Bond University

Research Repository

How much more to pay? A study of retail prices of organic versus conventional vegetarian foods in an Australian regional area

Lee, Megan; von der Heidt, Tania; Bradbury, Joanne ; Grace, Sandra

Published in:
Journal of Food Distribution Research

Licence:
Other

Link to output in Bond University research repository.

Recommended citation(APA):
Lee, M., von der Heidt, T., Bradbury, J., & Grace, S. (2021). How much more to pay? A study of retail prices of organic versus conventional vegetarian foods in an Australian regional area. *Journal of Food Distribution Research*, *52*(3), 46-62. https://www.fdrsinc.org/wp-content/uploads/2021/12/JFDR52.3_3_Lee.pdf

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.

Download date: 10 Oct 2026

Food Distribution Research Society

Journal of Food Distribution Research
Volume 52, Issue 3, pp. 46-62

How Much More to Pay? A Study of Retail Prices of Organic Versus Conventional Vegetarian Foods in an Australian Regional Area

Megan F. Lee[a]Ⓘ, Tania von der Heidt[b], Joanne F. Bradbury[c], and Sandra Grace[a]

[a]*Adjunct Senior Lecturer, Faculty of Health,*
Southern Cross Drive, Southern Cross University,
Bilinga, QLD 4215, Australia

[b]*Senior Lecturer, Faculty of Business, Law and Arts,*
Southern Cross University,
Lismore, NSW, Australia

[c]*Senior Lecturere, Faculty of Health,*
Southern Cross Drive, Southern Cross University,
Bilinga, QLD 4215, Australia

[d]*Professor, Faculty of Health,*
Southern Cross Drive, Southern Cross University,
Bilinga, QLD 4215, Australia

Abstract

Organic foods are popular around the world, with some consumer segments willing to pay price premiums. This study determined the price differential of a shopping basket of organic versus conventional vegetarian foods using an observation of retail prices across 13 conventional retailers in a regional area of Australia. The organic basket had a 60% price premium, with premiums varying widely by retailer. The higher premiums for fruits, vegetables, and grains relative to dairy and sugar may be due to higher costs of marketing channel logistics.

Keywords: consumer behavior, organic food, pricing, retailing

ⒾCorresponding author: Tel: +61 7 5595 5 | 0415 643 743
Email: megan.lee@scu.edu.au

Introduction

Organic foods (OF) are increasingly popular around the world (Golijan & Dimitrijević, 2018). They help to reduce the use of chemical pesticides and fertilizers and thereby increase sustainability indicators in agriculture (Mie et al., 2017). Governments around the world have identified organic agriculture as an important strategy to sustainably feed the world, particularly in the context of climate change and population growth (Diaz et al., 2019). Industry bodies, such as the International Federation of Organic Agriculture Movements (2018) and the Food and Agriculture Organization of the United Nations (2018), have aspirations for organics production to significantly scale up, to purportedly help provide more sustainable food production in view of perceived future challenges for food access, utilization, stability, and availability. Further, consumers value the perceived health benefits (Zander & Hamm, 2010; Gschwandtner, 2018; Lawson et al., 2018) and lower environmental impacts of OF (De Toni, Eberle, and Milan, 2018).

Consumer demand in the OF retail market in the United States is expanding with double-digit growth, and it currently accounts for more than 4% of total food sales. According to industry research, in 1999, the value of organic consumers' purchases globally was $15 billion, compared with $91 billion in 2017 (International Federation of Organic Agriculture Movements, 2018). This growth in demand is an international phenomenon. According to the Australian Organic (2019) market report, for instance, the organic food market in Australia is worth AUD$2.6 billion, a growth of 88% since the report's inception in 2012. In a random sample (N = 1,109) of Australian households, almost half (49%) indicated that they sometimes or often buy organic foods, particularly if they were employed full time, had one child, or were never married (Ward et al., 2012).

As a market-driven consequence of the growing demand for OF, the supply of OF has increased in recent years, and the nature of OF retailing in Australia has changed (Australian Organic, 2019). Initially, OF was the province of niche independent specialty grocery stores, cooperatives, and health-food stores, afforded predominantly by those with higher disposable incomes and "trendy or alternative" progressive leanings. OF was not always readily available, and when it was, the retail prices were high compared to the nonorganic counterparts. Within a relatively short period, conventional and popular food retailers, such as supermarkets, have been increasingly entering the OF market, and now routinely stock at least some OF items. Big supermarket chains have captured a large share of the OF market from organic grocery and health-food stores, which now sell less than 50% of all OF purchased. At the same time, the farmers' market movement (where consumers purchase directly from the farmers at local markets) has also grown. However, most farmers are struggling to keep up with the demand for organic produce, as the transition to full organic certification can take many years (Bernzen & Kristiansen, 2017).

