



# The survival consequences of intellectual property for retail ventures

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## ABSTRACT

While the value of patents is documented widely for technology ventures, whether retail ventures can improve their survival odds from patents, copyrights or trademarks remains unexplored. Given the relatively lower survival rate of retail ventures, whether investing in intellectual property could improve their survival odds is an important research question for both the retailing and entrepreneurship literatures. Based on a sample of 585 retail and 2406 non-retail ventures in the Kauffman Firm Survey, retail ventures have a lower chance of survival. Compared to non-retail ventures, patents, trademarks or copyrights in retail ventures increase the odds of survival. The findings have implications for resource allocations related to intellectual property in retail ventures.

## 1. Introduction

New retail ventures represent a significant portion of the US economy. Overall retail productivity is driven by “more-efficient firms replacing a set of less-efficient exiting ones” (Hortaçsu and Syverson, 2015, page 93). The US retail sector has vibrant entrepreneurial activity. In 2014, for example, entry and exit rates for new retail establishments with 1–4 employees were 15.0% and 20.5%, respectively. Despite their contribution to the vitality of the US retail sector, retail ventures face a slightly below average 5-year survival rate of 41.1% compared with an eight industry sector average of 43.9% (Census Bureau 2005 data).

While the interest in understanding retail venture failure has increased recently, the question of whether investments in intellectual property by retail ventures improve survival odds remains unexplored. We ask – Does the type of intellectual property protected by a retail venture improve its odds of survival?

We draw on a longitudinal sample of 585 retail and 2406 non-retail ventures followed from 2004 to 2011 in the Kauffman Firm Survey, the most comprehensive longitudinal sample of US ventures. To rule out alternative explanations, we control for a variety of factors, including credit risk from archival source, along with state, year, and industry dummies. We find that patents, copyrights, and trademarks improve survival odds of retail ventures.

### 1.1. Legal protection for intellectual property

Intellectual property (IP) is the term used to refer to the output of a

creative process. When the United States government recognizes the ownership of intellectual property, it grants certain rights that will be protected under the nation's laws. There are three such types of intellectual property protection common among retail firms, which are known as copyrights, trademarks, and patents. We review each type of IP and highlight benefits of each type of IP for retail ventures.

Copyrights are a form of intellectual protection provided to authors of original works of authorship fixed in any tangible medium of expression, meaning that the work has been documented or communicated in an observable way, either directly or through a machine or device. In retail industries, copyrights have been issued to protect proprietary retail management software, and virtually all e-commerce retailers' website designs. Other examples include artistic works, literary works, music, graphic works, and sound recordings.

A trademark is a word, name, symbol, device, or any combination, used or intended to be used to identify and distinguish a retailer's goods and services from those of others, or to indicate the source of those goods and services. Accordingly, trademarks prevent competitors from using confusing images or designs in order to piggyback on a retailer's hard-won brand identity. In addition to trademarking their business names, retailers also obtain trademark protection for their slogans, theme songs, logos, signature products, and their store and station layouts. The trademarked item must be distinctive and not trademarked by another firm.

Trademarks from the United States Patent and Trademark Office (USPTO) expire after 10 years but can be renewed. If a trademark application is approved, the company can add the registered trademark symbol (®) to the company's mark and is eligible for IP protection.

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Companies that have not successfully registered a trademark can use the ™ symbol to indicate their ownership of a mark, although the ™ symbol does not provide any special legal protection.

Inventions are protected by patents. Patent holders of designs, products, and processes are allowed to prevent others from producing selling or using the invention without authorization. Patents grant to their holders the exclusive right to make, use, or sell an invention for 14–20 years from their filing date, given certain considerations and provided that maintenance fees are routinely paid to keep the patent in force. Under U.S. law, patents on machines, known as utility patents, pertain to an invention that is novel, non-obvious, and usefulness. These terms have precise meanings within the domain of intellectual property law. Useful means that an invention's subject matter has a useful purpose and that, if the invention is a machine, is it fully operable. Novelty refers to the originality of the idea and connotes that an invention was not previously known or used by others, described in print, or previously for sale or in public use. Non-obvious means that an invention is sufficiently different from existing technology such that a person with “ordinary technical skill” would not consider an inventor's changes to any underlying machine obvious improvements.

