

Online Retailer vs. Click and Mortar Retailer: Who Performs Better?

Completed Research Paper

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Abstract

Retail business is characterized by different business models: pure-play model and dual channel approach, which uses both physical and online channels to reach customers. There is conflicting evidence regarding the relative value of these business models to the consumers.

We take a market valuation approach to evaluate the relative merits of both business models. We consider a panel of publicly traded US retailers and evaluate how their sales performance impacts their Tobin's q . We find that the dual channel retailers receive a market premium for their sales revenue as compared to the pure-play retailers. This higher valuation can be associated with higher customer satisfaction with dual channel firms leading to a higher intangible value as compared to the pure-play firms.

Our results have important implications for retailers as we demonstrate the value of different channels. Our work also contributes to the existing literature on online consumer retailing and multichannel research.

Keywords: Online retailing, Multichannel, E-business, Customer satisfaction, Business value of IS

Introduction

The online retail sales continue to grow at a steady pace and is expected to reach \$191 billion in 2011 and \$250 billion in 2014 from a meager \$36 billion in 2001 (Schonfeld 2010). Still it represents only a small percentage of expected retail sales of \$2.8 trillion.¹ In order to take advantage of the online medium to reach out to customers, companies have adopted different approaches. Regular brick and mortar firms i.e. firms with physical stores (e.g. Walmart, BestBuy, Blockbuster), have adopted a dual channel approach and have established an online channel along with their physical channel. On the other hand, some pure-play firms such as Amazon and Netflix use only the online channel to reach their customers and to conduct business. Anecdotal evidence of e-tailers such as Amazon.com may suggest that pure-play online retailers are always rewarded more by the market due to the merits of the online medium. However, many online retailers have failed since their initial launch due to lack of brand awareness, consumer trust, and established customer base (Prasarnphanich and Gillenson 2003). On the contrary, firms with a dual channel approach have further developed their multichannel business and many existing brick and mortar retailers continue to adopt online channel as their long term growth strategy (Wilson and Daniel 2007). Forrester finds that 70% of US online customers research products online and make purchase offline (Evans et al. 2009) which suggests that customers prefer dual channel retailers. Thus conflicting evidence exists regarding the value of different retailer business models for customers. This raises an important question as to how the stock market values the sales performance of these two – pure-play and dual channels – models followed by retailers?

Both pure play online model and dual model have advantages and disadvantages in terms of addressing customer needs. Online channel can reduce search costs of buyers (Bakos 1991) and provide companies with increased market coverage (Friedman et al. 1999). Additionally, firms can provide increased product selection using an online medium (Brynjolfsson et al. 2003; Cachon et al. 2008). The pure online model allows companies to have lower fixed costs and higher inventory turnover rates than the brick-and-mortar counterparts (Hays et al. 2005). However, lower search costs can result in higher price sensitivity and lower price dispersion (Brynjolfsson and Smith 2000). For example, prior research has shown that price is a significant factor that determines whether a customer chooses an online channel over an offline one in computer industry (Goolsbee 2001). This can reduce the revenue of firms competing online. There are additional disutilities associated with online purchase related to product evaluation, shipping and returns which can reduce the benefit of buying online (Forman et al. 2009). More than 60% consumers prefer the capability to pick up items from the stores after they make a purchase online.²

Dual firms can provide the best of both worlds. They can match up online capabilities of pure online firms by providing additional information and a wider selection of products. For example, Bestbuy.com lists several items which are available only for online purchase. Customers can be informed about a product online and its availability in a local store. This way the dual channel retailer can address customer need to inspect products, buy instantly and return conveniently to a store. Thus, an online channel can help to promote the store sells as suggested by the following quote from a former Walmart CEO.

Ninety percent of the people that are on our site are in the stores once a month. So they're coming online looking for information, for products, for services. And then in most cases they end up back in the store. So as our traffic grows we think that we will have more impact on the store's business.
– John Flemings Former CEO, Walmart.com³

Other firms have also realized the value of this complementarity. For example, Terry Lundgren, CEO of Macy's, Inc. stresses the importance of multi-channels and points out that the online channels help make \$1 billion for the company (Davidowitz 2009). However, multiple channels can also have a negative impact on the dual firms. Channel cannibalization takes place when both channels are substitutable of each other, target same customer base, and have little product or service differentiation (Deleersnyder et al. 2002). Brynjolfsson et al. (2009) find evidence of significant cross channel

¹ <http://techcrunch.com/2010/03/08/forrester-forecast-online-retail-sales-will-grow-to-250-billion-by-2014/>

² <http://blogs.forbes.com/prospornow/2011/01/24/all-online-retailers-are-not-created-equal-2/>

³ http://findarticles.com/p/news-articles/ceo-wire/mi_8092/is_20050107/wal-martcom-ceo-interview/ai_n50506625/

competition. Managing physical stores leads to additional costs associated with the inventory, space and labor which can impact their ability to execute their multichannel approach. Firms with dual channels have higher costs in store assistance and lower profits (Ofek et al. 2010). Thus, there is mixed evidence regarding the potential value of the dual channel approach for generating revenue as compared to the pure online model.