Despite this growth in OF supply and demand, OF remains a niche market, both in Australia and globally, making up only 1% of the world's total food industry (Islam, 2014; International Federation of Organic Agriculture Movements, 2018). Some consumers are willing to pay more for environmentally friendly products (Laroche, Bergeron, and Barbaro-Forleo, 2001), including OF (The Nielsen Company, 2016). For instance, of six different consumer segments based on

knowledge and attitudes toward OF, Ghosh et al. (2016) identified the "organic motivator" consumer type as having a positive attitude toward paying a higher price for organic food products (Ghosh, Datta, and Barai, 2016, p. 634). Further, consumer segments characterized by pro-environmental behaviors tend to choose a plant-based diet, such as consumers who identify as vegetarians or vegans (Fan et al., 2019). Among the many reasons consumers give as motivation to adhere to a vegetarian dietary pattern, most are related to ecological and ethical issues, such as environmental concerns, sustainability, and animal rights (Fox and Ward, 2008). While vegans adhere strictly to plant-based diets, vegetarian diets are primarily plant-based but also include some animal products, such as dairy and eggs. The price premium of a vegetarian conventional shopping basket is still unclear in the literature. Because vegetarians are more likely to purchase OF products due to ethical and ecological concerns, it is essential to investigate the price premium of a twice-weekly vegetarian shopping basket of organic versus conventional food items (Fox and Ward, 2008).

This paper presents a methodology and empirical findings regarding the actual price differential between a conventional versus organic, twice-weekly, vegetarian shopping basket at the retail level in a regional area in Australia. A positive price differential, also known as a price premium, indicates that organic food is more expensive than the conventional (nonorganic) version. Conversely, when the organic food is cheaper than the nonorganic equivalent, the differential may be referred to as a negative price premium or sometimes a price discount. There is a widespread perception that OF products generally cost more. Several studies have investigated consumers' willingness to pay premiums for organic products (Hamzaoui-Essoussi and Zahaf, 2012; Islam, 2014; Aschemann-Witzel and Zielke, 2017; Gschwandtner, 2018). In general, the higher price to the consumer in purchasing organic versus conventional foods was found to be a critical barrier to the buying preference of most consumers (Henryks, Cooksey, and Wright, 2014; Lee and Yun, 2015).

The magnitude of the price premium is an important indicator of the value consumers place on OF and hence their demand for it (Hamzaoui-Essoussi and Zahaf, 2012). Therefore, to better understand and manage the demand for OF, it is important to measure the actual retail price premiums for OF items (Islam, 2014). Existing studies examining OF price premiums at the retail level have yielded different estimates. According to Brown and Sperow (2005), in 1999, Promar International, a consultancy service to farmers, food companies, and retailers, reported that OF were associated with a 70% price premium on average. Similarly, the Australian consumer advocate *Choice Magazine* reported in 2000 that organic fruit and vegetables were on average 70% more expensive than nonorganic, but by 2013 the premium was decreasing (Footprint Choices, 2013). More recently, industry reports on the price premium for OF in Australia places it around a 20% premium on average, with wide variation depending upon location (Footprint Choices, 2013). Hamzaoui-Essoussi and Zahaf (2012) have suggested that wide-ranging premiums for OF products depend upon the country.

To date, only one published paper has investigated price differences between organic and conventional foods using a shopping basket methodology. Brown and Sperow (2005) found that the equivalent of a twice-weekly basket of OF was 49% more expensive than a shopping basket

of the same conventional items in a metropolitan area in the United States. The authors identified the organic price premium for different product categories: grains, 23%; fats and oils, 122%; sugars and sweets, 108%; fruits, 61%; milk and cheese, 69%; vegetables, 15%; meat, 57%; and other food items, 22%. However, this study focused on an average conventional household shopping basket that contained meat. The price premium of a vegetarian conventional shopping basket has not yet been reported in the literature. There is a paucity of scholarly literature on the current price differential between organic and conventional products at the retail level (Islam, 2014), especially for a vegetarian household's OF shopping basket. As vegetarians are more likely to purchase OF products due to ethical and ecological concerns, it is important and informative to investigate the price premium of a twice-weekly vegetarian shopping basket of organic versus conventional food items (Fox and Ward, 2008). As existing research on the price differential for an organic versus conventional food shopping basket has predominantly been conducted in the United States (Brown and Sperow, 2005), the current study seeks to understand the price differential in another location, namely a regional area in Australia.

Materials and Methods

Context

The context for the study is the Byron Shire in the Northern Rivers area of Australia, the country that has been described as an organic champion concerning the area of land certified under organic management (Lawson et al., 2018, p. 1). Organic products in Australia were worth about $2.6 billion AUD in 2019, or approximately 1.5% of the Australian economy (AUD1.7 trillion in 2019). Collectively, food crops and dairy products comprise half of all organic sales in Australia (Lawson et al., 2018).

