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## **Different Learning Trajectories for Performance in New Niches: Role of the Breadth and Depth of Experience and Entry Sequence**

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### **Abstract**

Research has only very recently started to consider within-industry diversification as a relevant and a different problem compared to inter-industry diversification (Zahavi and Lavie, 2013). In industries where new niches appear, it is crucial for firms to enter right niches in the right time for adaptation. Firms could leverage their experience accumulated in current markets (King and Tucci, 2002) but applicability of this could be limited due to different requirements of the focal niche. On the other hand, it is suggested that diversity of past entry experience helps in further entry to new niches by developing higher order routines for entry, but firms have difficulty in entering new niches early in their lives (Eggers, 2012). Although these studies suggest routes to action, they are scattered and conflicting at times.

Considering both breadth and relatedness of experience allows two interesting questions: Is there a trade-off in leveraging different kinds of experience and does it matter how experience is accumulated, beyond what experience is accumulated? I will be arguing and testing for the trade-off between different types of experience and moderating effects of sequence of entry the breadth of experience itself in the context of entering new niches.

Testing these hypotheses in the US Video game industry since its inception, preliminary results show support for the lasting effect of entry sequence in moderating the effect of experience itself. On the other hand, it is found to be different experience types complement each other, rather than trading-off. These findings may explain how firms go through different "learning trajectories" as they benefit from leveraging both types of experience through close entries or learning to explore markets.

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## INTRODUCTION

There is a recent interest in studies of within-industry diversification – a firm's presence in more than one market niche within an industry (Li & Greenwood, 2004), to bring light questions in broader diversification literature, such as performance effects of related diversification (Stern & Henderson, 2004). Findings show that diversification posture in niches matter for performance (Li & Greenwood, 2004; Tanriverdi & Lee, 2008), and even within an industry, potential niches have differing degrees of relatedness to firm activity (Stern & Henderson, 2004). Research has come to a point that is able to show that within-industry diversification is a separate and relevant problem compared to inter-industry diversification (Zahavi & Lavie, 2013). Although these studies have started to unpack within-industry diversification and performance relationship, these findings are based on a general diversification posture. As it happened in inter-industry diversification studies, there is a need to shift focus of analysis from overall profiles of firms to individual niche entry (Ramanujam and Varadarajan, 1989; Haleblian and Finkelstein, 1999). In fact, preceding this literature long before, it has been noted that in industries where niches are available, it is crucial for firms to enter right niches in the right time (Mitchell, 1989). I will be focusing on how firms learn to successfully enter new niches, and as such focus on the role of experience in explaining individual niche entry performance.

It has been argued that experience could develop the required capabilities to enter new niches successfully. In line with an organizational learning perspective, support has been found that experience helps in entering new niches, yet findings are conflicting on which type of experience helps. Some find support for the idea that firms could leverage their accumulated experience in current niches (King and Tucci, 2002), and some support the idea that firms could

leverage their experience in entering previous niches (Eggers, 2012). On one hand, young firms may find it hard to expand into a new niche, while on the other hand niche-specific experience may not be effectively applied to another niche. Therefore I ask: What are the qualitative differences between firms in new niche entry performance according to their past experience?

Research on the link between experience and capability development has suggested separating different types of experience in terms of breadth and depth of experience as they are related to the development of different capabilities. Breadth of experience, which is how many and how different niches a firm has entered in the past, is considered to develop a higher order entry capability through developing modification routines (Amburgey et al., 1993) for future entries. In contrary, depth of experience in a niche develops processes and knowledge of the firm in a given niche, and this experience could be used to enter other niches, contrary to received wisdom of competency traps and inertial tendencies (King and Tucci, 2002).

Considering issues of relatedness in within-industry diversification setting (Stern & Henderson, 2004) would not only help in reconciling contradicting evidence mentioned above, but it also brings on the table two interesting issues. First, we do not know how these experience types work together. At one hand, firms could leverage their experiences in related niches in entering a close new niche; at the other hand they could leverage their niche entry experience in especially entering distant niches. How do these two types of experience combined go together? Could there be a trade-off in leveraging both types of experience? Second, even more interesting is how breadth of experience emerges from previous entries. Two firms that followed different paths may reach to the same stock of experience, yet past sequence is expected to have effect on their future. It is not what has been accumulated, but also how is it accumulated. Sequence of entries is an understudied area and it deserves attention. My aim is to show that there is a trade-

off in leveraging two types of experience together, and sequence followed in the past has a lasting effect in addition to the accumulated stock of experience.

