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# Price Levels and Price Dispersion Within and Across Multiple Retailer Types: Further Evidence and Extension

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*In this article, the authors develop hypotheses on how prices and price dispersion compare among pure-play Internet, bricks-and-mortar (traditional), and bricks-and-clicks (multichannel) retailers and test them through an empirical analysis of data on the book and compact disc categories in Italy during 2002. Their results, based on an analysis of 13,720 price quotes, show that when posted prices are considered, traditional retailers have the highest prices, followed by multichannel retailers, and pure-play e-tailers, in that order. However, when shipping costs are included, multichannel retailers have the highest prices, followed by pure-play e-tailers and traditional retailers, in that order. With regard to price dispersion, pure-play e-tailers have the highest range of prices, but the lowest standard deviation. Multichannel retailers have the highest standard deviation in prices with or without shipping costs. These findings suggest that online markets offer opportunities for retailers to differentiate within and across the retailer types.*

**Keywords:** *pricing; digital economy; e-commerce; information economics; Internet marketing*

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Research in Internet marketing has increasingly focused on the issue of pricing. In the initial years of the Internet, it was widely predicted that the Internet would lead to a frictionless economy in which prices continually

decrease and converge to perfect competition levels (e.g., Alba et al. 1997; Bakos 1997). However, a growing number of theoretical and empirical studies have found that price dispersion is persistent among e-tailers and is no lower online than offline (e.g., Brynjolfsson and Smith 2000; Pan, Ratchford, and Shankar 2003a, 2003b; Scholten and Smith 2002; Shankar, Pan, and Ratchford 2003). Customers not only have lower search costs for information about prices but also have lower search costs for nonprice information (Degeratu, Rangaswamy, and Wu 2000; Smith 2002). These low search costs influence prices of the same item on the Internet and other channels. Managers are interested in better understanding pricing in different channels.

For a growing number of product markets, the competitive landscape has evolved from a predominantly physical marketplace to one that also includes the electronic marketplace (Parasuraman and Zinkhan 2002; Varadarajan and Yadav 2002; Watson, Berthon, Pitt and Zinkhan 2000). With the emergence of the Internet as a significant channel, we find three types of retailers, pure-play Internet e-tailers, bricks-and-mortar or traditional or offline retailers, and bricks-and-clicks or multichannel retailers, who coexist well for most product categories (Zettelmeyer 2000).

There are important research questions on pricing strategies of these retailers. For the same item, are there any differences in the price levels across the three types of retailers? Is there significant price dispersion within each type of retailer? Are the levels of price dispersions different across the three types of retailers? The answers to these questions have implications for price competition and

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pricing strategies for these retailers. Price levels across the three types of retailers reflect the competition *across* different channels, whereas price dispersion reflects the competition *within* each channel. For example, if price levels at pure-play e-tailers and those at traditional retailers are lower than those at multichannel retailers, then it might suggest that multichannel retailers can effectively compete by differentiating themselves from other types of retailers through the combined benefits of convenient access to information, physical inspection, pickup, and return of merchandise. Similarly, if price dispersion is larger for pure-play e-tailers than it is for traditional or multichannel retailers, it might imply that pure-play e-tailers can effectively differentiate themselves from one another on nonprice dimensions.

Prior research on price levels has examined price differences between either pure-play Internet e-tailers and bricks-and-mortar retailers (e.g., Brynjolfsson and Smith 2000) or between pure-play e-tailers and bricks-and-clicks e-tailers (e.g., Pan, Ratchford, and Shankar 2002; Pan, Shankar, and Ratchford 2002; Tang and Xing 2001). They have not compared all the three types of retailers. It is important to understand the differences across all three types of retailers. The explanations for price levels in any two types of retailers may depend on price level in the third retailer type. For example, the finding that multichannel retailers have higher posted prices than pure-play e-tailers (Pan, Ratchford, and Shankar 2002; Pan, Shankar, and Ratchford 2002; Tang and Xing 2001) can be better explained if it turns out that traditional retailers have even higher posted prices, thereby allowing multichannel retailers to be positioned between pure-play and traditional retailers.

By knowing the relative levels of prices and price dispersions across these types of retailers, we can gain insights into the nature of within- and across-retailer type competition. From these insights, retailers can make better decisions on channel presence (single or multichannel) and channel pricing. A comparison of price levels and price dispersion among the three types of retailers can address the following questions. Do pure-play e-tailers compete more with bricks-and-clicks e-tailers than they do with bricks-and-mortar retailers? Can a multichannel retailer differentiate itself from other multichannel retailers on nonprice dimensions? Both retailers and manufacturer can use the answers to these questions to better formulate their pricing strategies.

Understanding the differences in prices with and without shipping costs across the three types of retailers is also managerially important. For example, a pure-play e-tailer could have a lower posted price than a multichannel retailer, but a higher full price when shipping costs are included. If this is the case, then a multichannel retailer can compete more effectively by highlighting its lower full price in its communication to buyers.