In this research we address the questions whether market evaluates the sales performance of online and dual channel retailers differently and whether the market rewards the dual firms for their multichannel approach? Answers to the questions have significant implications for practice and they may provide practitioners with useful insights in establishing new retail channels. We address the research question by empirically analyzing and comparing the market performance of retailers which follow dual model with that of firms which are pure online.

We consider a balanced panel dataset consisting of publicly traded retailers in the US between the years 2004 and 2009 and use Tobin's q as a measure of market performance to capture the intangible value associated with firm's customer centric performance. A dummy variable is used to represent the pure online firms. We control for the firm performance variables and account for unobserved firm characteristics and time effects. We find that firms following the dual approach receive an additional premium for their sales revenue over the pure online firms. As we compare this valuation with the online firms, we can attribute this premium valuation of the dual firms to their physical presence. A plausible explanation is that this is due to higher consumer satisfaction associated with the dual firms.

Our paper makes several important contributions. From a firm's perspective we answer an important question about the value of different business models for selling retail goods to consumers. The market success of firms like Amazon and Netflix may suggest that selling goods online is the best approach. However, our analysis suggests that the dual mode of operation has benefits above and beyond the expected firm performance. This additional value is due to their physical presence which can enhance customer satisfaction and the potential for customer retention. This further leads to higher market valuation. As a consequence, pure online firms should invest in measures which can compensate for the disadvantage associated with the lack of a physical channel for customer processes such as product evaluation and returns.

We contribute to the multichannel research. Previous work has focused on the benefits of online channel (Shankar et al. 2003; Tang and Xing 2001; Wallace et al. 2004) and how it leads to higher valuation of the firms (Demers and Lev 2001; Geyskens et al. 2002; Subramani and Walden 2001; Trueman et al. 2000). Key drivers for this higher performance are better information access and lower search costs due to the presence of the online channel which lead to increase in demand. We extend this literature by comparing the market valuation of dual channel companies with the pure online companies and show that a physical channel can be beneficial as it can lead to higher customer satisfaction and higher revenue. Thus, we establish the benefit of the offline channel for retailers persuading a dual strategy.

We contribute to the literature on online consumer retailing. Previous studies have suggested how consumers (Baye et al. 2006) and firms (Brynjolfsson et al. 2003; Ghose et al. 2006; Ghose et al. 2005) can benefit from the online model of reaching customers. Some recent evidence (Brynjolfsson et al. 2009; Forman et al. 2009) suggests that offline shopping is still important due its various benefits and customers may be going online for only certain products. However, current analysis is restricted to either a single product category or a single retailer. In addition, these studies measure the performance measured in terms of price or customer demand. We add to this literature by taking a market valuation approach which allows us to evaluate the effect of online and dual channel shopping across a wide variety of firms and products. We show that firms receive a higher valuation for the revenue generated through a dual channel approach. This would suggest that customers may prefer the dual channel retailers in the long run.

Literature Review

Our work draws from literature in marketing on customer satisfaction, firm value, and multichannel strategy.

There are several studies in marketing which focus on how the marketing metrics impact the value of the firm. These include unobservable metrics, such as customer satisfaction and service quality, and observable metrics such as customer acquisition, customer retention and customer equity (Gupta and Zeithaml 2006; Srinivasan and Hanssens 2009). Higher customer satisfaction leads to customer retention and increase in sales (Gupta and Zeithaml 2006). Higher customer satisfaction leads to higher returns (Fornell et al. 2006; Mittal et al. 2005) and higher Tobin's q (Anderson and Simester 2004). Literature on customer satisfaction suggests that the confirmation of the pre-purchase expectation drives customer satisfaction (Oliver 1993; Oliver 1997). When the perceived quality matches with the pre-purchase expectation, the consumer is satisfied. Product information influences consumer beliefs and expectations (Jiang and Benbasat 2007; Lightner and Eastman 2002). In a dual channel set up, there is a possibility of getting more product information as customers can visit and inspect products in a physical store. As a result, one can expect that the gap between pre-purchase expectation and the perceived quality will be lower in a dual channel setup as compared to the pure online model. Perceived service quality is the level of discrepancy between customers' service perceptions and expectations (Zeithaml and Parasuraman 2004). Service quality has been associated with higher purchase intent (Gupta and Zeithaml 2006). Customers using dual firms may use both online and offline channel for shopping. Such customers are expected to initiate more contact with the firm. Due to higher expected service quality customers are more likely to buy from dual firms.