I predict that effectiveness of relatedness in determining new niche entry performance is reduced as firms accumulate broader experience in terms of entry to different product niches in the past. For a young firm, this means that relatedness is the primary factor of success in entering a new niche, but increasing breadth would be useful as the need to enter distant niches arise because of market conditions. As such, I will be separating out capability to expand from capability to leverage specialized capabilities and show when they are useful and how they interact. For the sequence, I predict that past jumps of the firm, in terms of distant or close entries, will moderate the effect of breadth on new niche entry. This would suggest that there are additional hitherto not analyzed issues creating different learning trajectories for firms in expanding their scope. I aim to contribute first to show this moderating effect of sequence, and how this differs from the current experience effect. This is an additional block for further research that has been scantily explored (a few exceptions are: Teece et al., 1994; Chang, 1995; 1996). Moreover, I show the trade-off between types of experience and limits of leveraging each one. Relationship between breadth and performance has been argued to represent dynamic capabilities (King and Tucci, 2002; Eggers, 2012), and in a way, I show some limits in leveraging such “dynamic capabilities”. As a last point, this study uses product portfolios of firms to infer their experience bases and capability relevance, and it complements previous research on product line strategy (Sorenson, 2000; Dowell, 2006). That literature has considered the link between product line breadth and survival while I will be developing a dynamic explanation in which firms are making their product choices and see how they perform in terms of their products in new entered niches.

Empirical setting to test the above theory is the US video game industry since its inception in 1972 until 2011. I will be measuring the performance of publishers in entering new niches (first game in a new-to-the-firm niche). This setting has several useful features to test the foregoing theory: creation of new niches and need to adapt, changes in the popularity of niches, stream of product releases and limited inter-industry diversification by firms. Publishers undertake the risk and costly commitment of funding and co-developing games with studios (in-house developers) and game developers. Availability of fine-grained product release and performance data also allows tracking the action and the result for each firm. Moreover, product portfolios are meaningful measures for the resource and capability base of the firm at each point in time according to resource-based theory (Lee, 2008), allowing dynamically measuring relatedness at each point of time. I will be testing my hypotheses on the population of video game publishers that have released at least 1 game in US. Main methodological and empirical issues are measuring the relatedness of each firm to a focal market, isolating the effect of experience on product performance from other determinants and the last one is self-selection of entrants to enter a new niche. The first issue is addressed by measuring distances through the use of co-occurrence patterns of products within firms (Teece et al., 1994; Lee, 2008), while the second is addressed through use of firm fixed effects which will measure the effect of within firm accumulation of experience. The last issue is dealt by using a Heckman (1979) method.<sup>1</sup>

The paper is structured as follows. In the next section, I will be identifying two different factors that affect performance of firms upon entry, generally based on resource-based view and capabilities literature. Then, I will be explaining the trade-off in leveraging them together. I will

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<sup>1</sup> Since some variables are still under collection and construction phase, only a preliminary analysis of simple independent variables are available in current paper.

then follow on the sequence of entries and its effect on the firm. Methods and results will follow and discussion will conclude.

## **THEORY AND HYPOTHESES**

Firms change the scope of their activities for various reasons: to grow, to adapt and to survive. In order to do so they need to develop capabilities necessary to succeed through experience (King and Tucci, 2002). How firms respond to changes in markets to adapt is researched under the rubric of dynamic capabilities (Eisenhardt and Martin, 2000). Researchers interested in different topics such as product development or corporate development activities have analyzed the role of experience in developing such capabilities (Helfat and Raubitschek, 2000). Even with differing topics of interest, these studies have underlined the important foundations of evolutionary theory (Nelson and Winter, 1982), especially the path-dependent nature of the firm according to the past experience.

As niches, are also a kind of market entry opportunity, the broader literature on the link between pre-entry resources and capabilities and market entry success (Helfat and Lieberman, 2002) is enlightening in understanding drivers of entry and performance. Starting with early theorizing on multiproduct firm (Teece, 1982), and following with resource-based view (Wernerfelt, 1984) it has been argued that capabilities have differing degrees of fungibility. Some capabilities could be leveraged on a wide variety of tasks, while some others could be leveraged only on a given few ones. Helfat and Lieberman (2002), distinguishes these two types of capabilities as specialized and generalized, and note that separating out more specialized and generalized capabilities in understanding market entry is useful.

Specialized capabilities include technology or product-specific knowledge, or processes that could be leveraged directly in the same or very similar technology or product. In general, it includes functional activities that are related to specific technologies or products of the firm (Helfat and Lieberman, 2002). Generalized capabilities include having developed capabilities to enter markets in a given mode (such as acquisition, or greenfield), or being able to transfer knowledge between businesses and so on, that is less market dependent (Helfat and Lieberman, 2002).