The proliferation of patents in retail industries provides evidence of the importance that competitors place on protecting their intellectual property. For example, since Amazon was founded in 1994, the company has obtained 1263 patents in the United States. From network encryption to software that blocks brick-and-mortar retailers' efforts to conduct competitive price checks against Amazon, patents have proven to be an effective component of Jeff Bezos' corporate strategy.

Another approach to protecting intellectual property derives its protection from the fact that it is kept secret from anyone outside of the company that developed it. Called a trade secret, it is not formally protected because the owner is attempting to save money or to assure nondisclosure by never permitting it to be publicly revealed even to government agencies. Business plans, client lists, manufacturing processes and restaurant recipes are examples. Similar to any other company property, its owners can bring suit against anyone who can be proven to have stolen a trade secret.

Exhibit 1 presents a simple taxonomic matrix that provides an overview of the characteristics of three intellectual property protections. The vertical axis shows these types of IP protection as patents, copyrights, and trademarks. The horizontal axis lists four characteristics of IP protection, namely a brief description, the period of time that the protection can be expected to last, the relative cost of the protection in comparison to the other two types, and several examples of intellectual property that benefit from the specific type of protection.

Next, we discuss literature explaining plausible gains for retail ventures from patents, trademarks, and copyrights.

## 2. Benefits of IP

In the retailing literature, empirical studies on intellectual property focused on large and established retail firms, while research on small entrepreneurial retailers has tended to focus on the role of patents for high-technology firms (Smith and Cordina, 2015). When using samples of large and established firms, retailing research has found support for the influence of IP on company performance (Pantano, 2014; Tsai et al., 2010), process management (Evanschitzky et al., 2015), and innovation outcomes of the consumer experience (Demirkan and Spohrer, 2014; Poncin and Mimoun, 2014). Unfortunately, the linkages among IP strategies and retail start-ups' survival are largely neglected topics in academic research.

New ventures are especially resource constrained and thus resource allocation decisions have elevated importance in their survival (Klingebiel and Adner, 2015; Kazanjian and Rao, 1999). In making resource allocation decisions, retail ventures must weigh the certain costs of IP against its uncertain and time-bound future benefits (Han and Shin, 2014). Rapid innovation pace in the retail sector further calls

Exhibit 1  
Intellectual property protection.

### Characteristics of the intellectual property protection

Type of intellectual property protection	Description	Protection Period	Cost	Examples
Patent	A government grant of an exclusive right that allows the holder of a novel and non-obvious invention to maintain a monopoly over the manufacture, use, and sale of the invention.	14–20 years depending on patent class.	\$5000 - \$10,000	<ul style="list-style-type: none"> <li>Amazon “1-Click” e-commerce feature</li> <li>Walmart smart-home technology that reorders customers' goods automatically</li> <li>Conduent's facial expression recognition technology assesses retail customer satisfaction in real time</li> <li>Priceline reverse auction process</li> <li>Google's mobile shopping lets customers scan a barcode to order online.</li> </ul>
Copyright	Legal protection which grants the holder of an original work of authorship exclusive rights for the reproduction, distribution, and use of the original work.	The author's life plus 50–100 years.	\$35 - \$900	<ul style="list-style-type: none"> <li>Disney Mickey Mouse cartoons</li> <li>Ford website photos and content</li> <li>LL Bean outdoor apparel catalog</li> <li>Microsoft Windows software</li> <li>Proctor &amp; Gamble packaging ad copy</li> </ul>
Trademark <sup>a</sup>	A registered sign, design, symbol, or expression that distinguishes a product or service as owned or licensed and confers exclusive use upon the owner or licensee.	10 years, with a renewal of 10 years, under continued use	\$225 - \$1300	<ul style="list-style-type: none"> <li>Apple logo and brand</li> <li>Geico's talking gecko mascot</li> <li>Johnson &amp; Johnson Band-Aid product name</li> <li>McDonald's golden arches symbol</li> <li>Nike “Just Do It” slogan</li> </ul>

<sup>a</sup> Assumes registration. A nonregistered trademark is denoted by the ™ symbol and does not require payment of a fee.

for a more focused and evidence-based approach to IP protection for retail ventures.