In this article, we address the above questions and gaps in prior research. We briefly review the research on price levels and price dispersion in the online and offline environments and develop hypotheses on the differences in price levels and price dispersion among pure-play, traditional retailers, and multichannel retailers. We test these hypotheses using data on two product categories, books and compact discs (CDs) from traditional, pure-play Internet, and multichannel retailers in Italy across a 5-week period during March-April 2002, comprising 13,720 price quotes.

The results show that when posted prices are considered, traditional retailers have the highest prices, followed by multichannel and pure-play e-tailers, in that order. However, when shipping costs are included, multichannel retailers have the highest prices, followed by pure-play e-tailers and traditional retailers, in that order. With regard to price dispersion, pure-play e-tailers have the highest range of prices, but the lowest standard deviation. Multichannel retailers have the highest standard deviation in prices with or without shipping costs. We discuss the managerial implications based on these results.

## RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

Much prior research has focused on the levels of prices and price dispersion online versus offline, and not across the three types of retailers (see Pan, Ratchford, and Shankar 2003a, 2003b for a detailed review). Tables 1 and 2 offer summaries of the different studies on price levels and price dispersion, including our study. Some studies (e.g., Brown and Goolsbee 2002; Brynjolfsson and Smith 2000; Morton, Zettelmeyer, and Risso 2001) found lower prices and price dispersion online than offline. Other studies (e.g., Bailey 1998; Clay, Krishnan, Wolff, and Fernandes 2002; Erevelles, Rolland, and Srinivasan 2001) found equal or higher prices and price dispersion online, which is conceptually supported by related studies (e.g., Degeratu et al. 2000; Lal and Sarvary 1999; Lynch and Ariely 2000; Shankar, Rangaswamy, and Pusateri 2001).

We develop hypotheses first on the relative price levels and next on the relative price dispersion across the three types of retailers. We consider the context of our data, namely, the markets for books and CDs in Milan, where relevant.

### Price Levels

Price levels at the three types of retailers may depend on several factors including channel-specific price sensitivity, the stage of development of the Internet channel, Internet reach, reduction of channel conflict, the extent of

**TABLE 1**  
**Summary of Selected Research on Price Levels in Online and Offline Environments**

<i>Empirical Analysis</i>	<i>Subject of Analysis</i>	<i>Results</i>
Bailey (1998)	Prices of books, CDs, and software sold through Internet and traditional channels, 1996-1997	Prices higher on the Internet
Brynjolfsson and Smith (2000)	Prices of books and CDs sold through Internet and traditional channels, 1998-1999	Prices lower online
Morton, Zettelmeyer, and Risso (2001)	Prices of cars	Prices lower online
Erevelles, Rolland, and Srinivasan (2001)	Prices of vitamins	Prices higher online
Tang and Xing (2001)	Prices of DVDs	Prices lower for online e-tailers than multichannel retailers
Clay, Krishnan, Wolff, and Fernandes (2002)	Prices of books sold online and offline	Prices similar online and offline
Brown and Goolsbee (2002)	Prices of insurance services	Prices lower online
Pan, Ratchford, and Shankar (2002)	Prices of books, CDs, DVDs, desktop, laptop, software, electronics, Personal Digital Assistants (PDAs)	Prices lower for pure-play e-tailers than bricks-and-clicks e-tailers for CDs, DVDs, desktop, and laptop computers. Similar for PDAs and electronics. Higher for pure-play e-tailers for books and software.
Pan, Shankar, and Ratchford (2002)	Perceived price levels of apparel, gifts and flowers, health and beauty, home and garden, sports and outdoors, computer hardware, consumer electronics, and office supply	Perceived price levels lower for pure-play e-tailers than for bricks-and-clicks e-tailers
Ancarani and Shankar (this article [2004])	Comparison of price levels and price dispersion across three types of retailers, pure-play (Internet only), bricks-and-mortar (traditional), and bricks-and-clicks (multichannel)	When posted prices are considered, traditional retailers have the highest prices, followed by multichannel and pure-play e-tailers, in that order. However, when shipping costs are included, multichannel retailers have the highest prices, followed by pure-play e-tailers and traditional retailers, in that order.

**TABLE 2**  
**Summary of Selected Research on Price Dispersion in Offline and Online Environments**

<i>Study</i>	<i>Subject of Analysis</i>	<i>Results</i>
Bailey (1998)	Prices for books, CDs, and software sold through Internet or traditional channels, 1996-1997	Price dispersion not lower online
Clemons, Hann, and Hitt (1998)	Prices for airline tickets sold online	Price dispersion higher online
Brynjolfsson and Smith (2000)	Price of books and CDs sold through Internet and traditional channels, 1998-1999	Price dispersion higher online but lower after weighting the prices by market share
Erevelles, Rolland, and Srinivasan (2001)	Prices of vitamins	Price dispersion higher online
Morton, Zettelmeyer, and Risso (2001)	Prices of cars	Price dispersion lower online
Tang and Xing (2001)	Prices of DVDs	Price dispersion lower for pure-play e-tailers than for multichannel retailers
Clay, Krishnan, Wolff, and Fernandes (2002)	Prices for books sold online and offline	Price dispersion higher online
Brown and Goolsbee (2002)	Prices of insurance services	Price dispersion lower online
Scholten and Smith (2002)	Prices of consumer products	Price dispersion in 2000 for both retail and e-tail markets comparable with that in 1976
Ancarani and Shankar (this article [2004])	Comparison of price levels and price dispersion across three types of retailers, pure-play (Internet only), bricks-and-mortar (traditional), and bricks-and-clicks (multichannel)	Pure-play e-tailers have the highest range of prices but the lowest variability (standard deviation). Multichannel retailers have the highest standard deviation in prices with or without shipping costs.