This taxonomy of capabilities in market entry and pre-entry experience literature is helpful in understanding the differences on two types of experience we are considering: breadth and depth of experience. On one hand, firms would develop more niche-specific capabilities by increasing the depth of their experience in a given niche. This follows a simple learning-by-doing (Arrow, 1962) idea that as firm becomes more experienced in a specific niche, it would improve by applying past knowledge (Kogut and Zander, 1992). As this experience niche-specific, it would be only effective in another niche to the extent that this niche is similar. This would be saying that depth of experience develops specialized capabilities (in a given niche). On the other hand, firms would develop niche entry capabilities by entering niches. The more different niches a firm has entered, a broader niche entry experience the firm has accumulated. Such an experience is useful without any niche-specific knowledge or processes, but rather it is about processes and knowledge of entering a new niche. This would be the development of a generalized capability through breadth of experience accumulated by past niche entries.

Specialized capabilities are by definition usable for a narrow field of activity and as such relatedness of entered niches matter in considering effects of breadth and depth of experience on new niche entry performance. Past research has not either considered this important contingency,

or didn't jointly tested effects of both types of experience (King and Tucci, 2002; Eggers, 2012). Therefore, there is a need to consider relatedness of focal niches in determining performance effects of breadth and depth of experience on new niche entry performance.

### **Breadth and depth trade-off**

This consideration would at first just reflect an important control, but a deeper look would suggest that the interrelationship between effects of capabilities develop by experience accumulation points to "learning trajectories" (Helfat and Lieberman, 2002) of firms, which we have some evidence, but only scant specific research on. At two levels, it could be considered as: i) how are specialized and generalized capabilities interrelated? and ii) does the sequence of entries that form this "learning trajectory" creates benefits or liabilities in the future? This issues deserve attention as entry to new niches has been related to the development of dynamic capabilities (Teece et al., 1997) by arguing for the adaptive properties of increasing breadth of experience (Eggers, 2012), yet both types of experience could be leveraged for achieving adaptation or high performance (Helfat, 1997; Helfat and Lieberman, 2002). "Dynamic" capability may reside in the path followed by the firm, rather than adapting itself to enter new niches.

### **Leveraging depth of experience in new niche entry**

Excess resources that are generated through ongoing activity of the firm is leveraged for entering new activity fields, which is a main part of Penrose's (1959) study. These excess resources, that are not contractible, combined with scope economies, underlie the need for multiproduct firms (Teece, 1980). The value generated from expansion of activity is contingent on the applicability of resources on another activity. It is a long held idea in diversification

studies that relatedness supports leveraging application-specific resources (Silverman, 1999). Coherence<sup>2</sup> in the patterns of how firms bundle their activities and effects of this relatedness has consistently found that firms combine coherent activities in corporate strategy (Teece et al., 1994), industry evolution (Helfat and Lieberman, 2002), and technological innovation (Breschi et al., 2003). Teece et al. (1994) finds that as firms become more diversified, they still keep a level of coherence and Breschi et al. (2003) finds that firms diversify technologically (i.e., patenting activity) to related areas. Helfat and Lieberman (2002) find the strong evidence from a wide variety of entry studies that the match between the firm and the requirements of the focal market in terms of resources and capabilities is an important determinant of entry as well as performance.

A high level relatedness would suggest that the firm can leverage more of its' specialized resources, and evidence from a wide variety of studies show that such use of specialize resources will improve performance in a new niche entry. This is quite consistent with firms that are able to enter new fields where they leverage their previous depth of knowledge that leads to performance (Klepper and Simons, 2000) and adaptation (King and Tucci, 2002).

### **Leveraging breadth of experience in new niche entry**

Variety in experiences is important in organizational learning literature (Levinthal and March, 1993), as organizations run into risk of falling into the success trap, by which success drives less variance but more optimization, where until it drives out exploration (March, 1991), and a second-order learning (Levinthal and March, 1993) could be driven out similarly by first-order learning by encouraging lower-level adaptation. On the other hand, experience in routines

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<sup>2</sup> "A firm exhibits coherence when its lines of business are related, in the sense that there are certain technological and market characteristics common to each." (Teece et al., 1994; p.4)

(Teece et al., 1997; Dosi et al., 2000) that help the firm integrate (Helfat and Raubitschek, 2000), reconfigure or develop new resources could increase the dynamic capability of firms (King and Tucci, 2002). One such important capability would be developed by entering new product market niches, as market entry is almost sure to develop new capabilities (Helfat and Lieberman, 2002), thus reconfiguring resource and capability base of the firm. Firm can develop capabilities that support the organizational change itself (Amburgey et al., 1993) through ongoing practice of new market entry, and they could ease further entry by developing required routines for identification and entering (King and Tucci, 2002) – which is well supported in the literature on dynamic capabilities, as Teece et al. (1997) put forward that the capacity to transform could itself be practiced and mastered through practice.