In addressing this theoretically sparse but a practically pertinent area of research, we assess the relevance of IP for retail ventures. Understanding the influence of IP in retail ventures is essential for two reasons. First, over the past decade competitiveness and complexity in the retail industry have been increasing due to rapid and diffused technological changes. Increasing demand for enhanced shopping experiences and retail services outside of traditional marketing and sales channels call for greater investments in IP to develop distinctive retailing niches (Arnold and Reynolds, 2003; Demirkan and Spohrer, 2014; Hristov and Reynolds, 2015; Johnson et al., 2015; Poncin and Mimoun, 2014). Increasing fragmentation of retail landscape has also led to calls for increased need towards leveraging IP to carve, protect, and sustain a unique retailing identity (Hortaçsu and Syverson, 2015). Shifts from push models of consumer goods marketing to pull models focused on customer initiatives (Hopping, 2000; Niemer and Zocchi, 2013; Pantano, 2016) call for a distinctive focus on patent, trademark, and copyright-based investments to develop both physical and intangible retail presence.

GrubHub provides an excellent example of the importance of the three formal forms of intellectual property protection for a young firm. GrubHub is a leading online and mobile food ordering company in the US that delivers orders to customers from local takeout restaurants. As detailed in Exhibit 2, the company's ordering platforms connect customers with more than 80,000 takeout restaurants in over 1600 U.S. cities and London. The company's intellectual property is protected by a combination of patents, trademarks, and copyrights.

Second, most studies in entrepreneurship have focused exclusively on the value of patenting in high-tech ventures (Smith and Cordina, 2015). Since intellectual property protections vary according to the type and form of innovation being protected, the influence of IP in retail startups may be distinct from its influence in non-retail ventures. Retail ventures, compared to non-retail ventures, have distinctive input-output conversion processes, rely on distinctive task, tools, and

#### Exhibit 2

Intellectual property protection at GrubHub, Inc.

##### GrubHub, Inc. patents

GrubHub has been assigned two patents related to their operations. The first involves a utility that creates heat maps for the study of competitive advantage of a particular restaurant in the marketplace (Patent 8,880,420). The heatmaps are developed using an activity logged with a restaurant's service, and available within its database.

The second patent involves a system, method, and utility for determining the competitors of a subject restaurant accesses a database that contains information about other, nearby restaurants (Publication 2,014,046,730; Patent 8,595,050). The utility assigns a competitor score to each restaurant within a specified distance from a restaurant, as well as the cuisine types, menus, and order histories of the subject and competitor restaurants.

##### GrubHub Trademarks

GrubHub has trademarked a number of titles, words, stylized words, and symbols that it associates with various activities of the business. The examples listed below pertain to various computerized online ordering services in the field of restaurants and food; electronic processing:

- GRUBCENTRAL (Serial Number: 86,623,269)
- GRUBHUB EATMAP (Serial Number: 86,842,442)
- GRUBHUB FOR WORK (Serial Number: 87,368,831)
- #HAPPYDANCE (Serial Number: 87,618,559)

Other GrubHub trademarks pertain to advertising, promotion, and marketing services including membership and loyalty programs (DELIVERY GURU, Serial Number: 87,123,178); educational services (FOODYSSEY, Serial Number: 87,123,188); and a website notices featuring consumer news and information on restaurants and delivery (THE CRAVE, Serial Number: 87,198,460).

##### Copyrights

GrubHub has received more than 20 copyrights, several of which cover a long list of publications. Other copyrights cover named promotions such as order confirmation systems, Allmenus.com website materials, "Sushi S#t Grubhub.com," "How do I work this thing?," Restaurants on the Run, and articles published in *New York* magazine and 1447 other titles.

processes, and face distinctive challenges related to providing services to customers (Davidson et al., 2002). Variations in service demands and early-stage challenges to developing a retail footprint may call for intellectual property to survive in the retail niche. A retail start-up's novel retail processes can be protected by patents, innovative products can be protected with trademarks, and creative website designs aimed at enhancing online shopping experiences can be copyrighted. The projected impact of each kind of IP on retail venture survival is less understood.

Due to lack of formal theoretical framework on IP in retail ventures, our primary goal is to propose a research question, instead of proposing formal hypotheses.