The Byron Shire is located in Australia's most easterly region in the Northern Rivers area of New South Wales. The Shire's population of around 34,000 residents is spread across five postcode areas. The Byron area is a popular tourist hub, attracting more than two million visitors annually. It is known for its natural beauty, strong community spirit, progressive values, and "green" lifestyle. Local farmers in the Byron Shire are country leaders in biodiversity, organic production, and management of soil and crops. There are numerous zero-chemical organic farms in the area that aim to protect the local fauna and flora, as well as provide sustainable and chemical-free produce to the local market (Byron Shire Council, 2020). The Byron Shire Council was the first in Australia to elect a Green mayor (2011), and the Council actively promotes organics through its policy to give preference to "organic, free-range, and fair trade" catering purchases to hosting events during National Organics Week (2017). The Byron Shire is often seen as a national leader in the production and consumption of organic produce (Department of Agriculture Water and the Environment [Australia], 2014). Food suppliers in the area offer a great variety of organic and nonorganic food products. The area is also well known for its ecotourism, wellness industry, and counter-culture. Local residents and tourists drive the demand for both vegetarian and organic produce (Byron Shire Council, 2020). In response to this demand there has been a proliferation of vegetarian and organic restaurants and cafes over the past 10 years.

Design

The study was designed as a cross-sectional in-store observation of shelf prices. The study method, as informed by Malhotra (2010), involved recording objects, or patterns of behavior in people, in a structured and systematic way. The phenomenon of interest, in this case, was the retail price of selected food items. By not giving prior warning to the retailers, the prices and the retail environment could be observed in a natural setting.

Sampling Frame

Thirteen retail food outlets in the Byron Shire Local Government Area (Lasky, 2020) were included. Retail stores (outlets) were included if they sold: (i) both organic and nonorganic foods and (ii) both fresh (fruit and vegetables) and processed (including coffee, bread, pasta, tins of tomatoes) foods. A sampling frame of food retailers in the Byron Shire was compiled through a brainstorming session with researchers and the industry partner (a nonprofit local health food retailer, see acknowledgments), all of whom had local knowledge of OF retailing in the area. Farmers' markets were excluded, as they generally sell only fresh produce. Thirteen conventional food retailers who met the study criteria were identified. Following Miller (2008), three retailer types were delineated: (i) supermarkets and grocery stores, which carry an extensive product range and adopt a mass-marketing approach; (ii) convenience stores, which carry some groceries, takeaway, and other merchandise, operate from a very convenient location, and have longer opening hours; and (iii) specialized food retailers, which focus on a narrow product range.

The Shopping Basket

A shopping basket was designed to represent the average twice-weekly purchase for a typical household—a family of four (two adults and two children). The definition of a vegetarian shopping basket was adapted from the 2014 Healthy Food Access Basket Survey (Queensland Department of Health [Australia], 2015). Food products were categorized according to the six core foods groups identified by the Australian Dietary Guidelines (National Health and Medical Research Council [Australia], 2006): (i) bread/cereals, (ii) dairy and eggs, (iii) fruits/vegetables, (iiii) nuts, (v) oils, and (vi) discretionary items (e.g., chocolate). These six food categories were also captured in Brown and Sperow's (2005) shopping basket, albeit in four food categories (breads/cereals, oils and discretionary items, fruits and dairy, vegetables, meat, meat alternatives, and other food items).

Within each of the six food categories, typical food items were chosen by the team of five researchers in consultation with the industry partner. Regular staples were included, such as bread and milk and tea and coffee, which would cover standard meals. For instance, the researchers agreed that most Australian households would probably have one pasta dish every two weeks, so tins of tomatoes, spaghetti, and olive oil were included in the basket. Fruit and vegetable choices were based on variety, including one starchy vegetable, one green leafy vegetable, and a variety of colors (red, orange, and green) and included a tinned rather than fresh variety of tomatoes. Eggs and almonds were selected in place of meat as common protein substitutes used in vegetarian dietary patterns. The final basket included 21 food items (see Table 1).

The quantities for each of the 21 items to be included in the shopping basket were then determined using the Queensland Healthy Food Access Basket, which specifies the quantities of commonly eaten foods for one- to six-person households (Queensland Department of Health [Australia], 2015). The items contained in the shopping basket were based on the nutritional needs of an Australian household for two weeks as recommended by the Australian Guide to Healthy Eating (National Health and Medical Research Council, 2016). This approach mirrors that of Brown and Sperow (2005), who based shopping basket quantities on the U.S. Department of Agriculture's Thrifty Food Plan quantities recommended for consumption, whereby calculated prices were for quantities consumed, rather than for quantity purchased, as per the package size. The quantities for the four-person household shopping basket of 21 items in the study at hand are included in Table 1.

Table 1. Food Items and Weights—Four Person Twice-Weekly Shopping Basket

Bread/Cereal	Vegetables	Fruit	Dairy and Eggs	Nuts	Discretionary	Oils
Flour (500g)	Tinned tomatoes (1.36 kg)	Apple (4.97 kg)	Milk (3 Ltr)	Almonds (780g)	Chocolate (400g)	Olive oil (165g)
Spaghetti (1 kg)	Carrots (2.4 kg)	Orange (4.19 kg)	Butter (1.06 kg)		Tea bags (252g)	
Sugar (900g)	Onion (1.08 kg)	Avocado (1.17 kg)	Eggs (2 dozen)		Freshly ground coffee (144g)	
Bread (2.8 kg)	Baby spinach (565g)					
Rice (900g)	Potato (2.61 kg)					

Source: Developed for this study based on food categories from the Australian Dietary Guidelines (National Health and Medical Research Council, 2006) and food weights from the Queensland healthy food access basket (Queensland Department of Health, 2015).