A wide variety of literature suggests the value of breadth of experience. Daneels (2002), in his study on the firm renewal through product innovation, puts forward that second-order competences are themselves developed as product development experience is gained about the ability to explore new markets and technologies, which is improved over practice. Katila and Ahuja (2002) find that the breadth of the search for knowledge increases new product output of the firm, while Nerkar and Roberts (2004) finds that combinations of distal (as opposed to proximal) technological and market experience increases the performance of new products significantly. As a last point, Eggers (2012) have found that increases in the breadth of experience improve performance in entering new niches.

### **The Trade-off**

Considering benefits of breadth and depth of experience, it would be suggested that firms who have high levels of both types of experience would perform better in entering new niches. They could both able to adapt entering new markets through modification routines developed via

prior entries, and they are able to leverage prior specialized capabilities by entering a related niche. Yet, going deeper on the evolution of the niches a firm enters would suggest that actually there are possible trade-offs in leveraging both types of experience together.

Research that analyzed distance of markets entered by firms compared to their experience base showed that as firms evolve, they go farther away by using intermediate entries as stepping stones. Such “learning trajectories” (Helfat and Lieberman, 2002) show that firms expand activities close to their core activity until they are more comfortable with expanding. Chang (1995) has shown that firms first enter areas they have highly related knowledge, and then they leverage experience gained in that market to a more distant market. In another study, Chang (1996) found that firms enter sequentially to markets in order to reach more unrelated markets of interest. Teece et al. (1994) have found that firms enter closely related markets to each other, but in overall firms gather together a highly diversified group of businesses. Chatterjee and Wernerfelt (1991) have found that firms undertake farther entries as they have more generalized resources. Summing up, these studies would suggest that firms would rely more on their generalized capabilities as they increase their breadth of experience. If this would be the case, it could suggest that actually effectiveness of specialized capabilities are reduced as firm accumulates breadth of experience.

It is a common problem for firms on how to combine exploration and exploitation (March, 1991). As firms become more adept of these search types, they start to develop routines geared toward a search type instead of other (Benner and Tushman, 2003). Firms that refine their processes on a particular task would be better able to exploit its knowledge, yet this will in turn make the firm less flexible (Benner and Tushman, 2002). This would mean that focused firms are better at leveraging their specialized capabilities. In line with this idea, Siggelkow (2003)

finds that focused firms are able to outperform others in market niches where they have related experience. Focused experience brings refinement to processes, and since it is more reliable (Martin and Mitchell, 1998) and simpler in terms of complexity (Grant, 1996) it should be related with increased product quality in subsequent development efforts. Those firms serving in niches that are very similar to each other, thus having low breadth of experience would be better able to leverage their specialized capabilities in entering a new niche. Formally stated:

**Hypothesis 1:** Breadth of experience negatively moderates the positive relationship between related experience and performance in new niche entry.

### **Sequence of Entries**

Trade-off of both types of experience according to relatedness is interesting on its own, yet what is even more interesting is how breadth of experience emerges from previous entries. Those who survived the evolution of industry may have undergone through two different “learning trajectories”: those who follow closely related niches to leverage specialized capabilities, and those who make distant jumps and learning to adapt for further entries. Evolutionary economics tell that firms are known to be quite persistent in their routines (Nelson and Winter, 1982). As such, these trajectories could have been strengthened by path-dependent search behavior of the firms, determined by their sequence of entries.

Firms that becomes efficient in one type of undertaking generally become less adept in another type of activity. Especially learning studies that follow firm behavior argue that this is a reason for firms to continue on doing what they do better, not necessarily what needs to become better. Levinthal and March (1993), argue that firms are myopic as they tend to overlook distant times, distant places, and failures. As such, firms are more likely to follow a path of undertaking that is similar to the past, hence path dependencies.

Thinking on such path-dependencies with the route followed by a firm among niches creates an interesting situation. This is the question of how the accumulation of a breadth of experience affects performance, different than the effect of stock of breadth itself. This is an almost unstudied issue, yet combining studies on sequential entry and evolutionary theory could be helpful in understanding.