Pure-play online and brick-and-click business models have been studied separately in the prior IS and marketing literature. The main advantages of the online channel are lower start-up cost, wider connectivity, and economies of scale. However, as pure-play online firms usually have lower price dispersion, they have to differentiate themselves in terms of branding, awareness, and trust (Brynjolfsson and Smith 2000). High shipping and handling costs, low customer service, loss of privacy and security, and lack of in-store shopping experience are the main limiters of pure-play business model (Grewal et al. 2004). Different from pure-play online firms, companies with dual channels enjoy cross-channel complementarities. An advantage of such business model is the expansion of customers' point of contact beyond the physical store (Geyskens et al. 2002). The increased exposure provides companies with more business opportunities and hence help expand market coverage (Friedman et al. 1999). Furthermore, empirical studies have shown that dual channel retailing can enhance customer satisfaction and foster customer loyalty as compared to a physical channel (Shankar et al. 2003; Wallace et al. 2004). E-commerce companies with an offline presence can also enhance firm's credibility (Tang and Xing 2001). Apart from these, market study also shows that cross-channel shoppers are wealthier and more willing to spend and usually purchase a wider variety of products (Johnson et al. 2004). Kumar and Venkatesan (2005) and Thomas and Sullivan (2005) show that multichannel shoppers lead to higher profits. Complementarity between online and physical channel has been observed in services as well. Hitt and Frei (2002) show that the existence of dual channels can increase the retention rate of customers in the context of PC banking. Campbell and Frei (2010) find that introduction of online banking service leads to an increase in overall banking service consumption and upsurge in total transaction volume.

Addition of an online channel to a traditional channel can also lead to negative demand effects (Geyskens et al. 2002). The Internet channel can lead to a demand shift for a company without any additional sales (Alba et al. 1997). Targeting the same customer segment and offering similar products, online stores and physical stores may face cross-channel competition (Brynjolfsson et al. 2009). However, with careful market positioning, the complementarities of dual channels are able to offset the negative impact of cross-channel competition to some extent. Nevertheless, empirical study shows that channel complementarities are not immediate and they may take some time to occur (Avery et al. 2009).

In summary, prior literature has shown that a dual channel retailer may provide higher customer satisfaction as compared to a pure online retailer. However, this depends on the actual implementation and it is not clear whether or not the market recognizes this effect. The relative market valuation of the sales performance of online and dual firms is an open and managerially significant question.

Research Model

Our objective is to investigate how the market rewards different types of retailer business models involving online channels. To measure the market performance, various market valuation measures such as market capitalization, ROI and Tobin's q have been used in prior literature. Tobin's q , which captures the intangible market value, is found to be more informative than traditional return of investment (Chen and Lee 1995). Prior literature has shown that Tobin's q has several advantages over accounting based measures, which are myopic, intolerance to risk, and susceptible to temporary disequilibrium effects (Amit and Livnat 1989; Bharadwaj et al. 1999; Fisher and McGowan 1983; Montgomery and Wernerfelt 1988). In IS research, Tobin's q has been widely used to analyze the intangible IT value (Bharadwaj et al. 1999; Chari et al. 2008; Tam 1998; Tanriverdi 2006). The variable is found to be useful to capture the strategic flexibility and intangible value of IT contribution to corporate performance (Bharadwaj et al. 1999). Tobin's q has been used to measure the market value of customer satisfaction (Anderson and Simester 2004) as well as the value of adding an online channel (Geyskens et al. 2002).

Firms selling goods online continuously make improvements to their website to address the information needs of customers (Mulvenna et al. 2000). Firms with a dual channel have to also make efforts on back end integration to synchronize their online and offline channels.⁴ Additionally, if they are going to provide a capability to determine in store availability, pick up and/or return of certain products then they have to ensure that their systems can coordinate these activities across online and offline channel. All the related technology investments provide intangible value to the firm which can be captured well using Tobin's q as a measure of market performance. Additionally, the complementarities of dual channel only take place in a long run (Avery et al. 2009). Therefore, we choose Tobin's q as our core dependent variable.

Our objective is to determine whether the market values sales generated by pure-play online firms and dual channel retail firms differently. Several studies have directly used measures such as customer satisfaction available from the ACSI to represent how customers engage with firms and its impact on firm's performance. However, this database does not report the customer satisfaction value for many publicly traded retailers in our sample. Sales represent both repeat customers and new customer acquisitions. Previous studies (refer to Gupta and Zeithmal, 2006) show that higher customer satisfaction results in customer retention and higher revenue. So our sales variable should capture the customer satisfaction outcome for the past customers. The sales variable also captures information about new customer acquisitions. After controlling for the growth of the firm, this serves as a proxy for the expected customer satisfaction and retention for these new customers. Large firms tend to have higher sales. Size of the firm is expected to have positive impact on firm's performance due to economies of scale (Hitt et al. 1997). In order to control for the effect of size, we normalize the sales variable with the size of the firm. Thus, for a given size of the firm, more sales would indicate either more purchases by the existing customers or purchases by new customers or a combination of both. We use an "online" dummy variable to indicate whether a firm is a pure-play online firm or a dual channel firm. We include an interaction variable between online and sales to analyze the differential impact of sales. If the market values the differences in the way customers engage with the two models then the interaction term should capture these differences. Prior literature (Fosfuri and Giarratana 2009) has used sales variable to represent the customer demand. We use several control variables that can potentially influence Tobin's q . These are explained below. We also use a lagged Tobin's q term to account for the carryover effect of the past market evaluation. Finally we also control for the temporal effects and firm specific effects using time dummies and firm dummies. Tobin's q for a firm j at time t can be expressed as