digital attributes in the product, service levels, and the ability to use shipping costs to differentiate prices.<sup>1</sup>

Conceptually, price levels in different channels are typically related to price sensitivity in those channels. Degeratu et al. (2000) found that price sensitivity was lower online than offline for grocery products when brand was salient. Lynch and Ariely (2000), in an experimental study of wine, found that price sensitivity declined as customers received more information on product quality online and increased when cross-store price comparison was made easy. In an analysis of the hotel industry, Shankar et al. (2001) found that although the online medium increased price search, it did not increase price importance, that is, price sensitivity was not higher online than offline, even if price search was higher online than offline. To summarize, prices at pure-play e-tailers are likely to be lower than other types of retailers when price comparison is easy but may not be lower when brand and quality information are offered more at pure-play e-tailers.

The stage of development of the Internet channel may also influence the prices at different types of retailers. In the early stage, innovators and early adopters of e-commerce may have low price sensitivity, leading to greater prices at pure-play e-tailers than those at traditional retailers. Indeed, Bailey (1998), although he compared the price levels at only two types of U.S. retailers, pure-play and traditional retailers during 1996-1997, found higher prices online for books, CDs, and software. Erevelles et al. (2001) also found higher levels of prices of vitamins for Internet retailers than for traditional retailers in an analysis of data prior to 2000. As the Internet channel becomes more developed, prices at pure-play e-tailers or multichannel retailers may be lower than those at traditional retailers. Clay et al. (2002) did not find any relevant differences in the two channels for books. Brynjolfsson and Smith (2000) found that prices of CDs and books sold online are much lower than those sold through traditional channels. Brown and Goolsbee (2002) found decreasing price levels in the life insurance industry due to the impact of the Internet. Morton et al. (2001) studied dealer pricing of automobiles in California and found that prices are lower online, although the difference was only 2 percent. In sum, over time, prices are likely to be lower at pure-play e-tailers than at multichannel or traditional retailers.

Pricing outcomes in multiple channels depend on the reach of the Internet (Zettelmeyer 2000). Zettelmeyer shows that if the Internet reach is small, more information is likely to be provided through the Internet than through a conventional channel alone and that average prices are likely to be lower in the Internet channel than in the conventional channel. He concludes that if the Internet reach is large, average prices on the Internet need not be lower than those at a conventional channel.

Reduction of channel conflict and the desirability of matching prices across channels may influence the prices at the online and offline channels of a multichannel retailer. Avoidance of channel conflict and the ability to use the Internet as a channel to support offline retailing would suggest the same price levels across the two channels for the multichannel retailers. Our focus, however, is the comparison of prices across the different types of retailers. Therefore, we examine price levels at these different types of retailers, assuming that multichannel retailers have the same posted prices on their offline and online arms. It is likely that prices at traditional and multichannel retailers will be higher than those at pure-play e-tailers because they will have to maintain higher prices to keep their conventional channel members happy.

The extent of digital attributes in a product will likely influence prices at different types of retailers. Typically, a product has some digital and nondigital attributes (Lal and Sarvary 1999). Lal and Sarvary argue that digital attributes can be explored by customers through Internet search processes, whereas nondigital attributes can be explored by customers only by physical inspection in a retail store. According to Lal and Sarvary, the Internet can lower customer search costs only for digital attributes, but for nondigital attributes, physical inspection in retail stores is still necessary. They show that when the extent of nondigital attributes in a product is not overwhelming and when customers have a positive attitude toward the brand, the Internet is likely to decrease price sensitivity and prices are likely to be higher online than offline.

Service levels are likely to determine prices at the retailers. The bricks-and-mortar retailer is likely to have a higher level of service and hence higher price than the pure-play e-tailer (Pan, Shankar, and Ratchford 2003b).

Only a few studies have compared prices at pure-play e-tailers and multichannel retailers (see Table 1). A study by Tang and Xing (2001) compared the price levels at pure-play e-tailers and multichannel retailers for the DVD category. They found that the prices of pure-play Internet retailers are significantly (about 14%) lower than those of online multichannel retailers. Pan, Ratchford, and Shankar (2002) found that prices are lower for pure-play e-tailers than they are for bricks-and-clicks e-tailers for CDs, DVDs, and desktop and laptop computers; they are similar for PDAs and electronics; and they are higher for pure-play e-tailers for books and software. Pan, Shankar, and Ratchford (2002) analytically and empirically showed that prices at pure-play e-tailers are lower than those at multichannel retailers in eight categories—apparel, gifts and flowers, health and beauty, home and garden, sports and outdoors, computer hardware, consumer electronics, and office supply. These studies suggest that prices at pure-play e-tailers may be lower than those at multichannel retailers for CDs or DVDs, but this situation could be the opposite for books.