It has been noted by the literature on firm diversification patterns that there is within-firm persistence in terms of related or unrelated diversification choices, yet there is heterogeneity between firms (Teece et al., 1994). Firms can benefit both types of movements, yet there should be fit between the firm strategy shaped by past behavior and the current action. Kim et al. (2013) have argued that the fit of search behavior has an impact on the innovation outcomes of the diversification mode. Firms that pursue local search would benefit more from related diversification, whereas firms that pursue distant search benefit more from unrelated diversification.

Considering in our situation, those firms who have reached a stock of breadth via small steps, entering related markets, would be only adapting a little at a time. Generalized capabilities that are developed through the accumulation of breadth of experience is expected to create modular processes that allows the firm to modify its routines in order to adapt new markets, yet those firms who adapted only a little at a time may only have partially developed their capability to adapt. I call these jumps Sequence distance, and it is the average distance of the new niches a firm has entered in the past. Formally I hypothesize that:

**Hypothesis 2:** Sequence distance positively moderates the positive relationship between experience breadth and performance in new niche entry.

## **METHODS**

### **Setting: US Video Game Industry**

Started from its humble beginnings in early 1970s, US video game industry has become one of the major entertainment industries, reaching to a revenue of 25 billion dollars in 2011 (ESA, 2011). Video game industry has been innovative from its beginning, and still it continues to change today. Optical disk technologies introduced around mid-90s have changed both PC and console gaming, and the ubiquity of the Internet starting from the early 2000s have additionally changed the industry greatly while hardware improved immensely on both PC and consoles, which as a results games have become immensely complex to design and the industry has taken the form from one person developer of games to the blockbuster releases with only a few big bets done by firms<sup>3</sup>. On the one hand, it is very important to release the best product in a category in the given period as best seller video game releases take the large pie of sales while rest of the sales is distributed among other released titles, while on the other hand success could be very hard to predict as the industry story is full with unexpected flops and hits. Although in such characteristics this industry resembles other entertainment and production based industries such as film industry, a very important difference in video game industry is that genres and sub-genres are in continuous flux, where new game sub-genres are constantly added to list while popularity of different genres are always changing. Moreover, in most genres competition becomes intense after a genre defining game is released (e.g., in FPS genre id Software's Doom, and in RTS genre Westwood Studios' Command & Conquer). Therefore, a video game publisher/developer is faced with multitude of decisions, in terms of where, what, and when to

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<sup>3</sup> Pham, A., (2009, March 5) "Calabasas publisher has a new game plan", *Los Angeles Times*, Retrieved from <http://articles.latimes.com/2009/mar/05/business/fi-cotown-thq5>.

release/develop. Also, the setting is ideal in that product performance could be measured through aggregated review scores, where the practice is well accepted also inside the industry as a measure<sup>4</sup>, by which bonuses of developers is also based on these scores<sup>5</sup>, especially in the recent years. Although there has been a recent interest in video game industry as a research setting, these studies typically focused on multi-sided platform economic structures of consoles (Zhu and Iansiti, 2012; Cennamo and Santalo, 2013), while this study is interested in publisher strategies and their learning over time in the market, making it novel also as an empirical setting to study.

## **Data**

The data source used in this study comes from the MobyGames website, which is the oldest and largest online video game archival on the Internet, having almost the population data on all video games released since so far on all known devices. From this larger population of releases, only those games released in US and those until 2011 have been kept (since information is entered by users on the website, lately released less known titles may not be observed on the site, biasing the sample). Data includes population of firms that had activity in US, and captures the complete history of the industry. Only games released on TV-based consoles and PC have been chosen as game releases of interest. Final data is consists of 26,248 title-platform releases and with 17,555 unique titles releases over the years 1972-2011. The data includes title, platform, publisher, developer, release date, genre and review scores. Also, merger & acquisitions (as well as name changes) between publishers and also between publisher and

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<sup>4</sup> As an example, THQ Annual Investor Report 2010, <http://investor.thq.com/phoenix.zhtml?c=96376&p=irol-reportsannual>

<sup>5</sup> Schreier, J., (2012, March 15), "Why Are Game Developer Bonuses Based On Review Scores?", Retrieved from <http://kotaku.com/5893595/why-are-game-developer-bonuses-based-on-review-scores>

developers have been tracked and coded in order to correctly assess the experience of any publisher or developer.