Data Collection Protocol

Prior to data collection, pilot data were collected across two retail outlets to refine the approach. On the first day, two researchers visited the first two stores together and manually entered the prices into handheld devices that contained a link to a data capture survey, hosted by the online survey platform Qualtrics (www.qualtrics.com). The researchers developed a consensus on which prices to collect to facilitate consistency in reporting through a process, including comparing the accuracy of the collected data and agreeing to a systematic approach for product selection. For example, mi-price range products were selected rather than more expensive or cheaper store-brand products, and the same brand was chosen across retailers where possible. Standard shelf price was used rather than any currently advertised discounted price. Packaged items were recorded in absolute terms (per item) and relative terms (per kilogram/liter). Fresh produce (loose) was priced in units or per kilogram, and the national average size of each item (Food Standards Australia and

New Zealand, 2018) was used to calculate the per-unit or kilogram price if it was not displayed in the retail outlet. For the remainder of the stores, the researchers collected data independently over five days.

Data Analysis Strategy

The retail price data collected was downloaded into an Excel spreadsheet for checking and descriptive statistics and then into Stata (StataCorp, 2019) for statistical analyses. The OF price premium was determined in two ways. First, the OF price premium was calculated by subtracting the price of the conventional item from the corresponding organic item per store. The "premium" was calculated as the price difference divided by the conventional price per item (i.e., premium = price difference/conventional price). Second, the quantities of each item that would typically go into a twice-weekly shopping basket for a family of four were used as weights to calculate the total a household typically spends on an organic and conventional shopping basket. This is consistent with how Brown and Sperow (2005) estimated OF price premiums.

The retailers' data were further explored for each of the three retailer categories: supermarket, general store, and fruit and vegetable store. Finally, OF price premium differences by retailer, location. and an overall average difference were calculated.

Results

Of the 19 food retailers identified in the Byron Shire who sold OFs, only 13 sold both organic and conventional foods; five retailers were health foods stores and did not sell conventional products; no retailers sold only conventional food (i.e., nonorganic options).

Organic Food Price Premium Based on Paired Observations

There were 152 paired observations of 21 organic and conventional food items. The means of the price premiums (of organic over conventional foods) per item, as a percentage, are provided in Table 2. While there was large variability in the mean OF price premiums, all means except for coffee were positive, indicating that OF products were more expensive than the matching conventional food items. The highest mean OF price premium was for carrots (143%). Negative price premiums (or discounts) were observed among only six OF food items—tinned tomatoes (-21%), carrots (-20%), coffee (-20%), bread (-18%), teabags (-17%), and rice (-11%). The three greatest price premiums were for rice (315%), butter (265%), and carrots (242%). The overall mean percentage OF price premium of the paired observations across the 21 food categories was 77.3% (unweighted for number of observations) and 74.8% (weighted for number of paired observations [i.e., frequency]).

Table 2. Mean Observed OF Price Premium Percentage (rounded to nearest %).

	Mean of Observed OFPP	SD of Mean	Min Observed OFPP	Max Observed OFPP	*N* of Paired Observations
Apple	75	56	19	180	6
Avocado	110	31	81	153	4
Onion	134	53	38	182	6
Spinach	39	25	12	60	4
Potato	84	55	33	186	6
Orange	75	47	27	144	6
Carrot	143	90	-20	242	8
Flour	63	16	50	82	4
Spaghetti	96	104	10	311	8
Sugar	58	16	41	72	3
Bread	60	61	-18	175	10
Rice	104	103	-11	315	8
Tinned tomatoes	50	94	-21	249	7
Milk	58	24	33	113	12
Butter	59	75	0	265	10
Eggs	71	44	0	168	9
Almond	95	16	77	106	3
Chocolate	121	53	60	190	10
Teabags	88	96	-17	229	8
Coffee	0	18	-20	34	12
Olive oil	41	45	1	117	8
Unweighted	77.3				
Weighted	74.8				

Shopping Basket Organic Food Price Premium

The OF premiums in Australian dollars (AUD) paid by the purchaser of a twice-weekly household shopping basket are given in Table 3. Using the average of the observed retail prices of each organic and conventional food item across all retailers for the standard weights, the total household cost of an OF shopping basket was calculated as AUD323.07, compared with AUD203,13 for the basket of conventional food items (see Table 3). The difference of AUD121.06 constitutes a 59.6% (95% CI: 39.79, 82.02) price premium of the basket of OF over the basket of conventional foods.

