A comparative analysis of online grocery pricing in Singapore

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Abstract
Our study of the pricing strategies of the dot-bams (brick-and-mortars) and dot-coms of the grocery trade in Singapore differs from other empirical studies. Dot-coms were found to exhibit higher price dispersion than the dot-bams which can be explained by the different marketing strategies of the two types of retailers. We also found that dot-bams change their prices more frequently than the dot-coms, thus implying that online markets will not always have lower menu costs. Moreover, we found no statistically significant difference between the average price level of dot-bams and that of the dot-coms, suggesting that price convergence occurs due to reduced search costs among consumers and thus lower information asymmetries in the grocery market.

Keywords: Online grocery; Grocery pricing; Price dispersion; Price convergence; Menu costs; Singapore

1. Introduction
According to some research, e-commerce markets provide efficiency unparalleled to traditional markets [4]. Some claim that e-commerce markets possess all of the characteristics associated with perfect competition: consumers can compare many firms’ prices with a click of a mouse, there are low barriers to entry, and firms can change prices at low cost [3]. This has resulted in intense price competition, dwindling product differentiation and vanishing brand loyalty [11].

The advantages conferred by e-commerce have led to a substantial projected increase in the online retail sale of goods and services from 2000 to 2005 [23]. Due to increased spending by buyers and higher percentages of online shoppers, it is projected that 142 million consumers or 65% of the online population will have made a purchase online by 2007 [15]. Hence, Jupiter Research expects online retail spending to reach US$1.06 trillion by 2007.

Among products sold online, homogeneous products seem to be the product category most likely to experience strong price competition given the characteristics of Internet channels [6]. In particular, Online grocery shopping seems to be a promising sector because it offers cost savings, greater assortment variety [2,17], better deals [5,9], and convenience [17]. Other factors that contribute towards the growth of online grocery shopping include higher labor-force participation by women who have traditionally been the primary food shoppers, a greater number of dual-income and thus higher-income households, and a greater number of single-parent and elderly households with time and other resource constraints [40]. Furthermore, the aesthetic and playful nature of virtual stores creates a stimulating shopping environment [33].

However, the development of the online grocery market is also complex and immensely challenging to the vendors while posing some risks to consumers. There are numerous operational challenges with regards to the ordering and delivery processes [8,43]. While the online grocery stores have to match their marketing, finance, operations and
logistics strategies [20], the consumers are wary about the inherent risks in e-commerce transactions [25,39]. Other issues of concern include the security, costs and legality of transactions, the lack of reliable information and other uncertainties [37]. In e-commerce, consumers constantly find themselves evaluating the benefits of disclosing their personal information in exchange for the increased potential of financial rewards, and improved services [49].

Surprisingly, online grocery prices are not the most important concern for consumers [46]. Critical factors affecting online grocery shopping are the size of the household, reasons for choosing an online grocery store over a brick-and-mortar store and the information needs of consumers [44]. Hence, online grocery stores need to be aware of the concerns and needs of online consumers. In this respect, the former can emphasize the chance of making better deals, the convenience of a delivery service, and the independence of opening hours to encourage the adoption of online shopping [24,35].

According to a survey [26], 20% of Singaporean Internet users spent a total of S$197 million on online shopping in 2003. This signifies the potential of online grocery shopping in Singapore. This has motivated us to study the burgeoning online grocery market in Singapore with the aim of illuminating the pricing strategies adopted by both the dot-coms and the bricks-and-mortars with online presence.

2. Methodology

2.1. Market selection

The selection of grocery stores in our sample was based on the following criteria: the primary operation of the grocery store should be the sale of groceries; each of the selected stores should be independent; and each store should display its grocery items on its website so that prices can be easily compared. The grocery stores chosen are then divided into two categories: the exclusively online grocery stores (hereafter referred to as “dot-coms”), and the online counterpart of the brick-and-mortar grocery stores (hereafter referred to as “dot-bams”). Having these two distinct categories allows us to carry out a comparison of their pricing strategies based on their unique characteristics. In selecting dot-bams, we referred to ACNielsen’s ShopperTrends [1] which listed the major grocery stores in Singapore. We then explored whether these grocery stores have online counterparts and further classified both Fairprice and Cold Storage as dot-bams. Next, through local search engines and local publications, we classified E-mart, Infobuy and Lifestyle Groceries as the other primary players in the dot-com industry.