Genre information is provided in 8 top-level genres and additional information about the themes and graphic perspectives of releases. These data have been coded to create meaningful sub-genres, following the genre structure provided by the NPD Research. This firm is the most prominent market research company in the industry that categorized games into over 50 genres, and with the data at hand, I have coded games into mutually exclusive 58 genres. Each of these genres represent a niche for the firm to enter.

### **Dependent Variable**

A valid measure of product performance would be review scores in video game industry. Moreover, this measure has additional advantages over other product level performance measures such as sales numbers as they are less dependent on complementary assets such as distribution and marketing. MobyGames uses its own proprietary method to calculate MobyRank for titles, by normalizing and weighting differently each review outlet according to their scoring scale, reliability and quality, as well as putting MobyRank score after enough reviews have been done about a release. For additional robustness checks, also title-platform sales data for the years 1994-2007 will be used as a dependent variable.

### **Independent Variables**

#### **Related Experience**

Relatedness between niches will be measured by calculating cosine index of similarity. Teece et al. (1994) have used co-occurrence patterns of industry activities under businesses to

determine their relatedness, in order to improve upon SIC based hierarchical relatedness measures. Applying the survivor principle, it could be argued that those activities that are combined are the ones that make economic sense, and those that don't would be expected to not stay in the market long (Stigler, 1968). Lee (2008) has built on this approach to infer capabilities of firms in determining entry timing from product portfolios. She argues and shows that product portfolios of firms are a meaningful reflection of upstream resources and capabilities of them and they are valid at both the industry level in determining related activities to each other, and also at the firm level in determining how related a firm is to a focal activity. Also, since product portfolios in an industry is a result of both supply and demand conditions (Lee, 2008), it effectively captures them, yet they only do not answer what is the basis of relatedness between two activities (Winter and Bryce, 2009). Following these studies, cosine index of similarity will be built by creating matrices of co-occurrences of niches in firms in a given year, and the

similarity between two niches  $i$  and  $j$  is calculated as: 
$$R_{ij} = \frac{\sum_{m=1}^M P_{im} P_{jm}}{\sqrt{\sum_{m=1}^M P_{im}^2} \sqrt{\sum_{m=1}^M P_{jm}^2}}$$
, where  $m$  is

the firms currently active in the industry and  $P_i$  represents number of product releases in the niche  $i$ . By calculating relatedness between each pair of niches, we can calculate the relevant experience of a firm to a focal niche, by what Lee (2008) named as composite degree of capability relevance, which is simply the relevance weighted activities in all markets of the firm according to the focal market. I will be following her, and calculate relevant experience as relatedness weighted depth of experience of the firm in all active niches according to a focal niche. Since some firms have high values, it has been logged.

## **Breadth of Experience**

Breadth of experience will be calculated via a modified version of concentric diversification index (Caves et al., 1980) used in past research (Eggers, 2012). It is computed as  $D_m = \sum_{i=1}^{N-1} \sum_{j=i+1}^N p_i p_j$ , for firm  $m$  where  $p_i$  is measuring the past release activity of a publisher in niche  $i$  and represents the percentage of niches that publisher had activity in (for example, if a publisher had activity in 10 niches,  $p_i$  will be 1/10 for each of these niches) while  $d_{ij}$  is the distance between niches  $i$  and  $j$ . Inverse of the industry-level relatedness between two niches calculated above will be used as distances between pairs of niches a firm has activity in.

Dummy variables will be created in order to account for new niche releases, to test our hypotheses.

## **Sequence Distance**

Sequence distance will be measured by calculating the average increase of breadth of the firm by dividing the breadth at time  $t-1$  to the total number of niches entered by time  $t-1$ . Mathematically represented, it is  $S_m = D_m / \# \text{ of Niches Entered}$ . This measure is in line with the theoretical idea that most firms will persist in making either close entries or distant entries, and therefore they will more adept at making the move they are familiar with.

## **Control Variables**

Total product development experience will be taken as a control, following the past research (Eggers, 2012), in order to better isolate the effect of breadth and depth on new product quality. Various decaying parameters is possible, as it has been suggested by various research in organizational learning that experience decays over time. Other control variables will be related

to the industry, where different consoles or devices could affect the possibilities of the games developed for them, and they should be controlled for. For each console and operating system in PC, controls will be created. Also, a publisher has the choice of developing games in-house or develop it together with third-party developer, so it will be also controlled if a game is made or bought. Moreover, developers are very path-dependent in what they do, mostly specializing in a sub-genre, or at most in a genre, but they show quite high heterogeneity of quality, therefore each developers experience will be controlled for in estimating effects of past publisher experience on new game releases. Another important control related to the setting would be for those owning platforms, namely consoles. Various studies have shown that they have their own strategies of game development (Zhu and Iansiti, 2012; Cennamo and Santalo, 2013) mostly related to their incentives connected to platform ownership, so that each of platform owners will be controlled for.

