletcher and Harris (2012), we choose, as tool through which firms learn indirectly, the inward licensing strategy. Based on Kauffman Firm Foundation Enclave Database, we find that the new ventures that decide to rely later on the indirect learning process exhibit a better innovative performance than the new ventures that decide to learn indirectly in the first years of existence. This relationship is negatively moderated by prior entrepreneurial experience, in terms of industry and start-up experience.

Keywords: indirect learning, licensing, new ventures, innovative performance

INTRODUCTION

Organizational learning is extensively accepted as being a pivotal activity for firms, an activity that shapes their development, their growth, the possibility of gaining competitive advantages over their rivals (Kogut and Zander 1992, Grant 1996). The progressive elaboration of the process through which firms learn, is of particular interest not only to strategy researchers and organizational theorists but it is also of fundamental interest in entrepreneurial literature. Indeed, as market competition becomes more and more intensified, new ventures need organizational learning to develop and maintain better competitive positions. Organizational learning has, therefore, developed into an essential tool for newly established firms to settle a competitive advantage and enhance performance (Senge 1990). Indeed, research suggests that it is a central tool by which firms generate innovations, adapt to environments, exploit the opportunities offered by new market, generate and maintain over time a competitive advantage (Argote, 1999). In this sense, the urgency to conceive and put into practice an organizational learning capability, which empowers a new venture to carry out adequate management practices, routines, and courses of action that facilitate and promote learning, has become a priority for entrepreneurs and managers.

Organizational learning is a construct that covers a multitude of aspects. It covers several fields such as a) the content of learning, what is learned?, b) the subject of learning, who is learning?, c) the incentives and aims for learning, why does learning take place?, d) and the efficiency and effectiveness of learning, which results does learning yield?. (Schwens et al., 2009). Many of these aspects have been the object of indiscriminate attention in entrepreneurship literature, but the extant research on organizational learning has produced a concise and insufficient comprehension regarding the learning sequences and their potential impact on firm's innovation performance. Despite the several enriching arguments on the importance of single direct learning trajectory (trial-and-error learning, experimental learning, improvisational learning) and indirect learning processes (vicarious learning), thanks to which much understanding about how firms use each of the learning processes alone has been provided, we notice that the studies around the learning sequences of these two processes and their impacts on firm's performance persist to be under-investigated (Bingham et al., 2012). Some researchers have explored the effect of using direct and indirect learning together (Baum & Ingram, 1998; Henisz & Delios, 2001; Schwab, 2007). The conclusive result of the studies indicates that, relying on both direct and indirect learning leads to an interaction in which the created knowledge exhibits a weaker effect than the linear addition of their independent effects. These studies are relevant for the suggestions they made: firms appear to make use of both direct and indirect learning processes and each of them may influence the other. Despite these

contributions, the effect of the sequences of these two learning processes on innovation performance remains an unclear issue.

We try to cover this gap, investigating the impact of two alternative learning sequences, adopted by a new venture at its initial development stage: direct-indirect and indirect-direct learning respectively. Consistent with Schwab (2007), direct learning entails that a firm learns from its own background. The most investigated processes through which direct learning takes place are: 1) trial-and-error learning, it occurs when organizations change their subsequent behaviour in response to prior performance outcomes. (Tsang, 2002; Van de Ven & Polley, 1992); 2) experimental learning, it occurs when organizations obtain knowledge and insights through predetermined examinations that take place in controlled settings and that are clearly created to help managers to be better prepared for any potential and unexpected hurdles (Pisano, 1994); 3) improvisational learning, it occurs when organizations learn in real time as reaction and action converge to solve emergent problems and take advantage of surprising opportunities (Miner et al., 2001). Finally, some scholars focused their attention on indirect learning, learning from others' course of actions (Ingram, 2002). Works in this stream of research usually sharpen on vicarious learning, which occurs as firms observe actions implemented by other firms and then change their own behaviour consequently (Haunschild and Miner, 1997). Through vicarious learning firms thus exploit the benefits of gathered knowledge while escaping from the virtual costs of the accumulation of experience (Srinivasan et al., 2007).

In developing our reasoning, few points should be kept in mind: 1) we analyse the two learning sequences at new venture's initial stage in order to highlight how the decisions undertaken in the first years of development have long-lasting impacts on new venture's performance; 2) we start from the assumption that the main difference between these two learning patterns is the timing at which a new venture decides to rely on indirect learning approach. Therefore, the research question around which we build the present work is:

when is it convenient to start learning through an indirect approach? Is it better to start learning indirectly soon after founding or to postpone this strategy until the new venture has accumulated significant resources?

In order to study learning sequences undertaken by entrepreneurial firms, we apply learning theory building on the works by Huber (1991).

According to Huber (1991), the way through which acquire indirect learning are mainly two: vicariously and grafting. Grafting corresponds to the hiring of people or purchasing business units (Huber, 1991), but the most widely accepted indirect learning process is the vicarious learning

(Srinivasan et al., 2007). In line with the definition provided by Fletcher and Harris (2012), we label indirect learning process based on vicarious model. In vicarious knowledge acquisition, firms learn from the experience of others, for example by observing them in networks, or through licensing, strategic alliances or strategies of collaboration (Chander & Lyon, 2009; Huber, 1991; Welch & Welch, 1996). The case we analyse in this study is vicarious learning through licensing.

We will try to demonstrate whether and how the age at which a firm decides to rely on indirect learning approach has an impact on its capacity to be innovative. In order to achieve our objective, we analyse a sample composed by 276 new ventures, extracted from the 4,928 firms included in the Kauffman Firm Database. Among them, 140 follow the indirect-direct learning path and 136 follow the direct-indirect learning path. Rephrasing in light of timing at which the indirect learning starts, 140 new ventures decide to start learning indirectly in first two years of their existence applying an inward licensing strategy and they are labelled as “early indirect learners”, while 136 start rely on indirect learning approach, implemented an inward licensing strategy some years after their founding and they are labelled as “late indirect learners”.

We propose that late indirect learners are more innovative than early indirect learners. This result is the consequence of the fact that establish initial operation in an autonomous way, relying on experiential and direct learning, allows the firms to build a better structured system of internal capabilities and better developed “learning by doing” process. Is so doing, a new venture avoids the risk of casual ambiguity and partial learning. We find that being a late indirect learner is positively associated with an increase in firm patenting activity in the years subsequent to the licensing deal. Furthermore, the results also confirmed the idea that startup experience is negatively correlated to the positive effect of licensing on innovation, while the idea that industry experience is positively correlated to effect of licensing on innovation is not supported.

The aim of this research is to highlight the importance of learning sequences, and specifically the impact of initial learning sequences, on firms’ innovation outputs. In more details, our focus is on the effect exerted by age at which a firm starts learning, following an indirect pattern, on its ability to be innovative.

The core contribution of the present study is revealing whether there are convenient learning sequences and how they differentially influence firm’s innovative implications. Our contribution is to build and expand the novel stream of research on “learning sequences” (Bingham et al., 2012), as a meaningful focus and concept in process research on learning. Since we choose to analyse the inward licensing strategy as a way through which rely on an indirect learning pattern, we could contribute to the licensing literature. In particular, we investigate the role of new venture as

licensee. We add novel insights on learning-by licensing as a relatively unexplored area in the literature on entrepreneurial firms.

The remainder of the paper is organized as follows: the first section sets up the conceptual framework that will provide a theory-based structure to answer our research questions and to develop our hypotheses. The second section presents a description of the research context, empirical setting, and methods used for gathering and analyzing data. The third section concludes with potential managerial implications that the research might have.

THEORETICAL FRAMEWORK

Reviewing the literature on organizational learning shows that the concepts of learning applied within the field of entrepreneurship (Harrison & Leitch, 2005) are several: the research literature addresses dynamic learning perspectives (Cope, 2005), the process of entrepreneurial learning, the nature of entrepreneurial opportunities (Dutta & Crossan, 2005), organizational learning and opportunity-recognition (Lumpkin & Lichtenstein, 2005), experiential learning (Corbet, 2005), and explorative and exploitative learning. While the weight of proactive and dynamics aspects as well as organizational change and enduring effects over time have been accentuated (Grant, 1996; Nonaka, 1994), our focus is on the evaluation of the impact of initial learning sequences on firms' innovation outcomes. Huber (1991) identifies four central organizational learning dimensions or mechanisms: (1) knowledge acquisition, the process through which knowledge is gained; (2) information distribution, by which information from different sources is shared and leads to new combination of understanding; (3) information interpretation, in which shared information takes same understood meanings and (4) organizational memory, process by which knowledge is stored and kept for later use. Researchers have dedicated the majority of conceptual and theoretical research efforts on the first process, knowledge acquisition (Huber, 1991). Huber disengages knowledge acquisition into five categories: (a) experiential, or learning from experience or activities, with subcategories that include experimenting, self-appraisal, unsystematic or unintentional learning, and learning curves; (b) vicarious, or learning by observing and imitating other firm's behaviour; (c) searching for information about the external organization's environment; (d) grafting, or adding on segments that own the essential knowledge but not owned by the firm; and (e) congenital, or drawing on knowledge ready at the organization's origin, such as the experiences accumulated by the founder and the employee from their prior activities.