2.2. Data collection and treatment

Before the first collection of data, a list of grocery items was created. The list consists of grocery items that are commonly found in the websites of the five selected grocers. Next, based on a survey [22] regarding the most popular grocery categories purchased online, we categorized the grocery items by “food”, “health and beauty care” and “household cleaners”. Later, we further sub-categorized “food” into “food”, “drinks” and “seasonings” to enable us to perform a more detailed analysis. As such, our sample consists of 5 grocery categories with a total of 88 common grocery items.

During the weekly collection of data, during the entire 18 weeks of data collection, after some initial weeks of collection, we eliminated items that were temporarily out of stock and permanently not available for more than 50% of the time during the entire 18 weeks. Hence, the original list of 88 grocery items was reduced to 86 for the purpose of our analysis. Data was collected from 4th September 2004 to 1st January 2005 on a weekly basis for 18 weeks, and a total of 7740 price observations were gathered.

3. Hypotheses

Consumer shopping behavior varies for dot-bams and dot-coms as marketing stimuli such as different retail environments and promotional activities will affect consumer behavior [7,53]. There are differences in the quantities purchased, the selection of products and the effects of promotions on dot-bams and dot-coms [10].

Price dispersion is particularly important since it reveals the notion of efficiency in the brick-and-mortar world versus the online world. A study [9] on both book and CD shows that price dispersion may be lower on the Internet than in conventional stores due to the dominance of certain heavily branded retailers, asymmetric information, search costs and retailer heterogeneity in these industries. Firstly, dot-bams with huge, established customer base would be able to leverage on their brand names to attract new customers because of the trust of their existing customers. Next, due to the efficiency gains of the Internet, the absence of asymmetric information would lead to higher search costs for consumers in the brick-and-mortar stores as compared to the pure dot-coms [4]. Positive consumer search costs can lead to prices above marginal cost in equilibrium [47]. Therefore, it is possible that e-commerce markets can reduce transaction costs resulting in efficiency gains, and they can also reduce information asymmetries for buyers by helping them to be better informed about prices [29].

When consumers enjoy prior positive experiences with a brand in the physical world, their online price sensitivity can decrease [48]. Hence, even when consumers are able to engage in a more efficient search with the online branch of the dot-bams, they may not utilize this opportunity. This retailer heterogeneity, particularly the emphasis of trust in dot-bams, may result in dot-bams having higher price dispersion than the dot-coms [59]. In addition, price dispersion for homogeneous products can also be explained by customers’ brand awareness [28]. Therefore, our first hypothesis is:
H₁: Dot-bams display higher price dispersion than dot-coms.

The availability of more information on prices could induce consumers to have higher price sensitivity for undifferentiated products like groceries. Since there is a greater market transparency of prices of groceries on the Internet, it is deduced that dot-coms would implement promotions and discounts for their products frequently [19]. However, the costs of changing prices or menu costs would affect the setting of prices and explain the non-optimal prices in an economy [50]. Some postulate the importance of fixed menu costs that are shared by all products within the same store and found that grocery stores tend to either have many price changes to lower the fixed cost per product or no changes at all to eliminate menu costs [30].

We focused on both the variation and frequency of price changes. It is found that online retail markets for books and CDs carry out price changes in much smaller increments than their offline counterparts in the same industries [9]. Online price changes are also more frequent, thus online markets seem more efficient in terms of lower price levels and lower menu costs [3]. In effect, the Internet is a more efficient channel in terms of menu costs as compared to the physical grocery stores that average US$0.52 per price change or US$106 thousands per store, and consuming 35.2% of net margins [30]. Thus, our second hypothesis is:

H₂: Dot-coms display a higher frequency of price changes than dot-bams.

Based on research on books and CDs [9,12,28], and cars [36], it is found that online retailers charge lower prices than offline retailers. In fact, prices of books and CDs sold through the Internet are 9–16% lower than in conventional outlets [9].

This phenomenon of lower price levels in electronic marketplaces may be due to an improvement in retailer cost structures [52]. Favorable cost structures may lead to lower price levels in the long run by decreasing the underlying costs by which any price premiums are paid [29]. Furthermore, some postulate that dot-coms will benefit from reduced inventory costs [38].