In the context of books and CDs in Milan in 2002, the setting of our study, the stage of development of the Internet is beyond the early stage, the extent of Internet reach somewhat small, likely leading to lower prices at pure-play e-tailers, moderate prices at multichannel retailers, and higher prices at traditional retailers. To reduce channel conflict, multichannel retailers may also be pricing no higher than traditional retailers, but somewhat higher than pure-play e-tailers. Because not much difference existed between pure-play e-tailers and other retailers with regard to quality or brand information, it is also likely that prices at pure-play e-tailers are no greater than those at other retailers. The extent of digital attributes, however, is high for books and CDs, so prices may be higher at pure-play e-tailers and multichannel retailers than they are at traditional retailers only from this standpoint. The expected net effects of these factors on retailer prices, however, are captured by the following hypotheses.

*Hypothesis 1a:* The posted price of an item at traditional retailers is higher than that of the same item at multichannel retailers.

*Hypothesis 1b:* The posted price of an item at multichannel retailers is higher than that of the same item at pure-play e-tailers.

The ability to use shipping and handling costs is an important determinant of full prices at different types of retailers. One general problem concerns the calculation of shipping and handling costs for online shopping. In previous studies, prices were often lower at pure-play e-tailers than those at traditional retailers when shipping and handling costs were not included. They were higher when such costs are included and charged to a single purchase, but the results were mixed when shipping and transportation costs are divided by the average size of an online order. In addition, online markets have matured over time, and the data in different studies were collected at different times. When we consider shipping costs for e-tailers, we compare the full price at e-tailers with the nominal price at brick-and-mortar retailers. Strictly speaking, consumers incur the cost of transportation to the brick-and-mortar stores. We do not consider this cost because it is difficult to obtain an estimate of it across consumers. For this reason, both pure-play e-tailers and multichannel retailers may have higher full prices than traditional retailers. This is captured by the following hypotheses. The difference between the full prices at pure-play e-tailers and multichannel retailers is an empirical issue, so we discuss this issue in our Results section.

*Hypothesis 2a:* The full price (price with shipping costs) of an item at multichannel retailers is higher than that of the same item at traditional retailers.

*Hypothesis 2b:* The full price (price with shipping costs) of an item at pure-play e-tailers is higher than that of the same item at traditional retailers.

## Price Dispersion

Price dispersion may be very different across the three types of retailers. Price dispersion is driven by several factors, including retailer service quality (such as convenience and reliability), market characteristics (such as number of competitors within the retailer type), and product characteristics (Pan, Ratchford, and Shankar 2003b; Shankar, Pan, and Ratchford 2003). While product characteristics for the same item may be common across the retailer types, variability in service quality and market characteristics may be different within each retailer type.

Prior studies have mainly compared price dispersion at pure-play e-tailers and traditional or multichannel retailers, but not across all the three types of retailers. From Table 2, the results of empirical research are mixed. Bailey (1998) found that online price dispersion in the book and CD markets is the same or even higher than offline price dispersion. The result is consistent with Clemons, Hann, and Hitt (1998) in the online travel industry and with Erevelles et al. (2001) in the vitamin industry. Brynjolfsson and Smith (2000) found that online price dispersion is equal or even higher than in the traditional channel. However, after weighting the prices by proxies of market share, they found price dispersion to be lower in pure-play e-tailers than in traditional stores. Brown and Goolsbee (2002) and Morton, Zettelmeyer, and Risso (2001) also found lower levels of online price dispersion in the life insurance and Internet car retailing industries, respectively. Tang and Xing (2001) found that price dispersion was lower for pure-play e-tailers than it is for multichannel retailers. Scholten and Smith (2002) found that price dispersion in 2000 for both retail and e-tail markets was comparable with that for retail markets in 1976, suggesting persistence in price dispersion over time and across channels. Ratchford, Pan, and Shankar (2003) did not compare price dispersion levels online and offline, but they found that online price dispersion is persistent, although it generally declined from November 2000 to November 2001 for eight categories—books, CDs, DVDs, desktop and laptop computers, software, PDAs, and consumer electronics. Shankar, Pan, and Ratchford (2003) found that the drivers of online price dispersion remained reasonably stable during the years 2000 and 2001.

It is important to know if price dispersion is different among pure-play, traditional, and multichannel retailers. Because multichannel retailers combine online and offline channels, their prices will likely reflect the variability in prices of all the retailers in both the channels. Therefore,