Huber's (1991) conceptualization of forms of knowledge acquisition has been re-elaborated in a recent work by Fletcher and Harris (2012). According to the authors, Huber (1991) has presented a

range of sources of experiential and objective knowledge for organizations. Objective knowledge, defined as explicit or codified, and experiential knowledge, defined as tacit or implicit, have long been differentiated (Fletcher and Harris, 2012). The principal discrepancy among these two kinds of knowledge is that the objective knowledge is readily procured through training or through acquisition from data sources such as market surveys, government statistics, company reports (Nonaka, 1994; Polanyi, 1966), while experiential knowledge cannot easily be acquired, taught, or transferred. Coupled with these two types of knowledge, a distinction between internal and external knowledge sources has been made in recent research on knowledge sources and their implications for innovative outcome (Weigelt, 2009). External sources have been identified to be especially important for new ventures: it is apparent that new ventures lack resources and proven competencies. Through external sources, they can close resource and competences gaps.

The combination and overlaying of these distinctions generate the framework illustrated in Fig. 1 below, adopted from Fletcher and Harris (2012).

FIGURE 1.

	Internal source of Knowledge	External source of knowledge
Experiential Knowledge	Direct experience	Indirect experience Vicarious learning and grafting
Objective Knowledge	Internal information	External search

External search: external objective knowledge

Firms can acquire knowledge from objective sources by searching and scanning the most relevant trends about its external environment and conducting focused search for new information (Huber, 1991; Welch, 1996). In this category of learning are included primarily many sources of published marketing information (Jones & Crick, 2004). Among which, official documents produced by chambers of commerce, associations, consultancy firms, trade publications, and government reports are covered. Firms may also conduct their own market investigation, and they can undertake education and training to learn from others.

Internal information: internal objective knowledge

For what concerns the internal information, it has been usually overlooked in previous research because it might be considered as knowledge already present within the firm. In developing this internal objective knowledge, the most important sources of objective information are both internal staff and system. Considering that firms many times *'do not know what they know'* (Huber, 1991:100) and fail to keep the stored organizational memory, this type of knowledge is not entirely experiential, thus can be categorized as objective.

Slater and Narver (1995) advise that managers make an effective use of internal sources in order to attain new knowledge about their firms and the surrounding environmental conditions. Firms can mature expertise by piecing together portions of information that they gain relying on other internal units (Huber, 1991).

Direct experience: internal experiential knowledge

Firms acquire some of their knowledge through their own first hand, direct experience (Huber, 1991). This is usually the outcome of the operating in the market, where people apprehend from the results of past decisions and apply the learnt lesson to current situations. Researchers are used to recognize as the most prevailing direct learning processes the following: trial and error, defined as the process by which firm undertakes course of action and the consequences lead to change in the firm's knowledge base (Greve, 2003); experimental learning that takes place in controlled situations that organizations use to test casual propositions in order to create new knowledge; improvisational learning, defined as real-time learning process, during which a firm learns how to resolve unexpected problems.

Indirect experience: external experiential knowledge

Indirect experience is referred a needed knowledge that has not been learned through a direct approach. The most accepted indirect learning process is the vicarious learning (Srinivasan et al., 2007). It is a process through which a firm apprehends from other firms' experience rather than

form its own experience, which generally is verified when firms change their behaviours as a consequence of the competitor's actions. The learning from the experience of others takes place observing them in networks, or through licensing, strategic alliances (Huber, 1991; Welch & Welch, 1996). The case we analyse in this study is vicarious learning through licensing.

After having considered each of the types of knowledge in turn, we focus our attention on the learning process that derives from indirect experiential knowledge. As already stated, in the present study, we analyse the inward licensing phenomenon recognized as a kind of vicarious learning and then, of indirect learning (Fletcher and Harris, 2012). Our final aim is to investigate whether the learning sequences, and more specifically, whether the timing at which a firm starts learn indirectly through a licensing agreement, have an impact on innovation performance.

Licensing-In And Innovation

Despite the evidence that licensing is one of the main mechanism for the acquisition of knowledge externally developed, the literature on markets for technology focuses almost exclusively on the incentives and rationales that foster an firm to decide to trade its technologies (Gans & Stern, 2003, Teece, 1986). Although the determinants and motives of trade through a licensing agreement are certainly relevant, understanding the link between licensing and firm innovation is equally fundamental. In fact, it is surprising that only a few empirical studies have considered licensing-in within the context of firm innovation (Ceccagnoli & Jiang, 2012; Laursen et al., 2010; Leone & Reichstein, 2012). These studies have pointed out that through licensing deals firms can speed the invention process (Leone & Reichstein, 2012) and augment the licensee's capacity of being innovative (Rigby and Zook, 2002), by reducing invention time.

Consistent with these arguments, Markman and colleagues (2006) propose that the tension for make innovation development faster may be a driving force that justify the firms' increasing use of technology in-licensing, given that it is pivotal for firms to have at disposal the capabilities and all the require set of resources necessary to introduce innovations at a rapid rate.

Despite those arguments suggest that licensing-in can be recognized as a tool for feed licensee's innovative abilities, the relation between licensing-in and innovation outcome has been ignored within the context of new ventures. In fact, it is surprising considering how much important is for a new venture to introduce new products or new services. Since inward licensing has been recognized by scholars (Fletcher and Harris, 2012) as one of the main tool through which a new venture learns indirectly and we investigate the new venture's innovation rate according to the timing at which it learns indirectly relying on a licensing-in strategy, we also fill the gap of the missing link between a new venture licensee and its innovative capabilities.

HYPOTHESES DEVELOPMENT

We aim at investigating the innovative outcomes of two alternative initial learning patterns, respectively direct-indirect and indirect-direct. We consider as main difference between these two learning sequences, the age at which a new venture decides to learn indirectly: first, those firms that choose to rely on indirect learning in first two years of existence and second, those firms that decide to postpone the decision to learn indirectly some years after the beginning of their operations. In order to achieve our purpose, we chose to study entrepreneurial firms because their small size simplifies the observation of learning process. In addition, studying entrepreneurial firms means trace the firms from the inception, gaining more transparent information about the development of learning dynamics. Moreover, according to some research, indirect learning may be an important initial learning process for new ventures (Bingham et al., 2012). Research shows that indirect learning is expressly helpful in new industries and when uncertainty is high. A different stream of research suggests that indirect learning may not be the right initial learning process because new ventures are inexperienced and suffer from lack the “absorptive capacity” to apprehend and exploit efficiently what learnt from others. Consequently, even if new ventures are able to obtain external knowledge, they may not be able to integrate and leverage on it (Zahra & George, 2002). The present study tries to shed light on this controversial trade-off.

The main characteristic of an indirect learning approach based on an inward licensing strategy is the fact that it entails the integration of a new technology into a firm’s current knowledge base. Integrating a new technology can also be challenging for the licensee. Indeed, the process of knowledge transfer and incorporation is directly dependent on the organizational capabilities and resources that the acquiring firm possesses to tap into external knowledge sources (Grant, 1996; Van Den Bosch, Volberda, & De Boer, 1999). Therefore, we also focus on organizational factors related to resource availability and firms’ capacity to drawn on external knowledge to explain cross-firm differences in benefiting from licensing-in and consequently from indirect learning.

Therefore, existing routines, capabilities, resources, competencies are important elements for organizational learning process, but the conventional literature on new ventures posits that their distinctive characteristics are the lack of all these elements necessary to learn indirectly, in particular in their first years of life. Therefore, we suggest that it is more convenient for a new venture to focus on direct learning in early stages of their lives and then, once built all the internal specific-resources, rely on indirect learning approach.

The rationales that underline this assumption are several.

By relying on an indirect learning processes in early stage of a firm's development, the main risk is to underestimate the development of internal capabilities. This aspect is particularly risky and unsafe for the long-term performance implications, because the firm's skills for internal development has a large scale positive effect on its capacity to assimilate and transform external knowledge and information into new products, processes or services (Caloghirou 2004; Weigelt, 2009). Although indirect learning processes may provide access to a new technology, such access reduces a firm's learning by doing, a firm's internal development and investment in the deployment of inward and specific capabilities and resources.

Learning by doing to develop integrative capabilities is an iterative process of successive trials that occur as the firm experiments with a new technology, responds to updates of the technology, and discerns its best uses depending on the technology's interactions with its business processes. Moreover, capabilities evolve through not only learning by doing, but also planned investment in inward processes (Zollo and Winter, 2002) and consequently in direct learning, that facilitates the building of know-how through a shared understanding around a new technology. According to organizational learning (Cohen and Levinthal, 1990; March, 1991), a firm's fixed technological knowledge can improve its level of absorptive capacity. This increase in capacity enables a firm to evaluate and utilize other firms' technologies, and in turn to enhance its technological knowledge. Thus, if a firm lacks a sufficiently developed technology base, it will likely have difficulty absorbing many external technologies and, consequently, it will have difficulty in learning through an indirect approach. As we stated before, in this study we consider the external knowledge acquisition strategy as a channel of indirect learning and among the tools through which a firm can acquire knowledge externally developed, we choose the inward licensing.