In addition, some argue that even though dot-bams may not demonstrate lower prices than the dot-coms, consumers may still prefer to purchase products from established dot-bams rather than buying from a dot-com that has the lowest price [12]. As mentioned earlier, a higher level of trust in dot-bams compared to dot-coms will allow the former to command a price premium from loyal customers of the physical stores. Trust may be conveyed by word of mouth, through advertising or indirectly by being mentioned favorably in the press. Hence, our third hypothesis follows that:

H₃: Dot-bams display higher price levels than dot-coms.

4. Data analysis

4.1. Price dispersion

In order to analyze the price dispersion by the dot-bams and dot-coms, the absolute difference in pricing within the dot-bams and the dot-coms for each grocery item on each collection date for all collection weeks was calculated. Absolute price dispersion is computed by subtracting the minimum price from the maximum price of each item within dot-bams and within dot-coms.

As shown in Table 1, absolute price dispersion for both dot-bams and dot-coms is investigated by comparing price dispersion and percentage price dispersion for all the items throughout the entire collection period. The price dispersion statistics for the data show a significant range of prices for both dot-bams and dot-coms. There is a larger number of items in the dot-coms demonstrating higher average price dispersion than in the dot-bams. The range of price dispersion averages S$0.47 for the dot-bams and S$0.69 for the dot-coms. Percentage price dispersion was also computed by dividing the price dispersion computed above by each respective mean price for each item within the dot-bams and within the dot-coms. The range of percentage price dispersion averages 11% for the dot-bams and 15% for the dot-coms. Thus, this leads us to reject H₁ as dot-coms display higher absolute price dispersion than dot-bams.

Following the methodology of a few studies [55–57] in analyzing absolute price dispersion, the average price dispersion (or the average percentage price dispersion) for the dot-bams in the grocery industry is S$0.47 (or US$0.28) (11%) as compared to US$3.96 (22%) in the CD industry [56], US$5.29 (32%) in the video industry [57], and US$6.20 (30%) in the toy industry [55]. In

<table>
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<tr>
<th>Table 1</th>
<th>Average absolute price dispersion observed over 18 collection weeks (all items)</th>
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<tr>
<td>Price dispersion</td>
<td>Total</td>
</tr>
<tr>
<td>Dot-bams</td>
<td>86</td>
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<tr>
<td>Dot-coms</td>
<td>86</td>
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<tr>
<td>Percentage price dispersion</td>
<td>Total</td>
</tr>
<tr>
<td>Dot-bams</td>
<td>86</td>
</tr>
<tr>
<td>Dot-coms</td>
<td>86</td>
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Note: $ denotes Singapore dollars.
addition, average price dispersion for dot-coms in the grocery industry is S$0.69 (or US$0.41) (15%) as compared to US$4.12 (24%) in the CD industry, US$4.37 (27%) in the video industry, and US$5.88 (24%) in the toy industry. We can see from Table 2 that both the average price dispersion and the average percentage price dispersions for both dot-bams and dot-coms are much lower for the grocery industry than for those of the other 3 industries. Specifically, the dot-bams do not exhibit higher price dispersion than the dot-coms, as similarly observed in the CD market but they show a sharp contrast to the results obtained from studies concerning video and toy.

In addition, we examine the price dispersion between the dot-bams and dot-coms by conducting a one-tailed independent sample t-test for all grocery items throughout the whole collection period. The one-tailed test was employed as our hypotheses are directional. The direction of the relationship between the two variables – the mean of dot-bams’ price dispersion and the mean of dot-coms’ price dispersion, has been defined in H1. Statistical results from the t-test (see Table 3) show insufficient evidence to support H1. It is found that there is significant difference in the price dispersion between dot-bams and dot-coms at 5% level whereby dot-coms actually display higher price dispersion than dot-bams.

Similar tests were conducted for all grocery items on each collection date to enhance the reliability of the above results and the tests show consistent results. Out of the 18 collection weeks, at least 17 weeks were found to display significant difference in the price dispersion between dot-bams and dot-coms, with dot-coms displaying a higher dispersion than dot-bams. Hence, the results do not support H1.