Table 3. Average Price of Food Items (per kg) in Twice-Weekly Shopping Basket (in AUD)

Food Item	Twice-weekly Household Total (kg or l)	Organic Average Price (kg or l)	Organic Basket Total	Conv. Average Price (kg or l)	Conv. Basket Total	Basket Diff	*N*
Apple	4.97	$9.38	46.62	$5.80	28.83	17.79	62
Avocado	1.17	$19.56	22.89	$12.61	14.75	8.14	55
Onion	1.08	$5.12	5.53	$2.89	3.12	2.41	77
Spinach	.57	$29.75	16.81	$24.25	13.70	3.11	23
Potato	2.61	$4.41	11.51	$3.21	8.38	3.13	37
Orange	4.19	$3.60	15.08	$3.82	16.01	-0.40	-3
Carrot	2.4	$5.09	12.22	$2.55	6.12	6.10	100
Flour	.50	$5.52	2.76	$2.93	1.47	1.29	88
Spaghetti	1.00	$8.30	8.30	$3.83	3.83	4.47	117
Sugar	.90	$4.34	3.91	$2.40	2.16	1.75	81
Bread	2.80	$7.44	20.83	$4.35	12.18	8.65	71
Rice	.90	$8.23	7.41	$4.32	3.89	3.52	91
Tin tomato	1.365	$5.41	7.38	$3.66	5.00	2.38	48
Milk	3.00	$2.71	8.13	$1.79	5.37	2.76	51
Butter	1.06	$22.16	23.49	$15.54	16.47	7.02	43
Eggs	1.62	$14.12	22.28	$8.59	13.92	8.95	64
Almonds	0.78	$38.03	29.66	$20.05	15.64	14.02	90
Chocolate	0.4	$59.29	23.72	$25.47	10.19	13.53	133
Teabags	0.25	$94.92	23.92	$52.56	13.25	10.67	81
Coffee	0.144	$44.48	6.41	$42.43	6.11	0.3	5
Olive oil	0.165	$25.50	4.21	$16.61	2.74	1.47	54
Total			323.07		203.13	121.06	
OFPP on total spend							59.6%

Note: Conv, Conventional; Diff, Price differential; OFPP%, Organic Food Price Premium Percentage

Using this measure of OF price premium (as a percentage), food items with the highest OF price premium were chocolate (133%), spaghetti (117%); and carrots (100%). Those with the lowest were coffee (5%) then spinach (23%) (see Figure 1). Organic oranges were 3% less expensive than conventional in the shopping basket. The items with the highest absolute mean price difference between organic and conventional foods were apples and almonds with differences of AUD17.79/kg and AUD14.02/kg, respectively. The AUD0.30/kg price difference between organic and conventional coffee was the lowest. There was more variability in the pricing for OF products than conventional (e.g., prices for 5 kilos of organic apples ranged from AUD28.00 to AUD46.80).

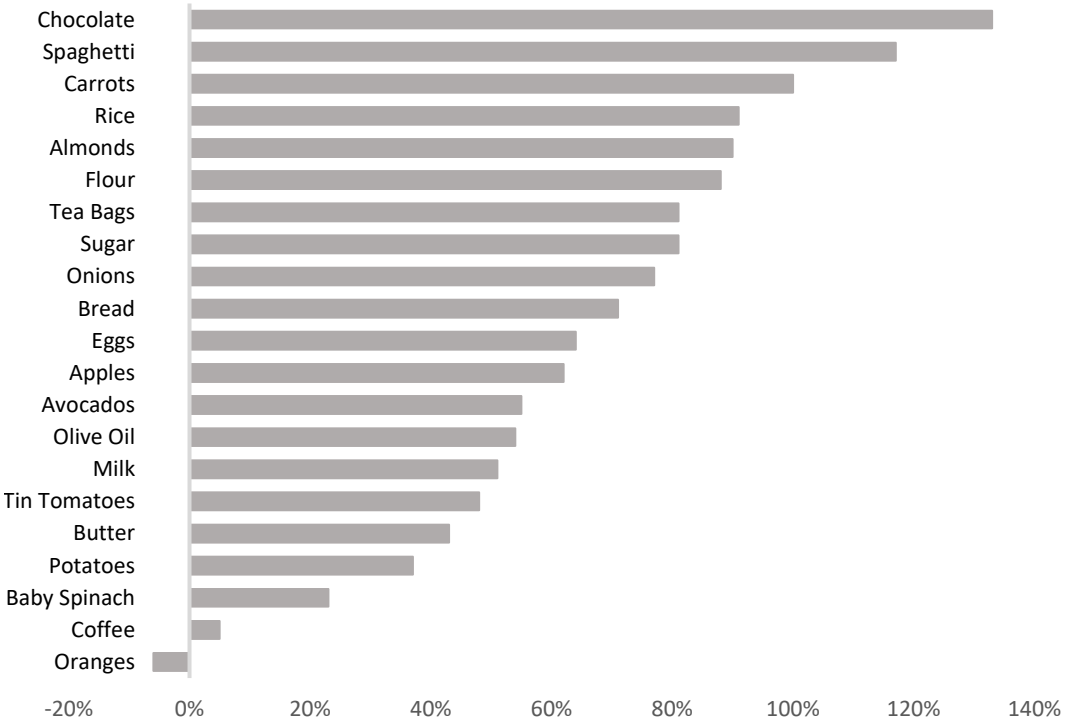

Figure 1. Organic Food Price Premium for a Twice-Weekly Shopping Basket (in AUD)