#### 2.1. Retail start-ups & patents

Retail patents typically fall into one of five main categories (Pantano et al., 2017). These categories include payment systems (e.g., a form of encryption to protect consumers' financial and personal shopping data), information and product displays (e.g., retail start-up McMillan's EyeQ system that uses sensors in end caps to detect the gender of a customer standing in front of them and provides appropriate advertising content on a screen), personalized shopping experiences (e.g., Amazon's recommendation engine), information search tools (e.g., a system that helps consumers match desired products with local retailers), and monitoring systems (e.g., technology used to monitor the performance of refrigerators in supermarkets).

A 2017 study of patents held in the retail industry found that the greatest percentage were issued for innovations pertaining to consumers' shopping experiences (Pantano et al., 2017). These findings are consistent with earlier studies that also concluded that the shopping experience was one of the retail industry's key innovation drivers (Demirkan and Spohrer, 2014; Pantano, 2014; and Poncin and Mimoun, 2014). Additionally, the findings provide evidence of unprecedented consumer demand for innovation at the point of sale and a heightened awareness among retailers of the benefits emerging from the adoption of smart technologies.

Research evidence suggests that when considering the choice between pursuing patents or embracing standardization, startups should pursue patents when knowledge protection is essential to their business model (Hopkins and Pearce, 2014), but opt for standardization when knowledge diffusion better serves their long-term interests (Abdelkafi et al., 2016). Therefore, if the startup anticipates seeking partnerships with other firms, their best option might be standardization, whereas if they intend to grow organically, the preferred IP choice would be to pursue patents.

Startups that wish to attract customers through an enhanced consumer shopping experience – a critical innovation trajectory within the retail industry – should move aggressively to patent their technology. Once again, the extent to which retail start-ups share performance-enhancing traits with technology start-ups is crucial. A four-year examination of 7038 high and medium tech-startups in the United Kingdom concluded that start-ups with patents had 8–27% greater asset growth per annum than non-patenting firms (Helmets and Rogers, 2011).

This finding is especially interesting in light of the trend toward brick-and-mortar activities among online retailers. For example, Birchbox, Rent the Runway, and Warby Parker, which all launched as online-only ventures, subsequently saw potential value in adding physical storefronts and began to invest in them. In Warby Parker's case, its physical stores average \$3000 in sales-per-square-foot – a figure higher than Tiffany & Co. and just under Apple (Zaryouni, 2015).

Finally, the benefits of patenting extend to start-up success in accessing venture capital funding. Research indicates that patent protection of business-critical technology is an important touchstone for venture capitalists (Antonelli and Teubal, 2008; Feldman, 2014).

## 2.2. Retail start-ups & copyrights

Because copyrights protect creative content, they can provide owner-managers with an invaluable form of IP protection when a start-up's business model and long-term strategy are predicated on a creative idea to preserve and extend the first-to-market advantage, such a novel product design or computer code. As a consequence, there is evidence that young retail businesses can leverage copyrights to increase their market share valuation (Shavell and van Ypersele, 2001), and thereafter can appropriate economic rents by charging higher margin prices for their products and services (Meurer, 2001).

Research has yielded important insights about retail survival and the ownership of copyrights. Specifically, researchers have concluded that copyright protection improves a young firm's survival prospects (Shah and Smith, 2010). They report that having multiple copyrights and patents are especially important for retail businesses since there is a nearly 20% decrease in the probability of exit associated with a retail business's 1% increase in the number of IP protections it holds (2010: 16).

Additional studies offer support for the hypothesis that young retail businesses that hold government IP protections achieve increased financial returns and greater odds of survival (e.g., Delmar and Shane, 2006). However, these studies commonly group patents and copyrights together for the purposes of analysis and thereby present no information about the associations between copyrights viewed independently and company financial performance.

## 2.3. Retail start-ups & trademarks

Trademarks occupy a unique place in a retail start-up's IP protection strategy. Like copyrights, they can help deter next-to-market competitors hoping to capitalize on the initial success of a first-mover's novel idea. Additionally, like patents, they can serve as an important defense against competitors seeking to mimic a retailer's products and services, or its approach to creating an enhanced consumer shopping experience.

Research supports the conclusion that environmental cues exert cognitive and affective influences on retail consumers' shopping behavior (Turley and Milliman, 2000). This research focuses on the ambient, design, and social factors of a retail environment, with researchers utilizing cross-comparable definitions of design to include store layout (Emmett et al., 2006), architecture (Van Oel and den Berkhof, 2013), accessories (Wall and Berry, 2007), and signage (Dennis et al., 2012). Each of these design factors has been associated positively with firm performance, and all can be trademarked by retailers. For example, young retailer Bonobos filed a trademark to defend its distinctive approach to multi-channel retailing as it sought to incorporate brick-and-mortar locations into its existing online retail business model (Retail, 2016).