Prior research suggests that in-house research and development investment is an important step in developing technological capability and improving a firm's absorptive capacity (Cohen and Levinthal, 1990). This investment strengthens the accumulation of dynamic capabilities (Helfat, 1997) and enhances the effectiveness of external technology acquisition on innovative activities (Gambardella, 1992; Mowery et al., 1996), and consequently the efficacy of indirect learning.

Although a firm during its indirect learning paths will gain some knowledge about the external sources on which it is relying, most learning that takes place about these activities will be indirect and incomplete (Zollo and Singh, 2002). The partial learning from external knowledge acquisition can create causal ambiguity about factors that led to the success or failure of the acquired external sources.

In addition to this reasoning, we have to take into account that the new ventures are characterized by experiential constraints and these constraints make even more difficult the success of initial

indirect learning. The knowledge based view states that knowledge evolves within the firm from experiential learning. "*Firms are described as routine-based and history-dependent systems that adapt incrementally to past experiences*" (March, 1988), but, by definition, new ventures has no past experience. Consequently, this research highlights the idea that experiential biases may limit the potential benefits of indirect learning for firms that decide to rely on this approach in their first years of life. When firms decide to postpone the timing of indirect learning, they have more chances to gain some experience from direct learning.

In sum, relying on indirect learning in the first two years of existence, reduces a firm's learning by doing and investment in integrative capabilities. A firm that postpones the indirect learning in subsequent years from its inception, has more chances to establish initial operations by developing and bundling its own resources and its own capabilities, accumulating them from the first year. It allows them to integrate and assimilate better the technological asset externally acquired.

Indirect learning is easy and efficient. But, because the knowledge generated through indirect learning is built on raw and weak causal links drawn from others' observable actions, it is of lower quality and so less likely to limit the future possibility of mistakes.

Yet because indirect learning often consists of making weak coincidental deducing for effective actions built on second-hand observations of others' behaviours (Kim & Miner, 2007), it can result in incomplete and inaccurate comprehension that conduct to lower performance. This hurdle could be overcome postponing the decision of learning indirectly.

Given that indirect learnt technologies can be difficult to assimilate and integrate, it is not uncommon that the acquiring firm needs to invest significant efforts and resources in order to benefit from it (Ceccagnoli & Jiang, 2012; Kotha et al., 2013).

We suggest that a new venture needs time to gain the sufficient amount of resources and capabilities to exploit the benefits of an inward licensing strategy and consequently of an indirect learning approach.

Therefore, we can state that:

H₁. Late indirect learners are more innovative than early indirect learners

The starting point of the learning process in a new venture is mainly shaped on individual learning, based on the founder's prior experiences (Voudouris et al., 2011). Coupled with entrepreneurial learning is the notion of organizational learning (Dutta and Crossan, 2005). Zhang et al. (2006) investigate how individual entrepreneurial learning may be associated with organizational learning. The authors attempt to provide an integrated conceptual framework of an organization learning

process in small firms. They acknowledge that '*learning in small firms can only be understood in terms of the organizational context and the influential role of the owners/managers as they attempt to embed their entrepreneurial learning within the organization that they manage*' (Zhang et al., 2006: 305). Viewed in this light, we incorporate the entrepreneurial learning as factor affecting organizational learning.

Indirect learning, exposure to external technology sources through licensing, may fuel organizational learning (Grant and Baden-Fuller, 2004). However, organizational learning is positively related to knowledge stock (Griliches, 1979); thus, learning from indirect patterns may contribute less to knowledge accumulation for firms with limited prior knowledge. This suggests that organizations need a certain level of technological knowledge before they can benefit from technologies discovered by other firms. In other words, organizations need a certain level of articulated knowledge base before they can benefit from indirect learning. For a new venture, its prior knowledge corresponds to its founder's knowledge and founder's experience. In an indirect learning process, implemented in the acquisition of externally developed knowledge through a licensing agreement, the ability to judge the technical merit of the technology or innovation often draws upon a very different set of expertise from that required to judge its applicability to a particular end use. Understanding how the technology can be best used requires not just only the technical expertise, but also management skills and industry expertise. In this sense, the founder's role is fundamental.

Moreover, the role played by entrepreneurial experience is relevant in particular in order to augment the level of absorptive capacity of the new venture. Namely, current stocks of knowledge promote the bundling and conversion of new knowledge, frame a firm's ability to comprehend and apply the new acquired information, and define its reactions to new contexts, to reduce the casual ambiguity about the factors that lead to a superior performance and to overcome the experiential constraints a new venture suffers from.

We investigate two sources of entrepreneurial experience related to prior knowledge: industry experience and startup experience.

Crafting an adequate and concrete business strategy that works in concert with an indirect learning process, requires a founder with a deep knowledge of the industry, the market, the behavior of incumbents, and the relevant technologies. Experience in similar settings reduces the number of unknowns and assumptions an entrepreneur must make when evaluating their prospects and consequently it reduces the degree of uncertainty. Founders with prior entrepreneurial experience in an industry are the most likely to know an industry's established players and how those players are

likely to respond to a startup's introduction of new products or processes. Firms founded by experienced industry entrepreneurs have more opportunities to exploit a match between what the new firm needs and what knowledge and resources the founder already knows. The closer the experience to the task at hand, the more likely the entrepreneur will be able to apply knowledge from this experience to the evaluation and operation of the new business.

To sum up, we expect founders with high level of industry with startup experience are more likely to understand the right moment in which start learning indirect, relying on positions and strategies of competitors and position their own products and services accordingly. These arguments lead us to hypothesize that industry experience positively moderates the main relation between timing at which starts learn indirectly and innovation performance. On the contrary, we expect that the founder's startup experience is negatively associated with the main relation. The rationales underline the latter assumption are the following. The benefits accruing from prior start-up experience in decision making may be limited in entrepreneurship for the substantial variability across entrepreneurial tasks. Exposure to new business activities does not automatically result in knowledge that can be reapplied to other new businesses (Reuber and Fischer, 1994). Much of the knowledge that an entrepreneur can accumulate, it is so specific to the new business that he is examining, to that business, to its circumstances and environment (Cassar, 2009), that it may not be useful if this particular experience is not similar to the one the entrepreneur is planning to start. Given the peculiarity of each new business, it is unclear to what extent previous new business experience can be transported to the evaluation of other new business opportunities.

Therefore, we state that:

Hy2. The positive effect of late indirect learners on innovation will be positively moderated by the founder's industry experience

Hy3. The positive effect of late indirect learners on innovation will be negatively moderated by the founder's startup experience

RESEARCH METHODOLOGY

This section presents the empirical setting and data, the variables and measures used in the analysis, and the econometric technique employed.

Data and sample characteristics

To demonstrate our hypotheses, we draw data from the Kauffman Firm Survey (KFS). The KFS is a panel study of the early years of operation of 4928 firms that began operations in 2004 and this panel has been created by using a random sample of new businesses. KFS is the biggest study of the founding of new businesses to date that tracks firms over a long period of time. The 2005 baseline survey of KFS identified a random sample of Dunn & Bradstreet's Database of approximately 250,000 businesses started in the U.S. in 2004. The survey was created using sampling weights based on the entire population of new businesses in the United States, with a predetermined oversampling of high-tech firms. The KFS identified 4,928 firms that started in 2004 and surveys them annually (presently, there are seven follow-up surveys). We use the confidential KFS dataset, which is available to researchers via remote access provided by the National Opinion Research Center (NORC). This confidential dataset provides greater detail than the publicly available dataset on entrepreneur characteristics, new firm performance and operating environment, such as location and industry.

The KFS public and enclave data are particularly well-suited to our study for several reasons. First, the database identifies entrepreneurial actions at firm inception, allowing us to study ventures as soon as they are created by controlling for prior histories. It also records resource acquisitions over time which is crucial to our theory. Second, since all the firms in the sample are created in 2004 and tracked on the same dimensions over seven years; we are able to control for period and cohort effects. Third, the sample is composed by firms which are tracked from the date of their birth to the age of eight years old, allowing us to follow the behaviors of those firms that engaged themselves in an inward licensing activities early in their existence or later on. Fourth, the data cover a wide range of industries, allowing us to estimate the effects of inward licensing in both high- and low-tech industries. Fifth, it is introduced a difference among inward licensing of patents, copyright and trademark. Sixth, following each new ventures from the foundation year, we could highlight the importance of the first resource choice made by entrepreneurs and focus attention on the order of resource acquisition choices as an important determinant of venture success. A limitation of relying on this database is the few information we have about the structure of licensing agreement.

To gain in-depth understanding of whether is better to start learning with a direct-indirect sequence or an indirect-direct sequence, we create a sample composed by 276 new ventures. Among them, 140 follow the indirect-direct path, whereas 136 learn according to the direct-indirect path. The main difference between the two groups is the timing at which they decide to be a licensee and start

learning indirectly. The direct- indirect “followers” choose to rely on external learning some years after their founding and they are label as “late indirect learners”; while the indirect-direct “followers” implement a strategy according to which the inward licensing is undertaken at inception and they are labelled as “early indirect learners”.