**TABLE 3**  
**Data Description (Books)**

	<i>Traditional Retailers</i>	<i>Pure-Play e-Tailers</i>	<i>Multichannel Retailers</i>
Number and description of retailers in the sample	Number: 5 Feltrinelli (national chain for a wide range of books) MS: 30% Mondadori (national chain for a wide range of books) MS: 30% Rizzoli (national chain for a wide range of books) MS: 5% Egea (regional chain mainly focused on professional and managerial books) MS: 1% Messaggerie Musicali (regional chain for a wide range of books and CDs) MS: 4%	Number: 4 Cdbox (national e-tailer for a wide range of books and CDs) MS: 1.5% Ibs (national e-tailer for a wide range of books and CDs) MS: 3% Libropolis (national e-tailer for a wide range of books) MS: 1% Unilibro (national e-tailer for a wide range of books and CDs) MS: 1%	Number: 2 Bol.it (national e-tailer for a wide range of books) MS: 6% Hoepli.it (national chain for a wide range of books) MS: 2%
Total number of retailers in the Milan metropolitan area	There are more than 100 traditional retailers in the area. The sample accounts for about 70 percent of the total sales of books through traditional retailers in the area. The other retailers are very small and their structure is fragmented.	The number of pure-play e-tailers is 35, according to the most widely used search engine (www.virgilio.it). The sample accounts for about 80 percent of the total sales of books through pure-play e-tailers in the area.	The sample accounts for 100 percent of the total sales of books through multichannel retailers in the area.
Distribution of books in the channel	Traditional retailers account for 84 percent of the total distribution of books.	Pure-play e-tailers account for 8 percent of the total distribution of books.	Multichannel retailers account for 8 percent of the total distribution of books.

NOTE: MS = market share. The source for market share data offline is the Italian Association for Advanced Documentation (AIDA), a certified agency devoted to support research activities through data collection. The source for market share data online is the business press, and namely, *Il Sole 24 Ore*, the main business daily in Italy.

multichannel retailers will likely have greater price dispersion than other types of retailers. We capture this logic in the following hypotheses. The difference between price dispersion within pure-play e-tailers and that within traditional retailers is an empirical issue, so we discuss this issue in our Results section.

*Hypothesis 3a:* For the same item, price dispersion within multichannel retailers is higher than that within traditional retailers.

*Hypothesis 3b:* For the same item, price dispersion within multichannel retailers is higher than that within pure-play e-tailers.

## DATA, MEASURES, AND METHOD

We test our hypotheses through an empirical analysis of price levels and price dispersion among pure-play, traditional, and multichannel retailers of books and CDs in Milan, the financial capital of Italy. We chose books and CDs as the two product categories for our empirical analysis because (1) these categories have also been widely studied by other researchers and (2) these categories allow comparison of completely homogeneous products. We

collected daily price quotes for a sample of books titles and CDs from a sample of traditional and multichannel retailers and pure-play e-tailers in Milan during a period of 5 weeks during March–April 2002.

### Retailer Selection

Tables 3 and 4 offer details on the selection of retailers for books and CDs, respectively. With regard to books, we searched for retailers in the Milan metropolitan area through the Yellow Pages. From more than 100 traditional retailers, we selected those retailers that offered a general selection of titles, excluding niche retailers focused on particular topics (e.g., tourism, sports), consistent with the general selection criterion used by Brynjolfsson and Smith (2000) and Xing and Tang (2001). The selected retailers account for about 70 percent of total sales in the area through the traditional channel, with the remaining 30 percent coming from multicategory retailers and a number of small retailers for books. We identified the pure-play e-tailers through the most widely used search engine in Italy (Virgilio.it). From 35 pure-play e-tailers, we selected four that offered a general selection of titles, consistent with Brynjolfsson and Smith (2000). The selected

**TABLE 4**  
**Data Description (CDs)**

	<i>Traditional Retailers</i>	<i>Pure-Play e-Tailers</i>
Number and description of retailers in the sample	Number: 5 Egea (regional chain mainly focused on professional and managerial books) MS: 0.5% Messaggerie Musicali (regional chain for books in different categories) MS: 8% Ricordi (national chain for a wide range of CDs) MS: 30% Virgin (national chain for a wide range of CDs) MS: 30%	Number: 3 Cdbox (national e-tailer for a wide range of books and CDs) MS: 3% Cdflash (national e-tailer for a wide range of CDs) MS: 2% Unilibro (national e-tailer for a wide range of books and CDs) MS: 1%
Total number of retailers in the Milan area	There are more than 100 traditional retailers in the area. The sample accounts for about 70 percent of the total sales through traditional retailers in the area. The other retailers are very small, and their structure is fragmented.	The number of pure-play e-tailers is 19. The sample accounts for 60 percent of the total sales of CDs through pure-play e-tailers in the area.
Distribution of CDs in the channel	Traditional retailers account for 90 percent of the total distribution of CDs.	Pure-play e-tailers account for 10 percent of the total distribution of CDs.

NOTE: MS = Market share. The source for market share data offline is the Italian Association for Advanced Documentation (AIDA), a certified agency devoted to support research activities through data collection. The source for market share data online is the business press, and namely, *Il Sole 24 Ore*, the main business daily in Italy.

retailers contribute about 80 percent of total sales in the area through the online channel. With regard to multichannel retailers, we selected the two multichannel retailers who operated in the area.

With regard to CDs, from more than 100 traditional retailers listed in the Milan Yellow Pages, we selected those retailers offering a general selection of titles excluding niche retailers. The selected retailers bring about 70 percent of total sales in the Milan metropolitan area through the traditional channel. Among 19 pure-players identified through Virgilio.it, we selected 3 that offered a general selection of titles, excluding niche and foreign retailers. The selected pure-play e-tailers do about 60 percent of total online sales in the Milan metropolitan area.