⁴ JupiterResearch 2007. "U.S. Online Retail Executive Survey," March 30.

$$\begin{aligned}
TobinQ_{jt} = & \beta_0 + \beta_1 TobinQ_{jt-1} + \beta_2 OpMargin_{jt} + \beta_3 CapInt_{jt} + \beta_4 R\&DInt_{jt} \\
& + \beta_5 MKTGInt_{jt} + \beta_6 SGAEInt_{jt} + \beta_7 Growth_{jt} + \beta_8 \ln(Sales_{jt}) \\
& + \beta_9 Online_j \times \ln(Sales_{jt}) + \beta_{10} Online_j + \beta_{11} Rec_t + \beta_{12} Brand_{jt} \\
& + \beta_{13} HHI_{jt} + \sum_{i=1}^{N_f-1} \delta_i Firm_i + \varepsilon_{jt}
\end{aligned} \tag{1}$$

In this research, we use the Tobin's q approximation formula initially proposed by Chung and Pruitt (1994) to construct Tobin's q. It is commonly used measure of Tobin's q (Chari et al. 2008)

OpMargin_{jt} Operating Margin is defined as net incomes divided by sales. As Tobin's q is a measure of future growth potential, operating margin should have a positive relationship with the measure. Operating margin has been used as control variable in a number of studies (Fosfuri and Giarratana 2009; Rao et al. 2004).

CapInt_{jt} Capital intensity is defined as total assets divided by sales. It measures the amount of money invested in assets so as to produce a dollar of sales. If a firm has capital intensity higher than the industry standard, it implies that its investment in labor and machines is excessive and the firm is not efficient in generating sales. If capital intensity is too high, firms may not have sufficient resources for other intangible investment (Bharadwaj et al. 1999). This may reduce Tobin's q. Capital intensity has been used as control variable in a number of prior studies (Bharadwaj et al. 1999; Chari et al. 2008).

R&DInt_{jt} R&D intensity is defined as R&D expenses divided by total sales. This variable indirectly reflects the research capability of a firm. R&D can generate more domain knowledge that leads to better product design and superior service. It is a strategic activity that can help generate intangible value. Therefore, higher R&D intensity implies higher potential to generate higher quality of products or superior service in the future. R&D intensity has been used as control variable in a number of studies (Bharadwaj et al. 1999; Chari et al. 2008; Fosfuri and Giarratana 2009; Rao et al. 2004).

MKTGInt_{jt} Marketing intensity is defined as marketing expenses divided by total sales. This measure reflects a firm's capability in brand management and product promotion. Marketing can enhance product awareness, generate brand equity and goodwill, and foster customer loyalty. These, in turn, create higher intangible value which should lead to higher Tobin's q. Marketing intensity has been used as a control variable in several prior studies (Bharadwaj et al. 1999; Chari et al. 2008; Fosfuri and Giarratana 2009; Rao et al. 2004).

SGAEInt_{jt} Not all firms report R&D and marketing expenses in their financial reports. Instead, some companies include them in selling, general & administrative expenses (SGAE). If a firm does not report R&D and marketing expenses, we follow the common approach adopted in prior literature and treat them as zero (Bharadwaj et al. 1999; Chari et al. 2008). To control for the unreported R&D intensity and marketing intensity, we take into account the SGA Intensity, which is defined as the ratio of SGAE minus R&D expenses and marketing expenses, and the sales.

Growth_{jt} Annual sales growth is defined as percentage change in sales from previous year. A high annual sales growth implies that the company uses an appropriate strategy to make profits. If the growth momentum is maintained, the company is likely to earn even more in the future. Therefore, sales growth is indicative of potential future growth. This parameter has been used as control variable in a number of prior studies (Fosfuri and Giarratana 2009; Nath and Mahajan 2008; Rao et al. 2004).

Rec_t Recession dummy variable flags the recession period. In recession, there is remarkable reduction in consumer demand because customers tend to remain solvent in the period of financial difficulty (Bernanke 1981). Also, firms tend to reduce both fixed investment and inventory (Hall 1993). In order to increase cash flow, some financially constrained firms even forsake market expansion in economic slumps (Chevalier and Scharfstein 1996). Therefore, it is expected that recession may drive down Tobin's q, which represents future growth potential. According to National Bureau of Economic Research (NBER), from 2004-2009, there was an 18-month recession starting from December 2007. We mark years 2008 and 2009 as recession years.

Brand_{jt} Retailers selling their own brand are organized differently as compared to the regular retailer. For example, their product variety is lower as compared to the regular retailers. Also, they are responsible for bringing the products to the stores. Additionally, customers buying directly from these retailers may exhibit different characteristics. In the view of these differences, we control for retailers selling only their own brand using the brand dummy variable.