MEASURES

Independent Variable

In order to test our hypotheses, we focus on entrepreneurial firms because they may allow for greater transparency of learning, better understanding of the existence, causes and consequences of learning sequences in older firms is also needed.

We created a cohort of new established firm. The correspondent variable takes value 0 if the firms rely on indirect learning in their first two years of existence and 1 if the firms decide to start learning indirectly in the third and fourth year of their lives. Firms that take value 0 are recognized as “early indirect learners”, while firms that take value 1 are recognized as “late indirect learners”.

In this study, we assume as channel to learn indirectly the reliance on external knowledge acquisition and, more specifically, through a licensing agreement.

Therefore, licensing-in activities are provided in the form of binary information and measured in the KFS database as a dummy variable. The question asked to newly established firms “early indirect learners”: “In calendar year 2004 and 2005, did [NAME BUSINESS] license in any patents?” . Same question, but for years 2006 and 2007 is asked to the late indirect learners.

The independent variable is labelled as *ind_learn*.

Dependent Variable

In the first hypothesis, we would like to test the impact of the learning sequences on innovative performance. In particular, we would like to test if late indirect learners are more innovative than early indirect learners.

Measures such as R&D inputs, patent counts, patent citations, or counts of new products have been used in trying to capture innovative performance of companies (Hagedoorn et al., 1993).

We measure firm innovation as raw count of patents. Given that firms might need more than one period to assimilate and apply the licensed technology to the generation of innovations (Leone & Reichstein, 2012), we use patent for the last 4 years of observations. The dependent variable,

labelled as *Patents*, is the sum of the patents introduced by the cohort of new ventures from 2008 to 2011. The variable *Patents* is created as a total number of patents businesses possessed at the time of each interview, from 2008 to 2011. The variable is constructed using data from two questions: 1) dummy measure, “Does the business have any patents?” 2) a continuous measure: “How many patents does the business have?”

There are a number of potential limitations to using patent data to study innovation. First, patents are partial measure of the production and exchange of organization knowledge. For instance, they do not always include tacit knowledge such as organizational routines. Another potential downside in the use of patent data is that all technological innovations may not be patented.

Surely, the majority of studies, in economics literature, recognizes raw patent counts as one of the most adequate indicators that allow researchers to compare the discrepancies in innovative performance (Cantwell and Hodson, 1991, Freeman and Soete, 1997, Griliches, 1998).

Even authors who are somewhat critical of the overall use of patents as a performance indicator, such as Mansfield (1986), admit that patents can be an appropriate indicator in the context of many high-tech sectors. The data from the Kauffman Firm Foundation are oversampled for high-tech industries.

Scholars in entrepreneurship have highlighted the value of patent data in analyzing the dynamics of innovation. Starting from the pioneering work by Schmookler (1966) and Scherer (1984), patent data have been usually used by researchers as parameter to guide the process of innovation and to evaluate its relationship to technological and economic enrichment. Therefore, empirically, we consider exclusively patent license agreements because they are tools through which promulgate knowledge (Shapiro, 1985), thereby ensuring a transfer of knowledge between the parts involved in the licensing agreement, from the licensor to the licensee. In addition to their ability to facilitate technology licensing (Gallini and Winter, 1985), patents are characterized by high levels of knowledge codification, ‘which makes technology transfer easier and faster (David and Olsen, 1992), and makes the knowledge potentially more accessible to the recipient firms’ (Leone et al., 2012:970).

Moderator Variable

Since the entrepreneurship process is characterized by high levels of uncertainty, which can be overcome by a deep understanding of competitors and industry structure, one might expect the success or failure of an entrepreneurial firm performance to be strongly linked to a founder's stock of knowledge and experience. For a new venture, its prior knowledge corresponds to its founder's knowledge and founder's experience. The role of entrepreneurial experience is important in order to increase the absorptive capacity of the new venture. Current stocks of knowledge make easy the conversion and integration of new knowledge, delimit a firm's ability to comprehend and put new information into practice, and mold its reactions to new conditions, to limit the casual ambiguity about the factors that lead to a superior performance and to overcome the experiential constraints a new venture suffers from.

In order to test the interaction effect of entrepreneurial experience we created two variables: 1) industry experience, number of years of experience the owner has in the same industry in which the firm competes, *Industry_exp* and 2) startup experience, the number of new businesses established by the founder to create our moderator variable, labeled as *Startup_exp*. The question related to the industry experience is the following: "How many years of work experience (have/has) (you/[OWNER B-J]) had in this industry—the one in which [NAME BUSINESS] competes?. The question related to the startup experience is the following: "How many other new businesses (have/has) (you/[OWNER B-J]) started besides [NAME BUSINESS]?" These two variables are measured for the whole period we are analyzing, from 2004 to 2011.

Control Variable

In each of our model specification we control for the matched variables:

Firm size measured as the sum of employees (*Num_Emp*), and as number of owners (*Num_Owners*).

These two variables are created taking into account the 8 years over which data are at disposal, from 2004, year of founding, to 2011, last year of survey. The focus on size is interesting because on one hand, studies suggest that larger firms have greater opportunities to exploit scale economies and superior organizational resources (Kogut and Zander, 1993), on the other hand, learning studies in organizational theory suggests that a firm's motivation to source external knowledge, and therefore,

learn following an indirect approach, decreases with size (Almeida et al., 2003). The question related to the firm size, repeated for each year, is the following: “Not counting owner(s), on December 31, 2004, how many people worked for [NAME BUSINESS]?” For the measurement of owners, the question, repeated for each year, is: As of December 31, 2004, how many individuals or entities owned [NAME BUSINESS]?

Industries controls. We use 2 digit NAICS code to identify the sector in which new ventures operate (*Industry*). Because of the analytic interest showed by KFF of the high technology businesses, the KFF oversamples these businesses. We use 2 digit NAICS code to identify the sector in which new ventures operate (**INDUSTRY**). We created 7 categories according to the definitions of each industry provided by Naics: 1) utilities and construction; 2) manufacturing; 3) trade; 4) transportation and warehousing; 5) business support services; 6) social services; 7) other.

Industry’s specific technical conditions as well as industry’s demand are important predictors of firm’s ability to innovate.

Firm Origin. We control for some descriptions of how a business can get started (*Origin*)

According to the way in which new ventures are founded, they differ in their ability to gain and assemble resources in building unique organizational capabilities that can result in differences in their performance (Zahra, 1996) and in their knowledge bases.

The question related to the way in which a new venture has been established entails descriptions of how the new venture can get started. It is a discrete variable in a numeric format. Specifically, the question related is: “Which of the following best describes how [NAME BUSINESS] was started.

Was it

- 1) A new business, branch or subsidiary owned by an existing business
- 2) A business inherited from someone else
- 3) A new, independent business created by a single person or a team of people
- 4) The purchase of an existing business
- 5) The purchase of a franchise
- 6) An organization designed for social and charitable objectives and legally established as “not-for-profit”
- 7) the business started some other way? (SPECIFY)”

Due to the nature of the question strictly related to the way in which the new born firm has been established, it has been asked only in the founding years, 2004.

Research and Development. We measure R&D intensity as expenditures in research and development (*R&D*). We consider this dummy variable for the whole period of time we are investigating, from 2004 to 2011.

To enhance its organizational learning capability, a new venture has to dedicate investments and resources on its internal efforts to create new knowledge and encourage the use of external knowledge sources. Thus, the broader the internal capabilities of the firm, the stronger the effects of different external knowledge acquisition tools on innovation performance.

The question related to the R&D activities, asked for all 8 years of observations, is: “Did [NAME BUSINESS] spend any money on research and development of new products and services during calendar year 2004?”

STATISTICAL METHODS

Given that we measure firm innovation performance using the sum of patents introduced in the last four years of observation (2008-2011), the model used to conduct the empirical analysis had to appropriately accommodate non-negative integer count values. Moreover, prior works have indicated that modeling patent count implies using a regression approach that has to deal with many zeros (Ziedonis, 2004). We start our analysis considering first to use a Poisson model as it is one of the simplest alternatives to deal with count data (Hausman, Hall, & Griliches, 1984). However, the Poisson distribution relies on the main assumption that the variance is proportional to the mean, $r(Y) = E(Y) = \mu$. If this assumption is violated, the coefficients will be estimated consistently, but underestimated standard errors might be reflected in counterfeit significance levels (Cameron & Trivedi, 1986; Gourieroux, Monfort, & Trognon, 1984). The test for overdispersion provided evidence against using a Poisson model and in favor of a model that allows the variance of the dependent variable to exceed its mean.

The usual alternative to the pure Poisson model is the conditional Negative Binomial specification (Hausman et al., 1984). It is acknowledged as the general version of the of Poisson regression, as it has the same mean structure as Poisson regression and it has an extra parameter to model the overdispersion. Negative Binomial is appropriate under conditions of overdispersion.