Based on the above review, as there is a limited theoretical framework to argue for the relative importance of patent, trademark, or copyrights for retail ventures relative to non-retail ventures, we propose the following exploratory research question for this area of practical importance to the retail sector:

*Research Question: Are patent, trademark, or copyright associated with retail venture survival?*

## 3. Methods

### 3.1. Data

To address our research question on the influence of patent, copyrights, and trademarks on retail venture survival we draw on Kauffman Firm Survey (KFS), one of the most comprehensive longitudinal sample of US ventures. KFS data was collected by the Kauffman Foundation. Used in a variety of studies on ventures (Farhat and Robb, 2014), KFS

sampling started with about a quarter million firms established in the year 2004. From this sampling frame, based on industry, region, and demographic stratification a sample of 32,469 ventures was identified. A startup in KFS is defined as an independent business established by an individual or a team. To ensure that the study followed ventures, and not established firms, businesses included in the initial sampling frame were excluded if the firm had a previous federal identification number, filed for income on Schedule C, or paid either federal Social Security or state unemployment insurance or any taxes prior to the year 2004. The initial sample of 4928 ventures was subsequently followed until 2011.

KFS data is available on the National Opinion Research Center's (NORC's) Data Enclave. We use the survival analysis file developed by Farhat and Robb (2014), listed as Longitudinal\_Long\_MI\_Survival\_Ready.dta. Additional details on KFS data collection are available on the KFS website (Source: <http://www.kauffman.org/what-we-do/research/kauffman-firm-survey-series>). To reduce the influence of alternate effects on survival we control for venture team, venture performance, location, industry and year effects. We do not use any filters. Based on case-wise deletion, our sample includes 2991 retail and non-retail ventures, of which 1408 ventures failed.

### 3.2. Variables

We coded ventures as retail ventures if they were in one of the three two-digit NAICS codes 42, 44, or 45. The remaining ventures were coded as non-retail ventures. Our primary outcome variable of interest is failure (= 1, else coded as censored). In the sample, 585 were retail ventures of which 303 failed, and 2406 were non-retail ventures of which 1105 failed.

For measuring IP, we used yes/no measures where the respondent was asked in three separate questions whether the venture had a patent, trademark, or copyright.

To reduce the effect of alternate explanations, we include gender of the primary owner (0 = female; 1 = male). Past work in entrepreneurship has shown that females are more likely to start retail ventures (Carter et al., 1997). To control for the extent to which ventures have overcome liabilities of smallness, we included the number of full-time and part-time employees and log of assets (Stinchcombe, 1965). As venture team is a source of critical inputs, we control for both the number of owner-operators and a total number of owners. Furthermore, total equity owned by owner-operators would impact the effort into building the venture (Kotha and George, 2012). We include the total value of equity owned by owner-operators. The capital structure of the venture could also influence the odds of survival (Helwege and Liang, 1996). We include the ratio of debt to total assets.

As an external measure of venture viability, we include credit risk, a measure compiled from archival sources. Higher scores represent lower credit risk. The scores were: 536–670 (91–100 percentile), 493–535 (71–90 percentile), 423–492 (31–70 percentile), 376–422 (11–30 percentile), and 101–375 (1–10 percentile) are scored 2, 3, 4, and 5, respectively.

We include state, industry (NAICS 2-digit), and year dummies.

## 4. Results

Table 1 lists mean, standard deviation and pairwise correlations based on case-wise deletions. For illustrative purposes, we also include the number of patents, trademarks, and copyrights in Table 1.