HHI_{jt} Market concentration is the Herfindahl-Hirschman Index (HHI) based on the initial 2 and 4 digits of North American Industry Classification System (NAICS).

$$HHI_{jt} = \sum_{i=1}^{N_{jt}} s_{it}^2$$
, where N_{jt} is the number of firms in the same industry as firm j in year t and s_{it} is the market share based on sales of firm i in year t

Prior studies have consistently shown that industry structure is an important control in analysis of firm performance (Bharadwaj et al. 1999; Bharadwaj et al. 2007; Melville et al. 2007; Thatcher and Pingry 2004; Zhu and Kraemer 2002). We compute industry concentration using Herfindahl-Hirschman Index (HHI) based on the initial 2 digits of North American Industry Classification System (NAICS).

Firm_i We use firm dummies to address any time invariant unobservable characteristics of firms.

Endogenous Sales

Our main model uses sales variable. Prior studies have shown that marketing strategies have direct impact on sales, which later translate into firm and shareholder value (Srinivasan and Hanssens 2009). Advertising and intangible value have positive impact on sales, which generate profits and subsequently lead to enhanced firm value (Joshi and Hanssens 2010). Sales is endogenous and we have to correct for the resulting endogeneity bias in our main model. Therefore, we model sales separately. Current sales depend on sales in the previous year, advertising expenditure, product improvement, and customers' per capital disposable income (Rao 1972). To forecast sales, it is suggested that we can use unadjusted SGAE, index of consumer sentiment, and firm specific effects (Kesavan et al. 2010). Sales for a firm j at time t can be expressed as.

$$\begin{aligned} \ln(\text{Sales}_{jt}) = & \alpha_0 + \alpha_1 \ln(\text{Sales}_{jt-1}) + \alpha_2 \ln(\text{SGAE}_t) + \alpha_3 \text{ICS}_t + \alpha_4 \text{Online}_{jt} + \alpha_5 \text{Rec}_t \\ & + \alpha_6 \text{Brand}_{jt} + \sum_{i=1}^{N_f-1} \delta_i \text{Firm}_i + \varepsilon_{jt} \end{aligned} \quad (2)$$

$\ln(\text{Sales}_{jt})$: log value of sales of firm j in year t

$\ln(\text{SGAE}_{jt})$: log value of selling, general administrative expenses of firm j in year t

ICS_t : Average monthly index of consumer sentiment in year t

Online_j : Dummy variable that indicates whether firm j is a pure online firm (1: yes; 0: no)

Rec_t : Dummy variable that indicates whether recession occurs in year t (1: yes, 0: no)

Brand_j : Dummy variable that indicates whether firm j is selling its own brand (1: yes; 0: no)

N_f : Total number of unique firms in our sample

Firm_i : Firm fixed effect dummy variable

Data and Estimation

Since we are interested in the market valuation of retailers, we only consider publicly traded retail firms. We include only US firms traded on NYSE and Nasdaq because online shopping is more mature in US than other international countries. Furthermore, the inclusion of firms traded on major stock exchanges

can eliminate thinly traded stocks, which may have extremely low trading volume and are radically responsive to relevant news announcements. We have identified retailers from several sources such as Dow Jones Retail Titan, S&P Retail Index, S&P 1500 Specialty Retail Index and Top 500 Internet Retailers suggested by Internet Retailer. We received the accounting data and market specific data from Standard & Poor's Compustat North America and Center for Research in Security Prices (CRSP) respectively. We consider only those companies which have accounting data available for a period from 2004-2009. Further, we only consider those firms that are selling physical products to consumers. So we leave out online and dual retailers in the travel business. Some firms, for instance, Epson, HP, Dell, Apple, and IBM, may collaborate with other online retailers for marketing their products. In our study, we have eliminated all those firms. Our final data consists of 90 firms (15 pure-play online firms and 75 dual channel firms) and 540 firm years (i.e. 90 firms in 6 years). Table 1 below shows the sample statistics. The correlation matrices are as shown in Tables 2 & 3. In order to address the issue of multi-collinearity we group mean center the variables growth and sales in our main model.

Table 1. Sample Statistics					
Variable	Obs	Mean	SD	Min	Max
Sales	540	12009.91	39625.19	18.11	408152.00
Unadjusted SGAE	540	2544.41	7407.30	14.59	79372.00
TobinQ	540	0.70	0.48	0.04	5.58
Op. Margin	540	0.03	0.08	-0.83	0.32
Cap. Intensity	540	2.32	1.08	0.74	8.84
R&D Intensity	540	0.01	0.02	0	0.20
Marketing Intensity	540	0.04	0.06	0	0.72
SGAE Intensity	540	0.25	0.10	0.04	0.60
Growth	540	10.28%	27.10%	-39.10%	459.29%
ICS	540	81.11	11.80	63.75	95.20
Online	540	0.18	0.38	0	1
Recession	540	0.33	0.47	0	1
Brand	540	0.42	0.49	0	1
HHI	540	0.08	0.08	0.01	0.23