In our case, the data are over-dispersed: the mean (2.7) is not close to the variance (218.5). The inappropriateness of Poisson model is also witnessed by the `poisgof` command, which tests the Poisson goodness-of-fit: a significant ($p < 0.05$) t-test statistic from the `gof` indicates that the Poisson

model is inappropriate. In our case, the gof test is significant (p-value=0.000). Therefore, we are inclined to use the Negative binomial model. We run the analysis one more time, this time using negative binomial regression. The likelihood ratio test in the negative binomial regression controls for the overdispersion. When the indicator of overdispersion is zero, the negative binomial distribution is analogous to a Poisson distribution. In our case, alpha is significantly different from zero and thus sustains one more time that the negative binomial model is the most appropriate method.

In conclusion, as indicated by econometric tests, run to check for the most appropriate model between Poisson and negative binomial distribution, we use the negative binomial model in order to validate our hypotheses.

RESULTS

Table 2.3.1 reports descriptive statistics of the variables used in the regression analysis. It presents the descriptive statistics for the explanatory, control and moderator variables. Specifically, in Table 2.3.1., the mean and the standard deviations, the minimum and the maximum values of each variable included in the regression analysis, are presented.

[Insert TABLE 2.3.1. here]

Since our main relation investigates the effect of timing at which a new venture starts learning indirectly on innovation performance, measured as number of patents, we test some additional descriptive analysis. Our hypothesis about the positive impact of late indirect on innovation performance is confirmed by these preliminary analysis. The difference in the number of patents introduced by the two groups of firms is statistically significant. As showed by t-test (p.value= 0.000), the mean of patents introduced by late indirect learning is 4.6, while the mean of patents introduced by early indirect learning is 0.74.

We compute the correlation matrix, generating correlation coefficients and p-values, placing an asterisk (*) only when the p-value is .05 or lower. The correlation between any variable and itself is always 1. The correlation coefficient can range from -1 to +1, with -1 indicating a perfect negative

correlation, + 1 indicating a perfect positive correlation, and 0 indicating no correlation at all. Correlation measures the strength and the direction of the linear relationship between the two variables. If it is positive and significant means that as one variable unit increases, so does the other.

Table 2.3.2. reports the results of the negative binomial model for the dependent variable, patents. To test our three hypotheses, we used hierarchical regression analysis.

[Insert Table 2.3.2 here]

Model (1) represents the main effects model, control variables plus the main explanatory variable, licensing-in at inception or soon after the founding year. In the second model (Model 2), we include the moderator variable, the industry experience, and in the third model (Model 3), we include the interaction term Industry Experience * Timing at indirect learning. In the fourth model (Model 4), we add the second moderator variable, Startup Experience, and in the subsequent model (Model 5), we test the joint effect of the startup experience and timing at indirect learning (Startup Experience * Timing at indirect learning) on the main relation between innovative capability and being early or late indirect learners.

The results provided support for Hypothesis 1, which stated that engaging in a licensing agreement as licensee soon after the founding year will be positively related to firm's subsequent capacity to produce innovations. The reported coefficients for Lic-In, the explanatory variable, are positive and statistically significant ($p < 0.05$) across all the models. It is possible to observe an increase in their magnitude from Model 1 to Model 5. We interpret this results stating that firms engaged in an inward licensing agreement after their founding years are more innovative than the counterparts that opt for the licensing strategy in their first stage of development.

Hypothesis 2 proposed that the main relation is positively moderated by the founder's industry experience. Counterintuitively, the second hypothesis is not supported. The positive effect of being a late indirect learning on firm patenting is not augmented in conditions of high level of founder's

industry experience, indicated by the number of years of experience the owner has in the same industry in which the firm competes. The reported coefficient for the interaction term, industry experience * ind_Learn is negative and significant ($p < 0.001$). Additionally, we used a Wald test to verify whether the combined effect of this interaction term and Ind_learn are simultaneously equal to zero, which would suggest that removing the interaction term would not significantly reduce the model fit. The result for the dependent variable rejected the null hypothesis that both terms are simultaneously equal to zero ($\chi^2(2) = 53.14, p < 0.000$).

Finally, the results supported the moderation effect predicted in Hypothesis 3 regarding the fact that the effect of the timing at which a new venture starts learning indirectly on innovation performance will be moderated by the founder's startup experience, in such a fashion that increasing the number of business established by the founder will weaken the positive effect of late licensing on the firm's subsequent capacity to produce innovations. Accordingly, the interaction term between startup experience and Ind_Learn produced statistically significant and negative coefficient ($p < 0.000$). This finding supports the idea that startup experience negatively moderates the relationship between late indirect learners and firm innovation. We also used the Wald test to check whether the joint effect of Startup Experience *Ind_Learn and the main variable is statistically different from zero. The results also indicated that the inclusion of the interaction term creates a statistically significant improvement in the fit of the model for the dependent variable ($\chi^2(2) = 62.83, p < 0.000$).

In sum, the overall results support the idea that both type of founder's experience, industry and startup experience, are important moderators for firms' capacity to produce innovations out of timing at which firms decide to start learning following an indirect pattern, though a licensing agreement. The counterintuitive result regards the moderation of industry experience that is a negative moderation, opposite to what we hypothesized.

Briefly, the final results do not support the idea that the higher number of years, the founder has accumulated in the same industry in which the new venture operates, is a measure that positively moderates the relations between the timing at which the indirect learning starts and the firms' capacity to produce innovations. The results suggest that the main relation, namely the positive correlation between late indirect learners and patenting activities, is negatively moderated by the experience gained by the founder in the same industry in which the firm is operating, with increasing number of years industry experience leading to a decrease in the positive effect of late indirect learning, through a licensing agreement, on patenting.

[Insert Figure 2.3.3 here]

On the other hand, the graph, reported in Figure 2.3.4, shows that increasing number of start-up held by the founder lead to a decrease in the positive effect of late indirect learning, through licensing-in, on firm's innovation abilities. That is to say, the effect of the timing at which a new venture starts learning indirectly on innovation performance will be negatively moderated by the founder's startup experience, in such a fashion that a growing number of business established by the founder will reduce the positive impact of late indirect learners on the firm's subsequent capacity to produce innovations. To demonstrate the breadth of the interaction effect, Figure 2.3.4 depicts the plot of the interaction regarding *Start-up Experience* with *Ind_Learn* (Age at which the new venture starts learning indirectly). The graphic representation of the interaction effect is consistent with the results in model 5 reported on table 2.

[Insert Figure 2.3.4 here]

The examination of the control variables reveals that Size had significant and positive effects on firm patenting. The rationales underpinning the importance of the size are larger firms have (a) more chances to access knowledge outside the firm's boundaries because of the higher number of links to the external environment as well as (b) more occasions to insert this new knowledge into the internal and current knowledge base due to the wider array of activities ongoing in the firm. Given the greater scale and scope of activities of larger new ventures, they exploit an higher number of opportunities not just to attain, but also to make an efficient use of the indirect learnt knowledge in their innovative activities. Thus, even if small and large firms have the same number of external relationships, larger firms are more likely to benefit from knowledge indirect learnt, since they can apply this knowledge across a greater number of activities. To fully exploit the opportunities given by indirect learning, new ventures must depend on their organizational and managerial resources and capabilities. Furthermore, firms must have the ability to combine existing knowledge with new knowledge indirectly gained. The nature of indirect knowledge may require that several sub-units interact actively across extended periods of time to build new products or processes (Sakakibara and Westney, 1992). To facilitate this knowledge building process, new ventures must establish intra-organizational mechanisms, processes and systems to link various sub-units across time (Almeida et al., 1998). Thus, the complex tasks of learning following an indirect approach, based on the inward licensing strategy, require the possession of significant managerial and organizational resources and

capabilities. Larger new ventures are more likely to possess these resources to meet the challenge of learning indirectly.

Also R&D displays a significant and positive impact on firm innovation performance. The increasing level of R&D allows the firm to absorb quickly and in a better way the knowledge acquired indirectly through the licensing agreement. In addition to that, Origin, the description of the way in which the new venture got started, also displays a positive and significant coefficient. The origin lead to variations in firm's goals, resources, and capabilities and, above all in the firms' knowledge base. For example, a new venture created as a new, independent business has a lower level of resources, a not well developed skills and capabilities structure compared to a new venture born as a purchase of an existing business. The successful conversion and integration of licensed-in technologies will imply an effort for the licensee, that consists in allocating significant amount of resources in the exploitation of the newly acquired technology. Consequently, unabsorbed resources at the time that a technology has been acquired can be necessary for the licensee to be able to deal with integration challenges.

For what regard the industry in which the new ventures operate, it is important to notice that there is no difference between the two groups of firms. The majority of them operate in the manufacturing industry, followed by Professional, Scientific, and Technical Services. The licensee's difficulties in integrating a newly licensed-in technology increase if the licensor and the licensee operate in different industries or at different activities of the value chain (Wilcox King & Zeithaml, 2003). This can be attributed to the fact that in most cases, a technology has been developed to be applied and to meet the needs of a firm in a specific context (Gambardella & Giarratana, 2012).