We use Cox regression. Retail ventures have a lower chance of survival (Table 2, Model 2:  $\beta = 1.540$ ,  $p < 0.001$ ), as a positive association indicates greater chances of failure. Next, retail ventures with patents (Table 2, Model 3:  $\beta = -0.788$ ,  $p < 0.05$ ). Retail ventures with copyright (Table 2, Model 4:  $\beta = -0.325$ ,  $p < 0.05$ ) and trademark (Table 2, Model 5:  $\beta = -0.237$ ,  $p < 0.05$ ) are more likely to survive. In the full model, while the direction of effects is consistent with the

**Table 1**  
Mean, SD, correlations.

	Full sample		Retail ventures		Non-retail ventures		1	2	3	4	5	6	7	8	
	Mean	sd	Mean	sd	Mean	sd									
1	5.4013	2.8892	5.1540	2.8827	5.4548	2.8879	1								
2	0.1776	0.3822	1	0	0	0	-0.0398*	1							
3	0.7353	0.4412	0.6884	0.4633	0.7455	0.4356	0.0614*	-0.0494*	1						
4	3.9647	13.6490	3.2970	7.6937	4.1089	14.6165	0.1008*	-0.0227*	0.0795*	1					
5	1.3821	0.9424	1.3804	0.9079	1.3824	0.9498	-0.0022	-0.0008	0.0274*	0.0279*	1				
6	2.1824	6.4089	1.7065	1.4952	2.2852	7.0288	0.0315*	-0.0345*	0.0279*	0.2202*	0.4490*	1			
7	21679.77	128382.90	20172.53	75770.28	22005.30	137121.90	-0.0643*	-0.0055	0.0257*	0.1970*	0.0918*	0.0376*	1		
8	9.8654	3.4867	10.3915	3.1233	9.7517	3.5503	0.1771*	0.0701*	0.1119*	0.2696*	0.1886*	0.1238*	0.0911*	1	
9	0.5939	0.4057	0.6113	0.3922	0.5901	0.4085	0.2728*	0.0200*	0.0323*	0.0869*	-0.0374*	-0.0335*	-0.1233*	0.2433*	1
10	3.0824	1.0480	3.1639	1.1032	3.0648	1.0349	-0.2480*	0.0362*	-0.0470*	-0.0226*	-0.0464*	0.0061*	-0.0482*	-0.1205*	0.0014
11	25.3543	15.1107	25.1739	14.6414	25.3933	15.2108	0.0416*	-0.0055	0.0024	-0.0036*	-0.0126*	-0.0260*	-0.0434*	0.0014	1
12	49.4847	15.2091	43.7748	1.1972	50.7179	16.5048	-0.0474*	-0.1745*	-0.1280*	-0.0640*	-0.0575*	-0.0728*	-0.0383*	-0.1290*	0.1771*
13	2008	2.8892	2008	2.8827	2008	2.8879	1.0000*	-0.0398*	0.0614*	0.1008*	-0.0022*	0.0315*	-0.0643*	0.1771*	1
14	0.0470	0.2117	0.0163	0.1268	0.0537	0.2254	0.0188	-0.0674*	0.0701*	0.1297*	0.1836*	0.3055*	0.1706*	0.0663*	0.0014
15	0.0833	0.2764	0.0484	0.2147	0.0909	0.2874	0.0182	-0.0587*	0.0534*	0.0434*	0.0799*	0.0996*	0.0025*	0.0435*	0.0014
16	0.1495	0.3566	0.1534	0.3605	0.1487	0.3558	0.0206*	0.0051	0.0302*	0.1055*	0.1168*	0.1919*	0.0875*	0.1086*	0.0014
17	0.2409	2.8736	0.2445	4.7134	0.2402	2.2903	-0.0055	0.0006	0.0006	0.0895*	0.1847*	0.2685*	0.0577*	0.0297*	0.0014
18	1.3929	13.2079	0.9096	10.7505	1.4972	13.6792	0.0543*	-0.017	-0.0158	-0.0136	0.0968*	0.0166*	-0.0129	0.0208*	0.0014
19	0.2745	1.0307	0.2468	0.8066	0.2805	1.0729	0.0307*	-0.0125	0.0429*	0.1226*	0.0995*	0.1890*	0.1365*	0.0989*	0.0014
9															
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Note. Correlations reported for the combined retail and non-retail venture sample 2991 ventures of which 1408 failed during the period of observation (47.07% failure rate) 585 retail ventures of which 303 failed; 2406 non-retail ventures of which 1105 failed.  
\* P < 0.05 (two-tailed).