Control variables are also needed to control for competition inside each subgenre as well as their attractiveness as they will be affecting the product quality of releases. These controls are: lagged total releases in niche and growth rate of niche. At the whole market level, year dummies will be used.

Firm level controls include firm age, firm size (which will be measured through number of business units owned by the publisher or aggregate project size in  $t-1$ ), and more importantly, firm-level fixed effects, in order to show how within accumulation of experience differs firm performance in entering new niches. At the firm level, additionally it will be controlled for the concurrent releases of games in the same niche and different niches, as past research (Eggers, 2012) has found that they are affecting the product quality, through mechanisms of inter-project spillovers and resource congestion.

In the full analysis, a two stage regression will be undertaken to account for the self-selection of diversifiers. As following Heckman (1979), a probit model is used if a firm is entering a new niche in a given year. Additional variables are performances relative to aspiration levels, which is important in undertaking entry and change decisions (Greve, 1998). Performance relative to historical and social aspiration levels will be used for the entry model, and it is also able to account time changing performance related self selection issues that are not controlled with fixed effects. Second stage analysis is a regression with firm-fixed and year-fixed effects with each released game being an observation according to the variables explained above.

## **Initial Results**

Full analysis with the outlined methodology to test hypotheses is currently not possible as data is still collected for control variables, and variables that require programming to calculate (Breadth & Sequence Distance) is still underway. Breadth of experience is calculated via a herfindahl index, according to how concentrated a publisher is in the past among niches, and sequence distance is calculated as the average amount of change of herfindahl index in niche entries of the firm. Therefore, independent variables with some of their simpler versions have been used to present initial results to test the hypotheses and discuss these initial results and the setting to enlighten the complete analysis. On one side, significance or size of the coefficients of independent variables may weaken or change due to control variables added later, on the other side, independent variables constructed as mentioned above may better capture theoretical effects and strengthen them.

Summary statistics and correlations are presented in table 1 and preliminary results are reported in table 2. In table 1, we can see that new niche dummy is negatively correlated with

performance. Total amount of experience (total), currently only control variable, as expected, positively correlated with performance. An interesting issue is about the related experience variable, which shows a significant and negative correlation with performance.

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Insert Table 1 About Here  
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At table 2, there are simple OLS regressions by main independent variables, and interactions of interest for hypotheses. In the first model, all variables except Related experience is significant. It can be seen that entering a new niche is indeed a hard task, as it is significant and negative. On the other hand, related experience variable is not significant. This may indicate that firms are not developing any specialized capabilities that they could leverage in general. Turning to second model, it is seen that increasing breadth of experience makes a firm to have worse releases in existing niches, theorized in Eggers (2012), yet unconfirmed. This could lend support the idea that firms are indeed better able to leverage their specialized knowledge if they are focused. First hypothesized variable shows unexpected results. Quite contrary to the H1, it seems there is support for the idea that firms are actually better able to leverage their specialized experience through breadth. This maybe related to be better able to apply market entry knowledge when there is some specialized knowledge to apply at hand, and otherwise, this related knowledge is not useful. In the last model, we use JumpSize variable for the average sequence distance. This preliminary results support the idea that breadth is indeed more useful in entering new niches if the firm is entering new niches, yet this could be a liability if the firm is entering old niches. This may indeed the firm is making something quite contrary by exploiting with sequels or new versions of the games in existing genres as the firm is used to explore the market for new niches, and able develop better products if it enters such a market.

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Insert Table 2 About Here  
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These initial results would point to a contrary finding of H1, while supporting the H2. In any case, H1 finding is important as there is no research on how these experience types interact, and conflicting findings on their usefulness. Now we turn to the discussion and conclusions.

## **DISCUSSION AND CONCLUSION**

Our results show a mixed support for the ideas developed above. On the one hand, firms may indeed be able to leverage both types of experience, specialized and generalized, yet on the other hand, the issue could be more related about not which experience is accumulated, but how these experience is accumulated. Different paths may imply different results, hence different routes taken by the firms as they are getting feedback of their actions. Such “learning trajectories” (Helfat and Lieberman, 2002) is an understudied area, yet current studies on within-diversification and performance link is going on this direction. Therefore, this study may enlighten these not well lit area of research, for the wide market entry and pre-entry experience literature.