Organic Food Price Premium by Retailer Type

The type of retailer had a significant impact on organic price premiums ($F(2,10) = 4.26$, $p = 0.046$). General stores had the highest premiums (110% [95%CI: 82%, 138%]). Compared with general stores, supermarkets had a significantly lower price premium (-40% [95%CI: -72%, -0.09%]), as did fruit and vegetable stores (-26% [95%CI: -66%, 0.14%]). The R-square statistic indicates that 35% of the variance in the price premium was explained by retailer type (see Table 4). A full list of all the price premiums by item and retail store is available in the supplementary material.

Table 4. Regression of Store Type on the Proportion of Price Difference between Organic and Conventional

	Coef.	Std. Err.	*t*	*P > t*	[95% Conf.	Interval]
Reference category: General Store						
Supermarket	-0.40	0.14	-2.87	0.017	-0.72	-0.09
F&V Store	-0.26	0.18	-1.44	0.182	-0.66	0.14
_cons	1.10	0.13	8.64	0.000	0.82	1.38

Note: $F(2,10) = 0.0459$, $p = 0.0459$, R-squared = 0.352, $N = 13$.

Discussion and Conclusions

This paper is one of the few empirical studies to report on actual retail price premiums of organic versus conventional foods using a shopping basket methodology. It is the first study to determine the actual price differential between a twice-weekly shopping basket for a family of four for vegetarian OF items compared with an equivalent shopping basket of conventional food items in retail outlets, and it does so in a regional area in Australia. Consumers in the Byron Shire were found to pay considerably more for a twice-weekly shopping basket of OF items: approximately 60% more when the premium was measured for the weighted aggregate shopping basket across multiple retailers. The shopping basket premium of 60% takes into account twice-weekly consumption habits of a typical family of four on a vegetarian diet.

The OF premiums determined in the study are about 10% higher than the those reported in a similar study in the United States (Brown & Sperow, 2005), where a twice-weekly shopping basket of organic products (including meat) was 49% more expensive than a comparable basket of nonorganic products. This may be due to the higher cost of agri-food supply chains providing "farm-to-fork" functions (Tsolakis et al., 2014) in Australia, where the population is small and widely dispersed. The relatively higher premiums for fruits, vegetables, and grains found in the current study may reflect these costs. By contrast, the relatively lower OF price premiums for dairy products (e.g., butter, milk) and sugar in the Byron Shire found in the study may reflect lower supply chain costs, as these foods are being grown within or near the Shire.

The OF price premiums identified in the Byron Shire varied widely by food category, retailer, and location. The current study found that even within the supermarket segment, there is a wide variation of the same shopping basket premiums, ranging from 51% to 78%. Store type also influenced the OF price premium, with general convenience stores demanding a higher premium than supermarkets. There was a significant effect of retailer type explaining one-third of the value in price premiums. However, caution in interpretation is required here as there were only two general stores in the sample (see Table 5). Larger samples in other regions are required to estimate whether this is a consistent trend for general stores.

Table 5. Average Price of Food Items (per kg) in Twice-Weekly Shopping Basket (in AUD) by Retailer

	Supermarket					General Store					F&V				
	N	Mean	Std. Dev.	Min	Max	*N*	Mean	Std. Dev.	Min	Max	*N*	Mean	Std. Dev.	Min	Max
Apple	4	0.81	0.71	0.19	1.80	0					2	0.64	0.16	0.53	0.75
Avocado	3	0.96	0.15	0.81	1.10	0					1	1.53	.	1.53	1.53
Onion	4	1.17	0.59	0.38	1.64	0					2	1.66	0.22	1.51	1.82
Spinach	2	0.60	0.00	0.60	0.60	0					2	0.18	0.09	0.12	0.25
Potato	5	0.85	0.61	0.33	1.86	0					1	0.80	.	0.80	0.80
Orange	5	0.70	0.51	0.27	1.44	0					1	1.03	.	1.03	1.03
Carrot	6	1.60	0.97	-0.20	2.42	0					2	0.90	0.46	0.58	1.23
Flour	4	0.63	0.16	0.50	0.82	0					0				
Spaghetti	6	0.60	0.65	0.10	1.45	1	3.11	.	3.11	3.11	1	1.00	.	1.00	1.00
Sugar	2	0.52	0.16	0.41	0.63	0					1	0.72	.	0.72	0.72
Bread	7	0.52	0.54	-0.18	1.56	2	0.30	0.25	0.12	0.48	1	1.75	.	1.75	1.75
Rice	7	1.21	0.99	0.19	3.15	1	-0.11	.	-0.11	-0.11	0				
Tin tomato	7	0.50	0.94	-0.21	2.49	0					0				
Milk	9	0.63	0.26	0.39	1.13	1	0.48	.	0.48	0.48	2	0.46	0.17	0.33	0.58
Butter	8	0.31	0.19	0.00	0.51	1	2.65	.	2.65	2.65	1	0.73	.	0.73	0.73
Eggs	8	0.80	0.38	0.44	1.68	0					1	0.00	.	0.00	0.00
Almonds	3	0.95	0.16	0.77	1.06	0					0				
Chocolate	8	1.10	0.54	0.60	1.90	2	1.63	0.07	1.58	1.68	0				
Tea bags	6	0.44	0.57	-0.17	1.40	1	2.29	.	2.29	2.29	1	2.17	.	2.17	2.17
coffee	9	0.03	0.20	-0.20	0.34	2	-0.06	0.08	-0.12	0.00	1	-0.17	.	-0.17	-0.17
olive oil	6	0.32	0.38	0.01	1.01	0					2	0.67	0.70	0.18	1.17