Further statistical analyses were conducted on the prices collected for each of the five product categories throughout the whole collection period. The results in Table 4 exhibit that at 5% significance level, dot-coms have significantly higher price dispersion than dot-bams in the categories of drinks and food, and household cleaners at 15% level. Conversely, price dispersion does not significantly differ for dot-bams and dot-coms in the other two categories. Hence, this again leads us to reject H1.

Our results from the absolute price dispersion analysis are supported by a study [56] in the CD industry where dot-coms exhibit higher absolute price dispersion than dot-bams. Another study [29] in the CD industry reveals that despite low online search costs and the growth of the online market size, the Internet market continues to show price dispersion. Similar results show that prices for airline tickets can differ by as much as 20% across online travel agents even after controlling for observable product heterogeneity [13]. This observed price dispersion can be explained as high search costs using data on prices of auto insurance policies [16]. Moreover, Bakos [5] finds that high search costs create inefficient allocation of resources and allow suppliers to make monopolistic profits. In addition, some postulate that even a decrease in search costs may lead to higher price dispersion if the market is in a segmentation equilibrium where high cost firms choose to sell only to high search cost consumers [42].

Imperfect consumer information may lead firms to charge different prices for informed and uninformed consumers [47] or serious shoppers and others. The presence of imperfect consumer information could explain why dot-coms statistically have significantly higher price dispersion than dot-bams in the three categories of grocery items – drinks, food and household cleaners. Another explanation for high price dispersion within dot-coms could be due to various strategies adopted by individual firms [3], thus allowing online grocers to practice price discrimination. For instance, Lifestyle Groceries’ target segment is corporate clients who are likely to be willing to pay price premiums for additional reliability and reassurance whereas Infobuy target households who are relatively more price-sensitive.
4.2. Frequency of price change

Price change was measured by subtracting the item price of the previous collection week from the corresponding item price of the current collection week. This process is carried out for all grocery items within each grocery store for all 18 collection weeks. In total, there were 309 price changes out of the 7740 price observations, suggesting that price changes only took place 4% of the time during the measured period.

Although price changes were infrequent for both dot-bams and dot-coms, price changes occurred more frequently in dot-bams than in dot-coms as shown in Table 5. This does not support $H_2$ that dot-coms change their prices more frequently than dot-bams. In terms of the direction of price changes, we observe that price increase occurs more frequently than price decrease for the dot-bams by 33%, whereas price change in either direction happens in almost equal number of instances for the dot-coms.

In addition, a price change of $S0.10 or more represented 86.7% of all the price changes while a price change of $S0.50 or more represented 32.7% of all the price changes for both dot-bams and dot-coms. Further computation shows that the mean price change is $S0.10 for dot-bams and $S0.13 for dot-coms, thus indicating that price changes by both retailer types were small in magnitudes.

Our results show that both dot-bams and dot-coms do not change their prices frequently (5.48% for dot-bams and none for dot-coms), thus indicating a high online menu cost for them. This does not lend support to the “lower menu cost” argument that says online retailers’ price adjustments over time are up to 100 times smaller than conventional retailers’ price adjustments [3,9]. Instead, our results support observations in the CD [56] and the video industries [57] that although theoretically, menu costs are close to zero for online price changes, in reality, online retailers do not follow this reasoning as our results from the grocery industry have indicated. Our results further demonstrate that if both dot-bams and dot-coms do adjust their prices, they do so in a bigger magnitude or more than one cent, once again contradicting the one-cent price change strategy documented by earlier literatures [9,56,57].

We further measured the frequency of price changes within the dot-bams and dot-coms by finding the percentage of total observations of each retailer type that underwent a price change from the previous collection period for all the 18 collection weeks.

Fig. 1 shows that price changes are rather infrequent among dot-coms and that dot-bams have a higher percentage of observations undergoing price changes for all the collections. Thus, it supports the rejection of $H_2$ that dot-coms experience a higher frequency of price changes as compared to dot-bams. In fact, no price change occurred for dot-coms for 9 out of the 18 weeks. An interesting observation was also noted for the dot-bams who revealed a steep increase of price changes on 6th November 2004, coinciding with two local festive celebrations, namely Hari Raya Puasa (The culmination of the fasting month for the Muslim community) and Deepavali (The Festival of Lights for the Hindu community).