	$\ln(\text{Sales}_{jt})$	$\ln(\text{SGAE}_{jt})$	ICS_t	Online_{jt}	Rec_t	Brand_{jt}
$\ln(\text{Sales}_{jt})$	1	0.97	-0.06	-0.41	0.04	-0.40
$\ln(\text{SGAE}_{jt})$	0.96	1	-0.08	-0.42	0.06	-0.33
ICS_t	-0.07	-0.09	1	0.00	-0.97	0.00
Online_{jt}	-0.38	-0.40	0.00	1	0.00	-0.10
Rec_t	0.04	0.06	-0.83	0.00	1	0.00
Brand_{jt}	-0.42	-0.33	0.00	-0.10	0.00	1

Lower triangle is Spearman correlation matrix and upper triangle is Pearson correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) TobinQ_{jt}	1	0.18	-0.08	0.14	0.15	-0.18	0.51	-0.07	-0.04	0.24	-0.24	0.04	-0.01
(2) OpMargin_{jt}	0.32	1	0.19	-0.22	-0.19	-0.18	0.31	0.08	0.26	-0.17	-0.18	0.08	-0.22
(3) CapInt_{jt}	-0.18	0.25	1	0.49	0.10	0.42	-0.02	-0.09	-0.02	0.06	0.04	0.12	-0.23
(4) R\&DInt_{jt}	0.07	0.04	0.06	1	0.31	0.15	-0.07	-0.09	-0.17	0.49	0.05	-0.09	-0.02
(5) MKTGInt_{jt}	-0.14	0.03	0.30	0.23	1	0.03	0.06	-0.20	-0.30	0.47	-0.06	0.21	0.06
(6) SGAEInt_{jt}	-0.26	-0.01	0.50	-0.07	0.16	1	-0.16	-0.41	-0.29	-0.12	0.09	0.33	-0.24
(7) Growth_{jt}	0.40	0.53	-0.02	0.07	-0.07	-0.14	1	-0.03	-0.01	0.00	-0.29	0.06	-0.03
(8) $\ln(\text{Sales}_{jt})$	0.00	-0.09	-0.19	-0.09	-0.16	-0.43	-0.09	1	0.51	0.00	0.05	-0.48	0.27
(9) $\text{Online}_{jt} \times \ln(\text{Sales}_{jt})$	0.00	0.03	-0.13	0.00	-0.06	-0.21	-0.03	0.41	1	0.00	0.03	-0.15	-0.02
(10) Online_{jt}	0.11	-0.15	-0.20	0.47	0.29	-0.16	-0.15	-0.02	0.02	1	0.00	-0.10	0.26
(11) Rec_t	-0.28	-0.18	0.05	-0.01	-0.04	0.08	-0.45	0.05	0.01	0.00	1	0.00	0.08
(12) Brand_{jt}	-0.07	0.26	0.30	-0.05	0.24	0.34	0.07	-0.50	-0.12	-0.10	0.00	1	-0.41
(13) HHI_{jt}	-0.13	-0.38	-0.25	-0.11	-0.03	-0.24	-0.29	0.26	0.01	0.17	0.32	-0.34	1

Lower triangle is Spearman correlation matrix and upper triangle is Pearson correlation matrix

Identification and Estimation

The above set of simultaneous equations represents a triangular system and has been addressed by authors in classical econometrics (Greene 1999; Hausman 1975; Lahiri and Schmidt 1978). It can be represented as follows

$$TobinQ = f(Sales, Sales \times Online, X1, \epsilon_{jt})$$

$$Sales = f(X2, \vartheta_{jt})$$

In this construction, sales value is endogenous while variables X1-X2 are exogenous. Identification comes from the fact that sales are completely determined by the exogenous variables such as past sales, marketing expense and consumer sentiment. Sales, in turn, influence the market valuation. Thus, the rank and order conditions are satisfied for identification purposes (Greene 2003). Lahiri and Schmidt (1978) have shown that the parameter estimates for a triangular system can be fully identified using GLS. Hausman (1975) shows that the likelihood function for a triangular system is the same as for seemingly unrelated regressions. Zellner (1962) has addressed triangular systems from a Bayesian point of view, and shows that the posterior probability distribution function is the same as in a seemingly unrelated regressions setting. Triangular systems have been estimated in the management literature using the classical approach (Elberse and Eliashberg 2003; Godes and Mayzlin 2004; Kuruzovich et al. 2008). For triangular systems both 2SLS and 3SLS are consistent but 3SLS is more efficient (Lahiri and Schmidt 1978). We have further verified our results using a 2SLS model and the qualitative results are similar.