Note: Data is for paired items (conventional versus organic item).

Price Premiums by Item and Store Type

It appears that the price premium for organic fruits, vegetables, and grains is higher in the Byron Shire of northern New South Wales than in a mid-Atlantic region of the United States (86% compared to 61%; 100% compared to 15%; 84% compared to 23%, respectively). However, the price premium for organic fats and oils, milk and cheese, and sugar and sweets is lower in the Byron Shire (50% compared to 122%; 58% compared to 69%; 90% compared to 108%, respectively). These differences may, in part, be due to the difference in the number of food items included in each category. For example, nine fruits were included in the American study, whereas the present study included only three. These three fruits were intended to represent the amount of fruit that a family of four would consume every two weeks by weight, although it did not account for seasonal variety.

Limitations and Further Research

There are several limitations to this study. First, sales data were not included for OF and conventional food equivalents. Studying turnover volume in addition to retail prices would help validate the appropriateness of the retail prices, as sales result from consumers' willingness to pay more. Also, there were a small number of stores, which was reflected in the wide confidence intervals. Nevertheless, all stores in the region were included, making this a census study of stores selling both conventional and organic foods in the local Shire. Future studies could widen the data capture area to increase the number of stores and the statistical analysis, perhaps across multiple local government areas.

Due to the cross-sectional nature of the data collection, differences in prices due to seasonality were not taken into account. Future research may benefit from a longitudinal study design to assess the seasonality of the fresh produce included in the twice-weekly shopping basket. Further, researchers used their discretion regarding the classification of some items in the food basket (e.g., ground coffee versus instant coffee as a conventional item). Other researchers may have made different choices; however, the impact on the results of the study are likely to have been minimal.

While the Byron Shire could be representative of regions seeking to increase the consumption of OF across the country (Franklin, 2015), it is possible that the OF price premiums for organics will vary across a country like Australia, as the flow of supply and demand may differ by geographical region. Further research would be required to determine the extent to which this occurs. Future research into how retail store attributes influence consumer decision making regarding OF, including the willingness to pay more for OF, is also recommended.

In conclusion, few studies have investigated the price of an average twice-weekly shopping basket of staples comparing organic versus conventional foods. In determining the actual price premiums, the present study extends current knowledge and addresses calls to determine the actual retail price premium for OF (Islam, 2014). It helps to inform the decision making of OF producers and marketers, for example, in terms of the level of production and pricing of OF. In turn, consumers

who have previously been skeptical about the high OF price premiums may be attracted to the market.

Acknowledgments

This research was supported by a collaborative seed grant from Southern Cross University's Centre for Organics research and Santos Organics, a local registered nonprofit environmental charity. Santos Organics provided a small monetary grant and staff time toward the project, including help with identification of OF retailers within the Byron Shire. Santos Organics were not involved in the data collection, analysis, and interpretation or reporting of the research.

References

Aschemann-Witzel, J., and S. Zielke. 2017. "Can't Buy Me Green? A Review of Consumer Perceptions of and Behavior toward the Price of Organic Food." *Journal of Consumer Affairs* 51(1): 211–251.

Australian Organic. 2019. *Australian Organic Market Report*. Nundah, Queensland: Australian Organic Ltd. Available online: https://austorganic.com/industry/publications/market-report/

Bernzen, A., and P. Kristiansen. 2017. *Challenges for Organic Agriculture in Australia: Getting a "Fair Go."* Organic Trust Australia—Research and Education. Available online: http://www.organictrustaustralia.org.au/sites/default/files/Bernzen-OA_in_AU.pdf

Brown, C., and M. Sperow. 2005. "Examining the Cost of an All-Organic Diet." *Journal of Food Distribution Research* 36(1): 19–26.

Byron Shire Council. 2020. *Food Production*. Available online: https://www.byron.nsw.gov.au/Business/Business-in-Byron/Food-production

De Toni, D., L. Eberle, F. Larentis, and G.S. Milan. 2018. "Antecedents of Perceived Value and Repurchase Intention of Organic Food." *Journal of Food Products Marketing* 24(4): 456–475.