**Table 2**  
Cox regression estimates.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Retail venture		1.540*** (0.308)	1.552*** (0.308)	1.578*** (0.308)	1.567*** (0.308)	1.609*** (0.308)
Have a patent			0.0851 (0.0788)			0.121 (0.0814)
Retail venture × Have a patent			−0.788* (0.315)			−0.700* (0.319)
Have a copyright				−0.226*** (0.0576)		−0.278*** (0.0608)
Retail venture × Have a copyright				−0.325* (0.164)		−0.211 (0.171)
Have a trademark					0.0401 (0.0462)	0.0984* (0.0492)
Retail venture × Have a trademark					−0.237* (0.106)	−0.159 (0.111)
Gender (Primary Owner)	−0.125*** (0.0332)	−0.125*** (0.0332)	−0.127*** (0.0332)	−0.121*** (0.0332)	−0.126*** (0.0332)	−0.125*** (0.0332)
Full time and Part-time employees	−0.00406 <sup>+</sup> (0.00212)	−0.00406 <sup>+</sup> (0.00212)	−0.00407 <sup>+</sup> (0.00212)	−0.00400 <sup>+</sup> (0.00211)	−0.00401 <sup>+</sup> (0.00211)	−0.00410 <sup>+</sup> (0.00212)
Number of owner operators	−0.0115 (0.0208)	−0.0115 (0.0208)	−0.0127 (0.0208)	−0.00905 (0.0208)	−0.0114 (0.0209)	−0.0127 (0.0209)
Number of owners	0.0116*** (0.00258)	0.0116*** (0.00258)	0.0109*** (0.00267)	0.0122*** (0.00258)	0.0113*** (0.00260)	0.0107*** (0.00267)
Equity of owner operators	3.16e-09 (1.73e-08)	3.16e-09 (1.73e-08)	3.07e-09 (1.74e-08)	3.21e-09 (1.72e-08)	3.12e-09 (1.74e-08)	2.95e-09 (1.75e-08)
Log of Assets	−0.0642*** (0.00428)	−0.0642*** (0.00428)	−0.0642*** (0.00427)	−0.0638*** (0.00428)	−0.0643*** (0.00428)	−0.0640*** (0.00428)
Debt to Assets	0.00756 (0.0395)	0.00756 (0.0395)	0.00857 (0.0395)	−0.00194 (0.0395)	0.00731 (0.0395)	−0.000110 (0.0395)
Credit risk	0.211*** (0.0168)	0.211*** (0.0168)	0.211*** (0.0168)	0.212*** (0.0168)	0.211*** (0.0168)	0.212*** (0.0168)
State dummies	Included	Included	Included	Included	Included	Included
Industry dummies (NAICS 2-digit)	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included
Observations	67,444	67,444	67,444	67,444	67,444	67,444
Ventures at risk	2991	2991	2991	2991	2991	2991
Chi-square	1080	1080	1088	1112	1085	1124
p-value	0	0	0	0	0	0

Standard errors in parentheses.

\*\*\*p < 0.001.

\*\*p < 0.01.

\*p < 0.05.

<sup>+</sup>p < 0.1.

stepwise model, retail ventures with patents have a significant negative association with failure.

### 5. Discussion and conclusions

The preliminary research question proposed here is important for retail entrepreneurs in allocating their resources to IP. Copyrights and trademarks that fulfill a unique cognitive niche for customers and/or provide competitive protections seem to increase the odds of retail venture survival. Our research that demonstrated broader support for patents, trademarks, and copyrights in improving survival odds. To our knowledge, this study is distinctive because of its focus on retail ventures from their early years. This focus on early-stage retail firms not only extends traditionally used public data and surveys but also adds a unique lens to retailing literature by allowing for focus on early stages of a retail firm lifecycle.

Allocation of resources towards IP is critical for retail entrepreneurs to understand. Investing in developing and filing for patents is generally advised in entrepreneurship curriculum and by investors. Development of intellectual property can be a very expensive and time-consuming proposition. They may not however initially recognize that the government imposes a number of fees on any organization that applies for a patent or wishes to maintain one that has been granted. The fees required by the USPTO can easily run into the thousands of dollars, even before legal and other auxiliary expenses are included. The amounts

vary with the size of the business and lifetime of the patent but include the following fees for any applicant: application filing, enrollment, examination, extension of time, maintenance, miscellaneous, petition, post-issuance, post-allowance, search, service, and trial and appeal. Other fees include the patent cooperation treaty fees for national and international stages and fees to foreign offices. Finally, a Hague fee will apply if an international design application is involved. A similar but far shorter list of fees exists for any trademark application.