ROBUSTNESS CHECK

We performed some additional robustness checks to validate whether our main results are receptive to alternative methods. Previous studies have demonstrated that patents are mainly related not only with new product introductions but also with non-patentable innovations (Trajtenberg, 1987). Therefore, since the literature has suggested several ways to control for the extent of firm's innovation performance, we choose to validate our results changing the dependent variable. We control for the introduction of new product and of product new to market. The literal question related to these two measures are respectively: "During calendar year 2010 and 2011, did (Business name) introduce any products or services that were new or significantly improved?" and "During

calendar year 2010 and 2011, were any products or services new to any market or markets (Name Business) competes in?”

As reported by the previous questions, the data at our disposal about the introduction of new products or new services are available only for the last years (2010 and 2011) of observations. Since we are dealing with a dummy variables, we use both the probit and the logit model to test whether the late indirect learners are still better at innovation performance, even if we take into consideration a new dependent variable.

The results show that the late indirect learners introduce higher number of products or services, that are new to the markets in which they compete, than early indirect learners. The coefficient that test the impact of late indirect learners on introduction of products or services in 2009 is positive and significant ($p < 0.000$) and the same condition is verified for year 2010 ($p < 0.03$). The coefficient that test the impact of late indirect learners on introduction of products or services new to the market in which the firm competes in 2009 is positive and significant ($p < 0.05$) and the same condition is verified for year 2010 ($p < 0.00$).

We check also for a different cut off in time. Since our main assumption in developing our hypothesis is that the late indirect learners are better performing in innovation because are better equipped with firm-specific resources, had more time to establish internal routines and competencies that allow them to exploit the benefits deriving from external knowledge acquired through a licensing agreement, we compare the firms that start learn indirectly in the first two years of experience with the firms that star learning indirectly very late, in the fourth and fifth years of life. Our main results are confirmed by the new analysis: the results show that (very) late indirect learners are more innovative than early indirect learners. The coefficient is positive (2.5) and significant ($p < 0.000$). We performed a test, to be even more sure and the p-value is equal to 0.000, showing that the average of patents introduced by early indirect learners in 2010 and 2011 is 0.88, whereas the average of patents introduced by very late indirect learners in 2010 and 2011 is 2.9. The directions of the interactions term are also confirmed. The industry and startup experience negatively moderate the main and positive relation between very late indirect learners and their capacity to be innovative.

CONCLUSIONS and FUTURE RESEARCH

Organizational learning is of considerable importance because it enables innovation, adaptation and enlarge its knowledge base. These elements are fundamental for the success of the indirect learning, meant as the reliance on external knowledge through a licensing agreement. Our study suggests that the innovative performance benefits associated with the learning sequences are contingent upon when it used. Even though scholars know much about the importance of learning and particular learning processes that firms use, not much attention has been paid about whether there is a better timing in which start to learn indirect or direct. This paper was mainly motivated by the scarcity of studies examining the concept of sequences in learning and their impact on innovation performance. The reason why the concept of sequences in the learning process is almost absent is due to the fact the organizational learning has a fluid development that make it difficult to isolate and analyze separately the phases and temporal ordering of the learning process. We try to do a first step in addressing this gap. We address not only how learning occurs in new ventures' firms, but also what is learned and the impact of the learned content on innovation performance, measured as number of patents. In line with Bingham's works (2012), we address the question of whether initial learning sequence patterns influence firm's performance. Hence, while extant studies contribute by suggesting a range of potential learning processes (Huber, 1991; Miner et al., 2001), the present study contributes advancing the hypothesis that internal constraints (e.g. lack of sufficient development of internal capabilities) may shape the outcomes derived from the different learning processes. Our study is mainly focus on the consequences of the timing at which a new venture starts learning indirectly on its innovation capabilities.

From our data, consistently with our expectations, the results provided broad support for the idea that by engaging in licensing-in deals, firms can increase their subsequent capacity to produce innovations. We find support for the hypothesis according to which it is more convenient for a new born firm to start learning indirectly in subsequent years after its inception. Operating in this way, a new venture can dedicate its initial effort to internal activities, to create routines and capabilities, specific-resources, it can rely on organizational slack that help firm to be better equipped for the indirect learning approach. While the hypothesis developed around the moderator role played by founder's startup experience is corroborated, the hypothesis suggesting the positive effect of founder's industry experience on innovation performance is not validated by econometric results.

This study mainly contributes to literature in the following way. First, its main contribution is related to the organizational learning literature within the context of new ventures. Our results challenge the "learning advantages of newness" thesis as put forward by Autio, Sapienza, and

Almeida (2000), and extended by Sapienza et al. (2006). In an empirical examination investigating international new ventures, Autio et al. (2000) argue in favour of the ‘learning advantage of newness’. This framework entails that the strategy of internationalization implemented in early developmental stages of a new venture allow the firm to experience greater entrepreneurial behavior, hinder learning hurdles and let the firm obtaining a growth advantage. To wit, early applicants for an internationalization strategy have more chances to grow up quickly than later entrants because of “learning advantages of newness.” Consistent with this reasoning, Sapienza et al. (2005) suggest that the earlier the firm is committed in international activity, the higher the degree of success of its learning efforts. The deduction is that, despite the severe consequences due to liabilities of newness, younger firms can enjoy some learning advantages in new context that can foster growth. Confirming the assumptions underlying the “learning advantage of newness” concept for international new ventures, Kuemmerle (2002) states that as international new venture has less solid routines than older internationalized firms, they are more likely to augment their organizational stock of knowledge. In line with Kuemmerle (2002), our empirical results, even if not applied in an international entrepreneurship framework, show that the older a new venture the faster in learning and developing innovation.

Second, we contribute to the technology licensing research stream (Arora et al., 2001; Fosfuri, 2006; Laursen et al., 2010; Leone & Reichstein, 2012). The literature stream on the demand side of markets for technology has largely ignored the fact that firms can use technology licensing-in as a learning mechanism connected to their overall innovation strategy. This paper addressed this limitation by examining the effect of technology licensing-in on firm capacity to produce innovations and by examining the timing at which is more appropriate for a new venture to implement an inward licensing strategy.

In so doing, we also contribute to the nascent literature about the role of new ventures as acquiring firm involved in a licensing agreement. This last contribution is coupled with the third contribution, related to the link between inward licensing and innovation. Given that firms are becoming more open to acquiring knowledge from external sources, it is particularly relevant to understand the link between licensing-in and innovation. Our study suggests that there is a positive relationship between inward licensing and innovation under conditions of well- developed licensee’s knowledge base, well-structured system of internal routines, a huge amount of resources , and well-developed internal R&D efforts.

Finally, we contribute to the literature based on the concept of “learning by licensing”. Considering the link between licensing and organizational learning, previous studies have proposed the term “learning-by-licensing” (Johnson, 2002) to indicate the learning possibilities that firms can access

when engaging in licensing agreements. According to this perspective, the acquisition of new knowledge results in organizational learning through an interactive combinatorial process in which new and existing elements are linked together through a continuous process of experimentation (Pisano, 1996). In this context, a licensed technology can be understood as an input that increases the size and diversity of the firm's knowledge base. Accordingly, licensing-in is expected to have a positive impact on the number of innovations produced by the licensee.

The findings in this paper also have managerial implications.

To understand the role played by organizational learning within the context of new ventures, we start from two basic assumptions: 1) new ventures are, by definition, characterized by several constraints, above all resource and competencies limits, 2) organizational learning is defined as the process whereby organizations increase their knowledge and add to their bundle of capabilities (Levitt and March, 1988). Therefore, organizational learning is turning into a fundamental instrument for new ventures to achieve and maintain a relevant advantage over competitors and enhance its performance. In this sense, the urgency to develop an organizational learning capability has become an important priority for entrepreneurs and managers.

Moreover, firms can use technology licensing-in as a mechanism to access external knowledge, which provides learning opportunities and opens up new possibilities for knowledge generation. However, given the challenges that are associated with knowledge acquisition, it is important for managers and entrepreneurs to be guided in choosing the moment at which implement an inward licensing strategy is a winning step.

According to our results, managers and entrepreneurs should pay attention to not rely too much on the knowledge already acquired in their past experience. Each business is specific and each industry is characterized by singular factors. Therefore, the consequence of strong reliance on past experience is the creation of path dependence and the risk of implementing myopic behaviors.

This study should also be considered in light of some limitations, that suggest opportunities for future research. More work is needed to examine learning sequences in a larger number of firms and a wider range of industries. It would therefore be valuable to explore how our findings generalize or do not with other channels of indirect learning, different from inward licensing mechanism, such as alliances, acquisitions. In addition, our sample consists of new born firms in which learning is critical to survival than it is for established and mature firms. Although a focus on new ventures allows for a greater level of transparency of learning dynamics, deeper comprehension

of the existence, determinants, rationales and consequences of learning sequences in older firms is needed.

An additional limitation could be derived from the variable used as indicator of innovation performance. We measure the firm's innovative capability relying on the raw count of patents, but other measures could be performed. For example, increasingly researchers are using patent citations as an indicator of inventive performance of companies. Compared to raw counts of patents, patent citations also include a measure of the quality of patents. The basic assumption in using this indicator is that there is a positive relationship between the importance of a patent and the degree to which a patent is cited in later patents. This information on previous patents can be traced in each patent application . The number of patent citations for a particular patent indicates its importance or impact.