### Item Selection

With regard to books, we selected 21 titles that represented a mix of best-selling and other randomly selected books, consistent with Brynjolfsson and Smith (2000) and Tang and Xing (2001). We obtained the best-selling books from the *Corriere della Sera* ranking of best-selling books in six product categories. *Corriere della Sera* is the leading national daily in Italy with the largest circulation. We selected two books from each product category in addition to the overall best-selling title. We also obtained a list of the first 200 book titles sold in Italy and selected randomly from this list to complete the sample. Best-selling books account for about 60 percent of the sample.

We compared their prices among 11 retailers (4 pure-play, 2 multichannel, and 5 traditional) and obtained 8,085 price quotes. We randomly selected the 5 traditional retailers from approximately 100 traditional retailers listed in the Yellow Pages of Milan. For multichannel retailers, the

average prices of items across the two channels of multichannel retailers are not statistically different ( $p < .001$ ), so we use the prices at their Internet stores for our analysis.

With regard to CDs, we selected 23 titles from a mixed sample of the best-selling CDs and a group of other randomly selected CDs. We compared their prices among seven retailers (four traditional retailers and three pure-play e-tailers). Among the online retailers for CDs, we had only pure-play e-tailers, but no multichannel retailers. Traditional retailers accounted for about 70 percent of the market for CDs in Italy, and pure-play e-tailers split the rest of the market. We collected 5,635 price quotes. Thus, our data set contained a total of 13,720 price quotes of books or CDs.<sup>2</sup>

We measured price levels by the means of the price quotes in the respective types of retailers. We measured the level of price dispersion using price range and standard deviation, consistent with prior studies (e.g., Brynjolfsson and Smith 2000; Pan, Ratchford, and Shankar 2003b).<sup>3</sup> We compared price levels and price dispersion among pure-play e-tailers and traditional and multichannel retailers, using *t*-tests, consistent with Brynjolfsson and Smith (2000) and Tang and Xing (2001). We ran nonparametric tests (median tests) to check for consistency. The results were similar, so we report the results of the *t*-tests in the Results section.

### RESULTS

For books, the results of the three-way tests of differences, that is, multichannel versus pure-play, multichannel versus traditional, and pure-play versus traditional, are shown in Table 5. For CDs, the results of the two-way



**TABLE 5**  
**Price Levels and Price Dispersion Among Pure Play, Traditional, and Multichannel Retailers for Books**

	Multichannel		(Multichannel- Pure Play)		t Statistic		Multichannel- Traditional		t Statistic		(Pure Play- Traditional)		t Statistic
	Pure Play	Multichannel	Pure Play	Multichannel	Pure Play	Multichannel	Pure Play	Multichannel	Pure Play	Multichannel	Pure Play	Multichannel	
Price levels													
List price levels	15.40	14.43	+6%	32.34	15.40	15.67	-2%	10.85	14.43	15.67	-8%	31.61	
With shipping costs completely charged	17.68	17.17	+3%	10.15	17.68	15.67	+12%	53.59	17.17	15.67	+9%	44.13	
With shipping costs divided among three items	16.15	15.39	+5%	9.34	16.15	15.67	+3%	9.40	15.39	15.67	-2%	7.00	
Price dispersion													
Standard deviation of list prices	4.83	4.26	+13%	21.26	4.83	4.73	+2%	7.79	4.26	4.73	-10%	11.65	
Standard deviation of prices with shipping costs completely charged	4.84	4.73	+2%	5.56	4.84	4.73	+2%	7.92	4.73	4.73	0%	ns	
Standard deviation of prices with shipping costs divided among three items	4.80	4.35	+10%	9.46	4.80	4.73	+1%	4.15	4.35	4.73	-8%	2.66	
Range of list prices	20.00	20.90	-4%	12.81	20.00	20.00	0%	ns	20.90	20	+4%	5.15	
Range with shipping costs completely charged	20.43	22.88	-12%	13.13	20.43	20.00	+2%	ns	22.88	20	+14%	21.22	
Range with shipping costs divided among 3 items	20.14	21.42	-6%	7.59	20.14	20.00	+1%	ns	21.42	20	+7%	7.49	

NOTE: All price levels, ranges, and deviations are in Euros. *ns* = not significant;  $p < .001$  for all significant values except in the comparison of prices with shipping costs divided among three items for multichannel and traditional retailers for books, where  $p < .005$ .

**TABLE 6**  
**Price Levels and Price Dispersion at Pure-Play and Traditional Retailers for CDs**

	Pure-Play	Traditional	(Pure-Play- Traditional)	t Statistic
Price levels				
Posted price levels	18.89	19.64	-4%	37.61
With shipping costs completely charged	22.43	19.64	+12%	14.08
With shipping costs divided among three items	20.07	19.64	+2%	19.06
Price dispersion				
Standard deviation of posted prices	2.59	2.67	-3%	5.08
Standard deviation of prices with shipping costs completely charged	2.79	2.67	+5%	17.33
Standard deviation of prices with shipping costs divided among three items	2.61	2.67	-2%	<i>ns</i>
Range of posted prices	14.75	11.82	+20%	35.18
Range with shipping costs completely charged	14.75	11.82	+20%	35.18
Range with shipping costs divided among three items	14.75	11.82	+20%	35.18

NOTE: All price levels, ranges, and deviations are in Euros. *ns* = not significant at  $p < .05$ ;  $p < .001$  for all significant values.

tests of differences between pure-play e-tailers and traditional retailers are provided in Table 6. All statistically significant results are significant at the .001 level except in the comparison of prices with shipping costs divided among three items for multichannel and traditional retailers for books, where the result is at the .005 level.