We also examine the trends in price changes by category of groceries by finding the average percentage of price observations undergoing price changes per category for the entire 18 weeks. From Table 6, we can see that food experiences the highest frequency of price changes throughout the 18 weeks, followed by health and beauty care, drinks, seasonings, and household cleaners. This result is not surprising as food is the most perishable category of grocery items and will require faster clearance of inventory. Some explained that sellers with higher inventory costs will offer periodic price deals as a mechanism for minimizing inventory holding costs [21]. Thus, the higher inventory cost of the dot-bams may lead to their having more frequent price changes.

Table 6 also displays interesting observations of the relationship between price changes and festive periods. There were increases in the percentage of price changes for almost all product categories for three collection dates – 6th November 2004, 27th November 2004 and 1st January 2005. All three collection dates coincide with festive periods, namely Hari Raya Puasa and Deepavali (6th

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<tr>
<th>Table 5</th>
<th>Retailer type and weekly price changes (all items)</th>
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<tbody>
<tr>
<td>Price increase Total</td>
<td>$\leq$0.01</td>
</tr>
<tr>
<td>Dot-bams</td>
<td>175</td>
</tr>
<tr>
<td>Dot-coms</td>
<td>8</td>
</tr>
<tr>
<td>Price decrease Total</td>
<td>$\leq$0.01</td>
</tr>
<tr>
<td>Dot-bams</td>
<td>117</td>
</tr>
<tr>
<td>Dot-coms</td>
<td>9</td>
</tr>
<tr>
<td>Overall mean price change Dot-bams</td>
<td>$S0.10$</td>
</tr>
<tr>
<td>Dot-coms</td>
<td>$S0.13$</td>
</tr>
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*Note: $S$ denotes Singapore dollars.*

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![Fig. 1. Percentage of observations undergoing price changes (all items).](image-url)
November 2004), pre-Christmas sale (27th November 2004) and New Year’s Day (1st January 2005).

Further analysis shown in Table 6 shows the price changes are due to price increases in all categories of groceries except for household cleaners. The highest percentage rise in price changes was observed in food from 7.7% on 30th October 2004 to 17.4% on 6th November 2004. Fig. 2 shows that the rise in price changes in food was largely due to the price increases rather than price decreases. The price increase for food rises from 1.9% on 30th October 2004 to 14.8% on 6th November 2004. In fact, the percentage of observations undergoing price decrease for food fell on 6th November 2004. One reason for this could be that the grocery stores are taking advantage of the two festivals to increase food prices as food items are usually in greater demand during festive seasons.

It was thought that the use of Internet would lead to lower online menu costs. As menu costs can affect the setting of prices, lower menu costs should lead to more frequent price changes and a more efficient market. However, our findings reveal that price changes are generally infrequent for both dot-coms and dot-bams and that dot-bams actually change their prices more frequently than dot-coms. This is contrary to previous empirical evidence which documented more frequent changes in prices for dot-coms as compared to dot-bams [3].

However, our surprising results are supported by some [57] who find that menu costs are not unimportant in practice even for online markets. In addition, due to the convenient nature of the Internet, price sensitivity can be lower among online grocery shoppers than it is for conventional shoppers, dot-coms may feel less need to engage in price changes as compared to dot-bams, which are required to coordinate the price changes for both their online and brick-and-mortar stores [19].

4.3. Mean price levels

Next, the mean price of a grocery item for dot-bams was compared to the mean price of the same grocery item for dot-coms throughout the whole collection period. Statistical results from the independent samples t-test for all grocery items throughout the entire collection period show that there is no statistically significant difference in the prices charged by dot-bams and dot-coms at the 5% significance level. Similar statistical analysis was also carried out to test the price levels charged by dot-bams and dot-coms by product categories. This is done by conducting tests for each category of the grocery items throughout the collection period. Weekly tests for the five different categories of grocery items were also performed, once again it is found that there is no statistically significant difference in price between dot-bams and dot-coms at the 5% significance level for all five categories. Therefore, we reject H3.
as our empirical results illustrate that dot-bams do not charge significantly higher prices than dot-coms.