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APPENDIX B

Table 2.3.1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Patents	2.7	14.78	0	205
Ind_Learn	0.49	0.50	0	1
Num_emp	8.01	40.87	0	1100
Num_own	4.71	12.89	0	100
R&D	0.41	0.49	0	1
Origin 4	0.05	0.22	0	1
Origin 5	0.07	0.25	0	1
Industry 2	0.32	0.46	0	1
Industry 3	0.11	0.32	0	1
Industry 4	0.01	0.10	0	1
Industry 5	0.37	0.48	0	1
Industry 6	0.06	0.25	0	1
Industry 7	0.05	0.22	0	1
Industry_exp	1.34	3.35	0	40
Startup_exp	13.54	11.14	0	47

TABLE 2.3.2. Negative Binomial Regression

	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V
<i>Dep. Var</i> <i>Patents</i>					
<i>Ind. Var</i> <i>Ind_Learn</i>	0.715*** (0.208)	0.716*** (0.225)	2.349*** (0.401)	2.324*** (0.407)	2.511*** (0.396)
<i>Control-Var</i>					
<i>Num_Emp</i>	-0.0107 (0.00607)	-0.0114 (0.00696)	-0.00888 (0.00806)	-0.00875 (0.00804)	-0.00124 (0.00786)
<i>Num_Owners</i>	0.0403*** (0.0117)	0.0468*** (0.0137)	0.0595*** (0.0172)	0.0588*** (0.0172)	0.0671*** (0.0175)
<i>R&D</i>	1.491*** (0.221)	1.424*** (0.225)	1.663*** (0.231)	1.677*** (0.235)	1.468*** (0.229)
<i>Year</i> 0.	0	0	0	0	0
1	-0.00633 (0.325)	-0.00854 (0.325)	-0.113 (0.320)	-0.111 (0.320)	-0.218 (0.311)
2	-0.120 (0.333)	-0.113 (0.335)	-0.207 (0.332)	-0.210 (0.332)	-0.336 (0.324)
3	0.0815 (0.352)	0.104 (0.356)	0.0246 (0.352)	0.0256 (0.352)	-0.0691 (0.345)
4	0.150 (0.367)	0.139 (0.374)	0.0360 (0.372)	0.0422 (0.373)	-0.0215 (0.365)
5	0.450 (0.379)	0.466 (0.387)	0.533 (0.392)	0.545 (0.394)	0.404 (0.384)
6	0.380 (0.393)	0.435 (0.405)	0.352 (0.401)	0.355 (0.401)	0.256 (0.392)
7	0.221 (0.419)	0.277 (0.431)	0.177 (0.426)	0.175 (0.436)	0.0717 (0.419)
<i>Business Origin</i> 3	0	0	0	0	0
4	0.229 (0.454)	0.228 (0.459)	0.740 (0.454)	0.721 (0.458)	0.321 (0.441)
5	5.503*** (0.743)	5.418*** (0.742)	5.198*** (0.746)	5.201*** (0.746)	4.694*** (0.717)
<i>Industry</i> 1	0	0	0	0	0
2	5.432*** (1.295)	5.440*** (1.305)	5.361*** (1.298)	5.361*** (1.299)	5.021*** (1.320)
3	1.134 (1.409)	1.153 (1.412)	1.227 (1.394)	1.226 (1.394)	1.268 (1.402)
4	-13.75 (2539.6)	-13.69 (2401.7)	-14.35 (3006.9)	-16.32 (8046.9)	-13.78 (1991.8)
5	4.536***	4.551***	4.772***	4.770***	4.577***

	(1.292)	(1.298)	(1.294)	(1.294)	(1.317)
6	-16.19 (537.6)	-16.11 (549.4)	-16.36 (655.3)	-17.93 (1434.1)	-15.51 (445.6)
7	0.543 (1.494)	0.537 (1.495)	0.247 (1.501)	0.268 (1.501)	0.0749 (1.519)
Moderator_Var					
Industry_exp		-0.00309 (0.0109)	0.0531*** (0.0157)	0.0536*** (0.0158)	0.0512*** (0.0151)
Startup_Exp				-0.0113 (0.0322)	0.0460 (0.0401)
InteractionTerm					
Industry_exp*Ind_Learn			-0.0101*** (0.0109)	-0.0102*** (0.0215)	-0.0831*** (0.0214)
Startup_exp*Ind_Learn					-0.580*** (0.112)
_cons	-5.504** (1.315)	-5.448*** (1.321)	-6.735*** (1.343)	-6.735*** (1.343)	-6.384*** (1.366)
Lnalpha _cons	2.246*** (0.0708)	2.237*** (0.0719)	2.195*** (0.0720)	2.195*** (0.0720)	2.128*** (0.0734)
N	1143	1390	1390	1390	1390

Figure 2.3.3 Graphs of interaction effect: Industry Experience* Indirect Learning

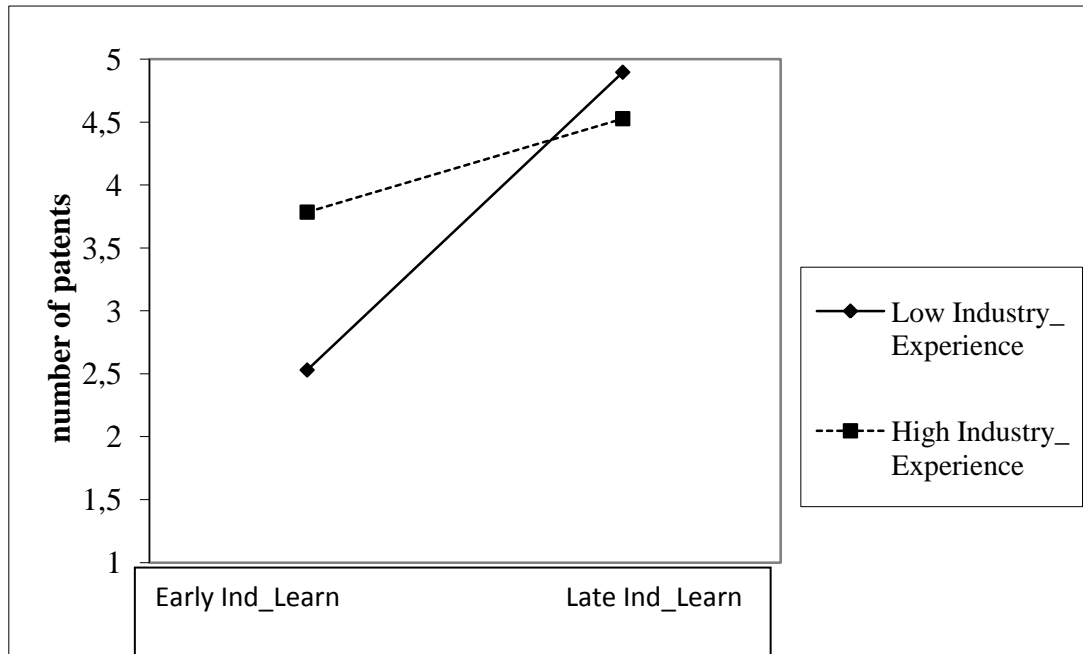
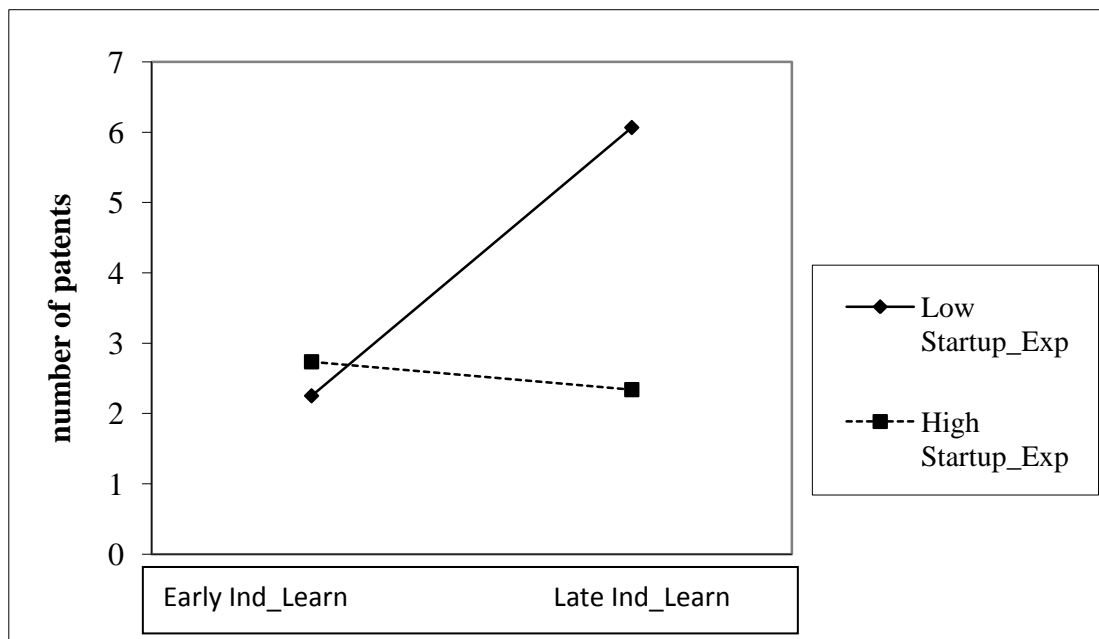