### Price Levels

For books, posted prices at traditional retailers are 2 percent higher than those at multichannel retailers, which in turn are 6 percent higher than those at pure-player e-tailers, supporting Hypotheses 1a and 1b. However, the picture changes when shipping costs are considered. When shipping costs are completely charged to a single purchase, multichannel retailers' full price levels are 3 percent higher than those at pure-play e-tailers, which in turn are 9 percent higher than those at traditional retailers. When shipping costs are divided among three items, multichannel retailers still have the highest full-price levels. Only now, the price levels at traditional retailers are 2 percent higher than those at pure-play e-tailers, unlike the situation when shipping costs are charged to a single purchase. These results generally support Hypotheses 2a and 2b.

For CDs, since there were no multichannel retailers, we compared the prices between pure-play e-tailers and traditional retailers. The results on this comparison are consistent with those for books. Unlike books, however, when shipping costs are divided among three items, full prices at pure-play e-tailers are higher than those at traditional retailers, more strongly supporting Hypothesis 2b.

These findings reveal that pure-play e-tailers have the lowest posted prices and traditional retailers have the highest posted prices; multichannel retailers have the highest full prices. When shipping charges are included, pure-play e-tailers do have the lowest prices. Multichannel retailers

posted lower prices than traditional retailers but effectively charge higher full prices when shipping costs are included.

### Price Dispersion

For books, price dispersion, as measured by the standard deviation of posted prices, is 2 percent higher for multichannel retailers than it is for traditional retailers, whose price dispersion is also higher (by 10%) than that for pure-play e-tailers. When range of posted price is used as the measure of price dispersion, the order is reversed. In this case, pure-play e-tailers have a 4 percent wider dispersion than that for both traditional and multichannel retailers, whose price dispersions are not statistically different from each other. Thus, Hypotheses 3a and 3b are supported for standard deviation, but not for price range as the measure of price dispersion.

When shipping costs are completely charged to a single purchase, there are similar differences between standard deviation and price range measures of price dispersion. When standard deviation of full price is considered, price dispersion is still highest at multichannel retailers, followed by traditional retailers and pure-play e-tailers, whose dispersions are not significantly different from each other. For price range, however, pure-play e-tailers have a 12 percent wider price dispersion than multichannel and traditional retailers, both of whom have similar price dispersions. When shipping costs are divided among three items, the pattern is generally similar to that when shipping costs are fully charged to one purchase. Thus, the results for price dispersion among the three types of retailers are invariant to how price is computed for a given measure of price dispersion but are systematically different for different measures of price dispersion, namely, standard deviation and price range. Pure-play e-tailers have the widest range of prices but have the lowest standard

deviation. Multichannel retailers have the highest standard deviation in prices.

Because there were no multichannel retailers for CDs, we compared the price dispersion levels between pure-play e-tailers and traditional retailers. The results on this comparison are mostly consistent with those for books. Unlike books, however, the standard deviation for CDs when shipping costs are completely charged to the purchase is significantly higher ( $p < .05$ ) by 5 percent for pure-play e-tailers than for traditional retailers but is not significantly different between these two retailer types when shipping costs are divided among three items.

## DISCUSSION

Based on the results of price levels and price dispersion, we discuss the relative positions of the three types of retailers with respect to one another on the two measures of price level (posted price and full price, including shipping costs) and the two measures of dispersion (standard deviation and range). With regard to posted price versus standard deviation comparison, the multichannel retailer has higher price dispersion than other types of retailers but is in between traditional retailers (high) and pure-play (low) e-tailers on price levels. Traditional and pure-play e-tailers are not very different on price dispersion. This picture changes quite a bit if we look at posted price versus price range. While the relative position of the traditional retailer does not change much with respect to posted price versus standard deviation, the positions of the multichannel retailer and the pure-play e-tailer change. This is because pure-play e-tailers have more extreme prices but have lower standard deviation in prices than do multichannel retailers. In the comparison of full price with shipping costs and standard deviation, the relative positions are different from those in the comparison of posted price and standard deviation. Finally, the comparison of full price with shipping costs versus range is still different from the other three comparisons. These comparisons underscore the point that the positions of the types of retailers depend on the measures of price level and dispersion and are inconclusive. More important, they imply that a retailer has room for differentiating itself from other types of retailers and from other retailers within its own type using both posted prices and shipping costs.