Results

Table 4 shows the research results for the Tobin's q model. The coefficient for online dummy variable is significant and negative. Ceteris paribus, this suggests that the online firm has a lower Tobin's q. The coefficient for the interaction term between online dummy and the sales variable is also negative and significant. This suggests that the market value increases at a higher rate with sales for the dual channel retailers. The coefficient for sales is negative and significant. Sales is correlated with the size of the firm (Bharadwaj et al. 2007; Chen and Bharadwaj 2009; Pentina et al. 2009). Large firms have inertia which can impede the adoption of innovation (Chandy and Tellis 2000) and have lower Tobin's q. As expected the coefficients of operating margin and growth are positive and significant. Similarly the coefficient for SGAE intensity is positive and significant which confirms that a higher sales expenditure results in higher performance and higher market valuation. However, the coefficient of R&D is positive but insignificant. This could be due to the fact that many retailers do not report R&D expense separately but rather report it as SGAE. Capital intensity, on the other hand, shows significantly negative impact on Tobin's q. Firms with high capital intensity are more likely to take away resources from intangible investments (Bharadwaj et al. 1999). Therefore, the higher the capital intensity, the lower is the Tobin's q. The coefficient for brand dummy is negative and significant. This suggests that the retailers selling their own brand in general have a lower market valuation after controlling for other parameters. Also, the coefficient for the recession dummy is negative and significant suggesting the general market behavior of lower valuations in times of recession. The coefficient for the lagged Tobin's q is positive and significant which suggests that there is indeed a carryover effect in market valuation. Finally the coefficient of HHI is positive and significant which suggests that lower intensity of competition leads to a higher market intensity.

Table 4. Panel Data Regression Results for Tobin's q Model	
Variable	Coeff (Std. Error)
Lagged TobinQ	0.16*** (0.03)
OpMargin	0.67** (0.28)
CapInt	-0.20*** (0.03)

<i>R&Dint</i>	1.58 (2.26)
<i>MKTGInt</i>	-1.12 (0.91)
<i>SGAEInt</i>	1.03** (0.50)
<i>Growth</i>	0.68*** (0.05)
<i>HHI</i>	3.10** (1.20)
<i>Online</i>	-2.52*** (0.46)
<i>ln(Sales)</i>	-0.37*** (0.08)
<i>Rec</i>	-0.06** (0.03)
<i>Brand</i>	-1.20*** (0.22)
<i>Online×ln(Sales)</i>	-0.25** (0.13)
<i>Const</i>	0.84*** (0.23)
<i>Adj R²</i>	0.7715

*, **, *** Statistically significant at 10%, 5%, and 1% respectively

Table 5 shows the research results for the sales model. The coefficient for the lagged sales variable is positive and significant. This suggests that the current sales is positively correlated with past sales. The coefficient for ICS is positive and significant which indicates that the sales performance depends on the consumer sentiment. The coefficient for online is positive and significant which suggests that online sales leads to a higher revenue after controlling for other parameters. This suggests a higher growth rate for online sales. This can be attributed to the increase in the internet usage as well as the small volume of online sales. The coefficient for brand is negative and significant which suggests that retailer selling their own brand have lower sales after controlling for other parameters.

Table 5. Panel Data Regression Results for Sales Model	
Variable	Coeff (Std. Error)
<i>ln(Sales_{jt-1})</i>	0.17*** (0.03)
<i>ln(SGAE_{jt})</i>	0.78*** (0.03)
<i>ICS_t</i>	0.0013 (0.0013)
<i>Online_{jt}</i>	0.91*** (0.09)
<i>Rec_t</i>	0.05 (0.06)
<i>Brand_{jt}</i>	-0.23*** (0.04)
<i>Const</i>	0.73** (0.32)
<i>Adj. R²</i>	0.9981

*, **, *** Statistically significant at 10%, 5%, and 1% respectively

Robustness Check

In our empirical tests, we match firms according to the industry classification such that there is at least one pure-play online and one dual channel firm in the same industry classification. However, for some mass merchant retailers, such as, Wal-mart, Target, and Amazon, they sell products in different categories. As a robustness check, we eliminate all the mass merchants from our sample data and redo the analysis. The total number of unique firms reduces from 90 to 75 resulting in 450 firm-years (75 firms in 6 years). In the Tobin's q model, apart from coefficients used above, we also control for nature of goods sold by retailers. Nelson (1974) classified goods into search and experience. Search items include goods such as jewelry, furniture, and apparels whereas experience items include goods such as electric appliances and food. We follow the classification of Nelson (1974) and include "search" as a dummy variable if a firm sells "search" items. Except lagged Tobin's q and Tobin's q, all independent variables in the Tobin's q model have correlation coefficients less than 0.6. Also, the VIFs are all less than 4. These imply that there is no significant multicollinearity. The result of Tobin's q model is as shown in Table 6. The results are similar to that obtained using the original sample. Due to page restriction, we do not include sample statistics, correlation matrices, and results of sales model.