Figure 2.3.4 Graphs of interaction effect: Startup Experience* Indirect Learning



2.4 OVERALL CONCLUSIONS

In the last decades, licensing activities and practices have increased their weight and significance, operating upon the wide-ranging spreading of markets for technologies. Consistent with the Open Innovation Paradigm (Chesbrough, 2003), firms make increasingly use of strategic collaborations and rely strongly on knowledge developed outside their internal boundaries. This new approach to innovation presupposes the need for the organisations to be more and more dependent on “foreign” technologies in order to unfasten the potential of firms’ internal activities, addressed to innovative outcomes. In this scenario, the firms’ likelihood to obtain and maintain over the time a competitive advantage is subordinated to their aptitude to identify the opportunities at hand, inside as well as outside their boundaries and to their predisposition to exploit them in an efficient way. In so doing, the firms can speed and make their innovation processes more dynamic. Licensing is recognized as one of the most popular tool applied by a firm in order to achieve and capitalize on the gains gathered from an open attitude in technology strategy choices.

My thesis attempts at shedding light on new stimulating and compelling issues correlated to in-licensing activities that have not been investigated by the literature on licensing and markets for technologies. We analyse the scenario of new ventures companies, considering them as licensee and studying the impacts of their decisions to be a licensee on their survival rates and innovation performance. While the majority of studied on licensing and markets for technology has dedicated its research efforts on the aspects in which the licensor is involved, the licensees’ perspective has been almost neglecting, leading to a weak understanding of the determinants and conditions affecting licensing-in practices.

From the licensee’s standpoint, the licensing strategy is strictly related to the exploration, combination, conversion, adaptation, exploitation of external technologies acquired through a licensing agreement. Since a new venture is characterized by many shortages, it is interesting studying how these processes take place in the development of its technology strategy.

General purposes of the present research project are to apprehend the innate characteristics of those newly established firms that are involved in a licensing deal, as licensee, and to assess the consequences of implementation of an inward licensing on new venture’s survival probabilities and innovative outcomes. Even though the factual evidences that the growth of licensing strategy has accelerated over the last times, as made manifest by the majority of firms implicated in a licensing agreement, the licensing phenomenon within the scenario of new ventures is still an open point in question.

Therefore, the thesis would like to add insights to the inward licensing strategy in the context of new ventures, recognizing the common features that differentiate a licensee from a non-licensee and evaluating the impact of this strategy on new venture's survival probabilities and their innovative performance. It is worthwhile to be mentioned that the analysis is elaborated focusing on new firm's first years of existence. We know from previous work that a firm's founding conditions have long lasting repercussions on its survival and growth (Mata et al. 1995, Huynh et al. 2008, Geroski et al. 2010). We embrace the literature that highlights the relevance of initial conditions (Bamford et al., 1999; Aspelund et al., 2005), supporting the idea that early decisions adhere with the organization and engrave the firm in the long term.

Each of the current research papers provides a manifold augmentation in order to achieve the general purpose of the thesis. They inquire from disparate perspectives the same phenomenon, the inward licensing, by undertaking distinct sides of analysis and by leveraging on heterogeneous frameworks of literature.

The theoretical paper, "New Venture's Inward Licensing: Who And What?", has been mainly motivated by the paucity of studies focusing on the demand side of markets for technology and, in particular, in the case in which the demand side is composed by new ventures. While much has been learned about intensity of licensing, its dynamics, features and attributes, determinants and hurdles met by companies doing or willing to license, less has been learned about the inward licensing strategy in the context of new ventures. In order to fill this gap, we identify the distinctive characteristics that discriminate between a new venture licensee and a new venture non-licensee. The most relevant breakthroughs about the features of a new venture, that decide to in-licensing a patent, suggest mainly that the majority of new ventures licensees comes from the manufacturing industry, while their counterparts come from the professional, scientific, and technical Services. Moreover, new ventures licensees are usually smaller than their counterparts and they are product-provider. In addition to these results, an higher number of new ventures licensees, compared to non-licensees, born as a purchase of franchise. For what concerns the financing method, we find that licensee have constantly higher level of debt and equity. The most unexpected finding is about the "what" new ventures are used to in-license. Indeed, we find that the number of new ventures that in-license copyrights and trademarks is higher than those new ventures that in-license patents.

In the second paper, "Effect Of Inward Licensing On New Venture's Survival", the starting point is the recognition that the liabilities of newness and the liabilities of smallness force new venture to be strongly dependent on external sources, but the contribution of external acquisition on new born firm's longevity has not been explored yet, especially in the licensing context. Comparing the

survival rate of a new venture in its first years of existence, with the survival rate of a new venture no-licensee in its first years of existence, we find that licensee has lower probability to survive than its non-licensees counterparts, as consequence of higher number of years necessary for a licensee to reach the market until the first sales. In other words, licensees survive less than their non-licensee counterparts.

In the third paper, “A Study Of The Influence Of Learning Sequences On New Venture’s Innovation: The Moderating Effect Of Founder’s Experience”, we shift our theoretical framework, putting the accents on implications of learning sequences adopted by new ventures on their innovative performance. Albeit scholars know much about the importance of learning and particular learning processes that firms use, not much attention has been paid about whether there is a better timing in which start to learn indirect or direct. Therefore, we mainly postulate that innovative performance benefits associated with the learning sequences are contingent upon when it used. Particularly, the timing at which a firm chooses to start learning indirectly, through a licensing agreement, impacts on its innovative outcomes.

In line with our expectations, the results provided broad support for the idea that is more convenient for a new born firm to start learning indirectly in subsequent years after its inception.

The thesis mainly contributes to literature in the following way. First, it adds enhancement to the specific stream of research on the role of inward licensing in new venture’s context, and, in particular, we contribute to the technology licensing research stream (Arora et al., 2001; Fosfuri, 2006; Laursen et al., 2010; Leone & Reichstein, 2012), identifying the licensing-in strategy as a learning mechanism related to the overall firm’s innovation strategy. We explore the effect of technology licensing-in on firm capacity to produce innovations and by taking into account the timing at which is more appropriate for a new venture to implement an inward licensing strategy.

Second, the thesis advances the in-process discussion on the factors influencing new venture’s likelihood to survive. While a consistent number of articles examine the effects of human, social, and financial capital on the likelihood of firm’s survival, we focus on the initial technology strategy as reason why a new venture could stop its operations.

Moreover, in line with Aspelund et al. (2005), we suggest that considerable research effort should be focused on investigating antecedents and the consequences of those initial strategic and market decisions made by new firms. Indeed, the technological strategy developed initially is therefore likely to establish a path dependency. Therefore, as third contribution we mention the supplement to existing literature on the effects of new venture founding conditions.

Fourth, the thesis could be considered as contributor in the identification (Arora et al.,2001) of the factors that lead to both inefficiencies and efficiencies in markets for technology. Therefore, the present study could enrich the markets for technology literature: the literature on markets for technology has not determined whether in-licensing is a winning strategy for new ventures. We show that gain access to a knowledge asset externally developed, through a licensing agreement, is not an adequate initial decision for a new born firm. Thus, although firms may choose to in- license technologies to over trough entry barriers, to exploit the newest technologies, the consequences of this choice for the speed to market, the survival and the innovation outcomes is not neutral.

Fifth, another contribution is related to the organizational learning literature within the context of new ventures. In particular, we challenge the “learning advantages of newness” concept (Autio et al., 2000; Sapienza et al. 2006). While it posits that younger firms can enjoy some learning advantages in new context that can foster growth, we state that the older a new venture the faster in indirect learning. This contribution is strictly related to the next one: given that firms are becoming more open to acquiring knowledge from external sources, it is particularly relevant to have a deep comprehension of the link between licensing-in and innovation. The present research work suggests that there is a positive relationship between inward licensing and innovation under conditions of well- developed licensee’s knowledge base, well-structured system of internal routines, a huge amount of resources , and well-developed internal R&D efforts.

Finally, we participate to the literature based on the concept of “learning by licensing”. Considering the connection between licensing and organizational learning, prior studies have developed the concept of “learning-by-licensing” (Johnson, 2002) to indicate the learning possibilities on which a firm can rely by engaging in licensing agreements. According to this perspective, the procurement of new knowledge leads to higher level of organizational learning through a dynamic process in which new and existing elements are put together through a continuous process of experimentation (Pisano, 1996). In this context, a licensed technology can be recognized as an input that augment the size and diversity of the firm’s knowledge base. Accordingly, licensing-in is expected to have a positive impact on the number of innovations produced by the licensee.

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