This is a surprising result, as opposed to studies conducted in markets such as CDs, book, and cars. Instead, our results are supported by the argument of efficiency gains as a reduction of consumer search costs would occur through advancement in information technology [5]. Since perfectly rational consumers should continue to search until the expected cost of searching is more than the expected benefits [54], lower search costs would induce a higher level of searching. Since lower search costs for online markets should promote the proliferation of price comparison tools such as shopbots as well as price competition among e-sellers, there would be lower profits in the online market. Furthermore, consumers will also benefit from savings due to online retailers’ lower cost structures. This will then lead to more efficient pricing as low market entry costs may limit the price premiums sustained by existing market players in a competitive environment [34]. Information asymmetries for buyers will also be reduced, therefore leading to price convergence [55].

5. Limitations

Unlike studies in the online toy and video industries [55,57], our study excluded the delivery costs in the data analysis. This is justifiable since all the online grocery stores in Singapore deliver only within the borders of Singapore. Furthermore, the pricing comparison is done based on the supplier side instead of aspects of consumers’ considerations, thus rendering delivery costs as less important in this context.

Another limitation involves the product line constraint within the common grocery items across the five grocery stores. This is unavoidable due to the restrictions in matching common grocery items that are displayed on the websites of the grocery stores. Once the grocery items are selected, the categorization of the grocery items is arbitrary for further detailed analysis. Although the weight of importance of each of the five grocery categories surveyed may be different for each grocery store, we do not have such information, thus we merely look at the overall results and interpret them based on our understanding of the dot-bam and dot-com grocery industry in Singapore.

The analysis of this study was conducted in a time series manner instead of a cross-sectional one because of the limited number of dot-bams and dot-coms in the grocery industry in Singapore. The smaller market size of Singapore in contrast to that of larger countries partly explains the relatively small number of established dot-bams and dot-coms. Hence, this constraint in grocery store selection prevents us from performing a cross-sectional analysis.

Future research can attempt to overcome the limitations by carrying out the study for a longer period of time and across different countries. For instance, our current 18 weeks can be extended to 52 weeks so as to capture the seasonal variation in prices throughout the entire year. In addition, a country with a larger market size may possess more dot-bams and dot-coms which will allow an enhanced common grocery items’ list and thus a cross-sectional analysis. Even though pricing strategies are immensely important in attracting and retaining customers, it is essential for grocery stores to focus on other non-pricing issues that are important to customers. Hence, further research in this field could explore the importance of price versus other aspects of the grocery store such as its reputation, delivery policy, assortment variety, customer service and network security.

6. Discussion and conclusion

Many studies have been carried out to compare dot-bams and dot-coms, with particular emphasis on price dispersion, price levels and the frequency of price changes. Research has been performed on books [9,12], CDs [9,29], cars [36], videos [57] and toys [55]. Our study extends beyond the existing literatures by applying some of these theories to the online grocery market in Singapore. There are numerous surprising findings such as: dotcoms exhibit higher price dispersion than the dot-bams though with much smaller magnitude than CD, video, and toys; dot-coms do not adjust their prices more often than the dot-bams; dot-bams do not charge higher prices than dotcoms. Moreover, additional managerial insights pertain to grocery industry are derived and discussed.

We analyze the burgeoning online grocery market in Singapore by comparing the pricing dynamics of dot-bams and dot-coms. Such a comparison is pertinent as previous research demonstrated stark differences between the welfare of dot-bams and dot-coms. The collapse of the first wave of dot-coms demonstrated the inability of some dot-coms to achieve competitive advantage over the traditional dot-bams in addition to the failure of the former to develop a profitable business model. In fact, total operating costs per customer were substantially higher for dot-coms than for dot-bams in the grocery industry [45]. Moreover, a study [14] shows that dot-bams who sell their products through multiple channels greatly increase their probability of generating remarkable profits.

Dot-bams have also capitalized on their trustworthy reputations which are becoming increasingly important in contexts characterized by uncertainty and risk [31]. The willingness to provide online shopping by both dot-bams and dot-coms seems to be largely dependent on the brand image of the organization [27,31].

Our empirical results are consistent with an earlier study in the CD industry [29], providing sufficient evidence that dot-coms do not exhibit lower price dispersion than dot-bams despite the easy availability of price information for online consumers and the growth of the Internet market size. Some suggest that consumers may not be willing to conduct much price research for grocery items which have relatively low base prices [18]. Therefore, consumers may not be aware of the price differences among the various
dot-coms which results in a higher level of price dispersion among the dot-coms in the grocery industry.