Variable	Coeff (Std. Error)
<i>Lagged TobinQ</i>	0.10*** (0.04)
<i>OpMargin</i>	0.39 (0.31)
<i>CapInt</i>	-0.23*** (0.03)
<i>R&Dint</i>	1.30 (2.36)
<i>MKTGInt</i>	-1.71* (0.95)
<i>SGAEInt</i>	1.14** (0.54)
<i>Growth</i>	0.81*** (0.06)
<i>HHI</i>	1.94 (1.60)
<i>Online</i>	0.21 (0.45)
<i>ln(Sales)</i>	0.02 (0.38)
<i>Rec</i>	-0.09*** (0.03)
<i>Brand</i>	0.28 (0.42)
<i>Search</i>	-0.31 (0.44)
<i>Online×ln(Sales)</i>	-1.26** (0.52)
<i>Const</i>	0.89*** (0.29)
<i>Adj R²</i>	0.7845

*, **, *** Statistically significant at 10%, 5%, and 1% respectively

Discussion and Conclusion

We study the market valuation of online and dual channel retailers using a panel of publicly traded US retailers. We evaluate firm's Tobin's q as a function of the type of retailer (i.e. pure online model or dual channel model), their sales performance as well as the interaction between the two. We control for the usual drivers of Tobin's q value. We find that after controlling for various parameters, online firms can expect a lower market valuation. We also find that the market valuation increases at a higher rate with sales for the dual firms. This suggests that the market places a premium on the valuation of the dual firms and values the revenue generated by these firms more than the revenue generated by the online firms. As the dual firms have similar online capabilities as the pure online firms, this premium can be attributed to their physical presence. There is anecdotal and empirical evidence to suggest that customers may prefer to ultimately buy from the store for certain type of products. This may suggest that they are receiving higher customer satisfaction from the dual firms which maybe driving the higher market valuation.

Our research has several important implications. First, we show that the market valuation of few firms like Amazon and Netflix may suggest that market only rewards the pure online model of selling physical products to customers. However, our results show that dual firms are rewarded by the market for their physical presence. While the Internet is a channel of information with reduces search costs, there are limitations when it comes to actual purchase and return of physical products. In that sense, it serves as a complement and not as a substitute for the sales of physical goods. Note that consumer preference for a channel may depend on the product category. However, from a managerial perspective, our results suggest that pure online firms should invest in customer satisfaction measures to compensate for the lack of their physical presence. This could involve investment in technologies that provide richer product specific information to the customers and assists their decision making process. Leading online companies like Amazon already provide much richer information to customers through useful online reviews and recommendations. They also enable better customer assessment of features through the use of images and videos. These methods can reduce the gap in the perceived and actual quality of products which in turn will minimize product returns for these companies. There is huge variance in the adoption of these measures by the online channel. One possible reason could be the lack of awareness among retailers regarding the potential benefit of these technologies. Our study further makes a case for the retailers to look at these measures to improve customer satisfaction. Second, these online companies need to improve customer satisfaction by improving their merchandise pickup and returns process. One way to handle this could be by allowing these through a third party with a physical presence. For example, Amazon is planning to use 7 eleven stores as an alternate way in which customers can pick their merchandise.⁵

We conduct a posterior analysis using return shopper data retrieved from top500guide.com. We find that dual channel firms in our sample generally have higher rate of return shoppers than pure-play online firms. In a sample t-test based on the sample data published by top500guide.com from 2008 to 2011, online firms with removal of outliers Amazon and Netflix have significantly lower rate of return shoppers in 2010 and 2011 than the dual channel counterparts at 5% and 10% levels, respectively. Customer satisfaction is positively related to repeated shopping. Thus t-test results further lend support to our findings that dual channel firms may be rewarded for their sales due to higher customer satisfaction.

Our study adds to the literature on online consumer retailing. Recent work in this literature has suggested that the online channel faces a significant competition from offline channel because of the additional disutilities associated with online shopping. Our research adds to this stream by giving a market perspective on these different models. Our results are significant because they provide an industry wide analysis. Additionally, it shows that the market correctly recognizes the value of the dual model of operation in the retail business. The results also add to the existing multichannel research. Previous work has always compared the merits of dual channel over the physical channel. Further, the results show that the dual model has benefits over pure online channel as well and provides evidence of how this can be attributed to the sales generated from a dual business model.

⁵ <http://www.engadget.com/2011/09/04/amazon-7-eleven-team-up-to-bring-delivery-convenience-to-your-c/>

There are several limitations in this research. First, we only focus on B2C retailers listed in the US. The primary reason for selecting this particular segment is that online shopping is more mature in the US than in other countries. However, we expect the advantages and disadvantages associated with online and dual firms would be similar in other places provided the models adopted are similar to the ones in the US. Second, we classify companies into a broad category of either pure online or companies with physical stores and e-commerce Web sites. However, these firms can also differ in their capabilities to attract and retain customers. For example, the online recommendation capability would be different for different firms. Similarly, the web design, capabilities, and reputation would be different for different firms. Dual firms may differ in the way they service customers for different channels. While we do not account for these individual differences, we do control for their effect using the firm-specific fixed effects. However, future studies should explicitly model the impact of these features on the market valuation. We also use an aggregated sales measure to evaluate performance. However, we do not account for the intensity of online and offline interaction of the customers dealing with the dual model companies. For example, some customers could be buying online and picking up from stores. Other customers could be just searching for information online and buying from the physical store. Future research should investigate the effect of this interaction on the market valuation of firms.

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