These fees can represent a meaningful financial burden for an independent entrepreneurial firm in its early days of operation. The average waiting time of two years before an application is processed can also present planning complications for entrepreneurs. As a consequence, young retail firms may be hesitant to invest in IP protection. This is an understandable but risky decision. Trademark squatting and patent trolling can be financially disabling for small retailers (Rogers and Jeon, 2014; Rupert, 2009). For example, the potential knowledge spill-over associated with patent disclosure requirements increases the likelihood of trademark squatting (Lai, 2015). Although large firms with deep pockets continue to be the primary targets for lawsuits aimed at disabling IP protection rights, cases alleging infringement faced by firms of all sizes. Intellectual property infringement complaints in U.S. federal courts totaled more than 11,641 cases in 2016 as shown by the Bloomberg Law data (Nayak, 2017). Patent infringement filings totaled 4624 complaints, copyright complaints were 3811; and filings of trademark complaints were 3186.

These facts invite several avenues of future empirical investigation into the advantages of IP for young retail ventures. Is IP protection worth the costs of legal representation and government fees? Is IP protection of each type equally valuable for businesses in all industries? Does the value of IP protection change with the age and size of the firm? Does IP protection at startup provide a lifelong safeguard against unwarranted lawsuits and other legal action? Can IP protection provide a distinctive competence that can be leveraged for increased profitability (Pearce, 2006)?

Future studies can extend understanding of early stage IP in later years of a retail venture. While the current study focused on the very stages of venture lifecycle, it is likely that the returns from IP could be realized during later years of a venture life-cycle. As both tangible and intangible resources coalesce over time, the returns from IP could increase, and as such, patents could be a viable source of competitive advantage in later years. Gains from more expensive and time-consuming patenting processes are quite limited for smaller and younger firms. However, trademark and copyright both require smaller outlays (fees information for each) and improve odds of survival. This finding has important implication for resource allocation in young ventures (Kazanjian and Rao, 1999; Smith and Cordina, 2015).

In a related KFS study, Shah and Smith (2010) explained IP protection for 4928 U.S. firms concluded that significant survival benefits were enjoyed by high-tech businesses when founders' prior entrepreneurial experiences were combined with IP protections (Shah and Smith, 2010). Additionally, IP protections influenced start-ups' exit mechanisms, with acquisition rather than closure being more likely when competitors also possessed IP. In relation to these findings with a more longitudinal sample and exploring the value of IP in a retail context, we further add to this lineage of research.

From the standpoint of retail IP, this shift requires an overhaul of systems that traditionally centered on the physical movement of goods rather than the management of customer relationships, with IP protection playing a central role in preserving the competitive advantages accruing to retailers who successfully navigate this challenging transition. Future studies could also explore how retail firms leverage IP at resource interfaces to create a bundle of resources. Understanding this process would be particularly salient given the rapidly increasing integration of smartphones and personal computers in the consumer shopping experience suggests that retail start-ups, many of which launch as purely online ventures (Evans, 2011).

Given the widespread disruptive innovations within the retail industry, successful start-ups are likely to be those that can profitably situate themselves along the leading edges of the evolutionary retail technology timeline. This timeline proceeds from I-commerce (i.e., Internet-based retailing), to M-commerce (i.e., mobile technologies-based retailing), and terminates in U-commerce (ubiquitous computing-based retailing) (Wu and Hisa, 2008). The importance of this timeline is underscored by research that notes a shift away from traditional points of sale towards ubiquitous online stores that offer a high level of mobile connectivity (Blázquez, 2014; Kourouthanassis et al., 2007; Pantano and Timmermans, 2014).

The findings of this study are not without limitations. First, the findings provide an understanding of IP dynamics for US ventures established in 2004 and followed until 2011. As such, the IP dynamics for developing country context would be non-existent and would vary across developed country context. While the US represents the most vibrant IP system, future studies could focus on the generalizability of the current findings.

Second, while KFS data is widely used and the credit risk control from archival source and survival is a reliable outcome variable, we call for future studies to further explore the influence of other factors such as locational dynamics, customer interactions, entrepreneurial initiatives at different stages of a retail venture life cycle. Future research could focus on providing a further understanding of the relationships among knowledge conversion cycles that help retail ventures translate

and embed knowledge among employees, customer-employee interactions, and in resource portfolios.

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