When comparing the price levels, our results show that although posted prices are lower at pure-play e-tailers than at multichannel and traditional retailers, the difference between these posted prices is not very large. More important, when shipping costs are included, we obtain the opposite result—prices are higher at pure-play e-tailers than they are at multichannel and traditional retailers. The lower posted prices at pure-play e-tailers may be due to increasing product (books and CDs) maturity online and

growing Internet efficiency, among other factors. Recall that the prices of books and CDs were higher on the Internet than offline in data from 1996 and 1997 (Bailey 1998) but were lower online than offline in data collected at later periods in subsequent studies.

Our results on price levels extend prior research. They are consistent with Pan, Ratchford, and Shankar (2002); Pan, Shankar, and Ratchford (2002); and Tang and Xing (2001) in that prices at pure-play e-tailers are lower than they are at multichannel retailers. They also conform to Pan, Shankar, and Ratchford (2003b) in that the prices at traditional retailers are higher than those at pure play e-tailers. This result is invariant to the computation of prices (with or without shipping costs). An additional finding from our analysis is that multichannel retailers posted lower prices than do traditional retailers but effectively charge higher prices when shipping costs are factored. This could be driven by the fact that to draw more customers both to their online and offline stores, they may post lower prices than do traditional retailers, but once customers are online, they may charge higher overall prices that could be better justified for multichannel benefits such as search, customized information, personalized account, inspection, pickup, and return options.<sup>4</sup>

Our results on price dispersion also extend prior research in pointing out differences between the three retailer types in range and standard deviation measures. The results from the two categories suggest that prices at pure-play e-tailers may have greater extreme values (price range) than those at other retailers but have lower variation than those at other retailers. When posted prices are considered, standard deviation is slightly lower, but when shipping costs are added, it is higher at pure-play e-tailers than at other retailers. This means that dispersion increases online merely by bundling a completely homogeneous product with a reasonably homogeneous service. Moreover, regardless of whether price dispersion is higher online or vice versa, it seems to be persistent online. Multichannel retailers have the highest variability in prices among all types of retailers. The results suggest that there are more opportunities for differentiation for this type of retailer than for other types of retailers. We conclude that although the Internet has an efficiency effect on price levels and dispersion over time, it still allows multichannel retailers to have high variability in prices. Firms that can compete on multiple channels have opportunities to differentiate themselves, thereby keeping price dispersion and price levels high on the Internet.

## MANAGERIAL IMPLICATIONS AND FUTURE RESEARCH

On the basis of the results of our empirical analysis, we offer some managerial implications. First, our results

point out significant differences in price levels and price dispersion among the three types of retailers on different measures of prices and price dispersion. They suggest that retailers can use posted prices and shipping costs effectively to differentiate themselves from one another even if they might sell the same products.

Second, the results suggest that multichannel retailers can compete through the pricing strategy of having higher posted prices than pure-play Internet retailers and higher full prices (including shipping costs) than other types of retailers. They could sustain this price premium if they could consistently communicate that this higher price is due to the higher value of the option to the customer to search and shop at both online and offline channels and the benefits of search, personalization, physical inspection, pickup, and return of merchandise.

Third, the relative positions of multichannel and pure-play e-tailers on the two measures of price dispersion offer some implications on competition in these channels. There is a wider range of prices but a lower standard deviation for pure-play e-tailers than for multichannel retailers. That is, although there may be one or two pure-play e-tailers that offer much lower prices compared to others, prices at pure-play e-tailers tend to be closer together than are prices at multichannel retailers. These arguments suggest that multichannel retailers appear to be able to differentiate themselves from one another more than pure-play e-tailers can among themselves. Pure-play Internet retailers can better compete with other types of retailers through online personalization and customisation (Kalyanam and McIntyre 2002) and by focusing on nonprice dimensions such as trust (Shankar, Urban, and Sultan 2002), loyalty (Shankar, Smith, and Rangaswamy 2003), and quality (Lynch and Ariely 2000).

Our research has certain limitations that can be addressed by future research. First, the markets we studied are from one country, and the categories are books and CDs. The study can be extended to multiple categories across multiple countries. Second, we study only observed prices because it is very difficult to obtain data on multiple types of prices and antecedent variables across multiple channels. If data are available, it would be interesting to compare price levels and dispersion when prices are adjusted for service quality (antecedent variables) across the three types of retailers. Additional analyses such as regression and factor analyses could also be done with data on multiple variables. Third, studying the market share outcomes of the three types of retailers could be useful. Finally, the online and offline prices were the same for the multichannel retailers in our data. It would be interesting to analyze the case where online and offline prices are different for multichannel retailers.

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## NOTES

1. We thank anonymous reviewers for this line of reasoning.
2. Our data set is comparable with that of Brynjolfsson and Smith (2000). In their study, these authors selected 20 titles of books and 20 titles of CDs from a sample of eight retailers. The retailers in their study are national, whereas the retailers in our study are regional, as in Bailey (1998) and in Morton, Zettelmeyer, and Risso (2001). Our data set is also comparable with that of Tang and Xing (2001), which comprised 4,896 price quotes of 50 DVD titles from 14 retailers and e-tailers.
3. We also used the coefficient of variation (the ratio of the standard deviation over mean price) as a measure of price dispersion, but the results were similar to those for standard deviation, so we do not report them.
4. Indeed, many multichannel retailers, including those in our data offer these benefits.

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