Finding that related experience is not significantly related with performance alone is quite opposing to studies that considers co-occurrence patterns are showing feasible combinations of products, due to survivor principle (Teece et al., 1994; Lee, 2008; Winter and Bryce, 2009). In the within-industry diversification literature, Greenwood and Li (2004) have argued for the sociological side of these co-occurrence patterns, which will create needed institutions that support the firms that undertake activity in highly related niches through their co-occurrences.

This contradicting finding needs more work, as this could also result from the initial results, and there is yet many other variables that need to be controlled for.

Findings of this study have dual implications for the within-industry diversification. Firms may indeed benefit from their breadth in entering new markets, but in doing so, they should be following a trajectory of close entries that allows them to benefit more from their specialized experience. This could be the result of negative transfer effects (Haleblian and Finkelstein, 1999), that firms having higher breadth over time is better able to understand which specialized knowledge to apply, and otherwise firms could haphazardly apply a learned lesson to an unfitting situation.

There are also possible limitations due to the industry for the implications of results and results of analysis. Although there are many niches in the video game industry, developers are much more constrained in applying their specialized knowledge to new niches, while publishers are more in the role of a renaissance patron that may not need for them to have that much specialized knowledge, as much as knowing about how to enter new niches in general.

I believe that evolution of industries by analyzing co-evolution of products, firms and their path-dependent nature have a high potential to bring answers to many old questions, and able to revitalize our view on industry evolution, diversification and even learning.

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**Table 1. Correlation Matrix**

	Mean	S.D.	Min	Max	Mobyrank	Newniche	Breadth	Logrelated	Jumpsiz	Total
<b>Mobyrank<sup>a</sup></b>	<b>70.60036</b>	<b>13.07059</b>	<b>7</b>	<b>97</b>	<b>1.000</b>					
<b>Newniche</b>	<b>.370352</b>	<b>.4833025</b>	<b>0</b>	<b>1</b>	<b>-0.1353*</b>	<b>1.000</b>				
<b>Breadth</b>	<b>.6135683</b>	<b>.3726317</b>	<b>0</b>	<b>.9590285</b>	<b>0.0843*</b>	<b>-0.5856*</b>	<b>1.000</b>			
<b>Logrelated</b>	<b>.3996954</b>	<b>.9884791</b>	<b>0</b>	<b>7.08997</b>	<b>-0.0772*</b>	<b>0.5268*</b>	<b>0.1455*</b>	<b>1.000</b>		
<b>Jumpsiz</b>	<b>.0488341</b>	<b>.0473238</b>	<b>0</b>	<b>.1666667</b>	<b>-0.0661*</b>	<b>-0.994*</b>	<b>0.3133*</b>	<b>0.1710*</b>	<b>1.000</b>	
<b>Total</b>	<b>133.0416</b>	<b>244.2855</b>	<b>0</b>	<b>1545</b>	<b>0.1557*</b>	<b>-0.3429*</b>	<b>0.4381*</b>	<b>-0.0721*</b>	<b>-0.2455*</b>	<b>1.000</b>

**Notes:**

**Starred coefficients \* are significant at the 0.05 level.**

**a) Only available for 11175 observations out of 26248**

Table 2. Preliminary OLS Regressions

	(1)	(2)	(3)
<b>Dependent Variable</b>	<b>mobyrank</b>	<b>mobyrank</b>	<b>mobyrank</b>
<b>newniche</b>	-3.185583 (.3827098)*	-5.051746 (.635936)*	-4.139261 (.6495759)*
<b>total</b>	.0059239 (.0004665)*	.0063028 (.0004775)*	.0047216 (.000551)*
<b>Breadth</b>	-1.243857 (.5384963)*	-3.189066 (.7550461)*	-.0248116 (.78307)
<b>Related</b>	-.0004369 (.0052308)	-.022275 (.0079168)*	
<b>RelatedBreadthNewNiche (H1)</b>		1.23544 (.3363378)*	
<b>JumpSize</b>			38.51102 (12.17641)*
<b>BreadthJumpSize</b>			-87.49349 (19.8012)*
<b>BreadthJumpSizeNewNiche (H2)</b>			27.12234 (11.74116)*
<b>constant</b>	71.12593 (.469923)*	72.69057 (.6340511)*	71.7811 (.6674582)*
<b>Number of obs</b>	<b>11172</b>	<b>11172</b>	<b>11172</b>
<b>Adj R-squared</b>	<b>0.0322</b>	<b>0.0333</b>	<b>0.0342</b>
<b>Prob &gt; F</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

Notes:

Starred coefficients \* are significant at the 0.05 level.