The difference in the level of price dispersion between the dot-bams and dot-coms can also be explained by the different marketing strategies of the two types of retailers. The current small market size for online grocery purchasing in Singapore enables dot-bams to compete while building up their reputations and quality of service. Smaller price dispersion among the dot-bams suggests that price competition among this type of grocery retailers is relatively more aggressive than within dot-coms. This is evident in the weekly advertisements in the local newspapers by Fairprice and Cold Storage, the leading dot-bams in Singapore.

Our second hypothesis was also overturned as our findings provide strong evidence that dot-bams change their prices more frequently than the dot-coms in the grocery industry. Our results show that online markets will not always have lower menu costs and it seems that making frequent price changes to their online posted prices is not the main pricing strategy used by the dot-coms in the grocery industry. This could be due to the small market size for online grocery shopping in Singapore. On the other hand, dot-bams have higher price change frequency which may be due to the implementation of identical pricing strategies for their brick and mortar stores, which are based on EDLP (everyday low price). Since dot-bams are more likely to offer discounts to clear their inventories given their large warehouse capacity [56], they are more likely to adopt EDLP strategy, resulting in more frequent price changes than dot-coms.

For our third hypothesis, the average price level between the dot-bams and the dot-coms was found to have no statistically significant difference. This suggests that prices of both types of retailers converge due to reduced search costs among consumers and thus lower information asymmetries. In order to remain competitive with the larger and more reputable dot-bams, the smaller dot-coms may have also pegged their online posted prices closely to those of the dot-bams, and lower search cost has certainly made such operation easier.

One of the issues affecting online grocers is that conversion rate or the proportion of consumers who make purchases among the total who visit a website, is low, ranging between 2% and 3% [51]. This is even more pertinent in Singapore because of the limited market size. Hence, both dot-coms and dot-bams should emphasize the positive factors of online grocery shopping: the chance to price discriminate or to make better deals, the convenience of online shopping [44] and its delivery service, and the flexibility of opening hours [41,60].

In addition, both dot-bams and dot-coms should focus on customer density – sales per geographical area [61] as well as the frequency of orders and the size of each order [14]. Not only should they cater to customer demands that can be fulfilled effectively, but also that correspond to the bulk of customers’ purchases [58]. In fact, providing more product information to customers will lead to improved product fit, reduced price sensitivity and hence, higher profit margins [32].

We have also derived certain managerial implications from this study. The pricing strategies of dot-bams are seen to be influenced by their market power in the brick-and-mortar market. Dot-bams in Singapore are reluctant to decrease their online prices as they view their online grocery stores as substitutes and not complements to their physical stores. Hence, given that smaller dot-coms observe and peg their prices closer to the dot-bams, there is a lack of significant difference in price levels between dot-coms and dot-bams. This demonstrates that the online grocery stores in Singapore are not taking advantage of the efficiency of the Internet by positioning themselves as having the lowest prices. Dot-coms in this context appear to have failed to capitalize on the low menu costs of the Internet as dot-bams actually change their prices more frequently than the dot-coms.

In addition, we observe that the players in the grocery industry in Singapore are not overly price sensitive, leading to a lack of competition. The grocery stores involved in our study need to reshape their online strategies by gaining a better understanding of customer’s needs as well as providing quality online shopping experience. In particular, dot-bams should actually form integrated strategies for their online and brick-and-mortar stores in order to dominate both the online and physical marketplaces. Currently, online grocery stores may only attract customers who actively seek convenience and time-saving. In order to gain more online customers, they should focus on other non-price strategies such as increasing product variety, providing better warranty and refund policies, improving delivery services, ensuring tighter online security, and creating trust to enhance their reputations – some of these can be implemented efficiently with the aid of the information technology.

Despite the trusted reputations of dot-bams and the fact that their financial and operational resources confer advantages upon them in the online grocery market, pure dot-coms can still create niche markets by segmenting their markets and analyzing their customers’ needs and wants. It would be interesting to explore how online grocery stores create customer awareness, increase their customer base and whether they can obtain more alternative sources of advantage.

References