Department of Agriculture Water and the Environment. 2014. *Australian Food Statistics 2012-2013*. Canberra, Australia: Department of Agriculture Water and the Environment. Available online: https://www.agriculture.gov.au/ag-farm-food/food/publications/afs/food-stats-2012-13

Diaz, S., J. Settele, E. Brondízio, H. Ngo, M. Guèze, J. Agard, . . .S. Butchart. 2019. *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Bonn, Germany: IPBES. Available online: https://www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf

Fan, A., B. Almanza, A.S. Mattila, L. Ge, and E. Her. 2019. "Are Vegetarian Customers More 'Green'?" *Journal of Foodservice Business Research* 22(5): 467–482.

Food and Agriculture Organization of the United Nations. 2018. *The Future of Food and Agriculture: Alternative Pathways to 2050*. Rome, Italy: Food and Agriculture Organization of the United Nations. Available online: http://www.fao.org/global-perspectives-studies/resources/detail/en/c/1157074/

Food Standards Australia and New Zealand. 2018. *Nutrients Table for Use in Australia (NUTTAB)*. Available online: http://www.foodstandards.gov.au/science/monitoringnutrients/nutrientables/pages/default.aspx

Footprint Choices. 2013. "Why Does Organic Food Cost More?" *Australian Organic Food Directory*. Available online: https://www.organicfooddirectory.com.au/organic-answers/why-organic-food-costs-more/

Fox, N., and K. Ward. 2008. "Health, Ethics and Environment: A Qualitative Study of Vegetarian Motivations." *Appetite* 50(2-3): 422–429.

Franklin, J. 2015. *Characterisation of the Socio-economic Landscape of the North Coast Region of NSW*. Casino, New South Wales, Australia: North Coast Local Land Services. Available online: http://northcoast.lls.nsw.gov.au/__data/assets/pdf_file/0012/564789/characterisation-of-the-socio-economic-landscape-of-the-north-coast-region-of-nsw.pdf

Ghosh, S., B. Datta, and P. Barai. 2016. "Modeling and Promoting Organic Food Purchase." *Journal of Food Products Marketing* 22(6): 623–642.

Golijan, J., and B. Dimitrijević. 2018. "Global Organic Food Market." *Acta agriculturae Serbica* 23(46): 125–140.

Gschwandtner, A. 2018. "The Organic Food Premium: A Local Assessment in the UK." *International Journal of the Economics of Business* 25(2): 313–338.

Hamzaoui-Essoussi, L., and M. Zahaf. 2012. "Canadian Organic Food Consumers' Profile and Their Willingness to Pay Premium Prices." *Journal of International Food and Agribusiness Marketing* 24(1): 1–21.

Henryks, J., R. Cooksey, and V. Wright. 2014. "Organic Food At the Point of Purchase: Understanding Inconsistency in Consumer Choice Patterns." *Journal of Food Products Marketing* 20(5): 452–475.

International Federation of Organic Agriculture Movements. 2018. *2017 Consolidated Annual Report of IFOAM*. Bonn Germany: Organics International. Available online: https://www.ifoam.bio/en/our-library/annual-reports

Islam, S. 2014. "Marketing Organic Foods through Conventional Retail Outlets." *Journal of Marketing Development and Competitiveness* 8(1): 98–112.

Laroche, M., J. Bergeron, and G. Barbaro-Forleo. 2001. "Targeting Consumers Who Are Willing to Pay More for Environmentally Friendly Products." *Journal of Consumer Marketing* 18(6): 503–520.

Lasky, J.L. 2020. *Byron Shire Council Local Government Area (LGA)*. Available online https://www.webdesignbyronbay.com/byron-bay-shire/byron-shire-council/byron-shire-council-local-government-area-lga/

Lawson, A., A. Cosby, D.S.L. Baker, E. Lefley, Euromonitor International, . . . C. Rhiannon. 2018. *Australian Organic Market Report 2018*. University of New England and the Mobium Group commissioned by Australian Organic Ltd.

Lee, H.-J., and Z.-S. Yun. 2015. "Consumers' Perceptions of Organic Food Attributes and Cognitive and Affective Attitudes As Determinants of Their Purchase Intentions toward Organic Food." *Food Quality and Preference* 39: 259–267.

Malhotra, N. 2010. *Marketing Research: An Applied Orientation*, 6th ed. New York, NY: Pearson.

Mie, A., H.R. Andersen, S. Gunnarsson, J. Kahl, E. Kesse-Guyot, E. Rembiałkowska, . . .P. Grandjean. 2017. "Human Health Implications of Organic Food and Organic Agriculture: A Comprehensive Review." *Environmental Health* 16(1): 111–133.

Miller, D. 2008. *Retail Marketing: A Branding and Innovation Approach*, 1st ed. Mornington, Australia: Tilde University Press.

National Health and Medical Research Council. 2016. *Australian Dietary Guidelines*. Canberra, Australia: National Health and Medical Research Council. Available online: https://www.nhmrc.gov.au/about-us/publications/australian-dietary-guidelines

National Health and Medical Research Council (Australia). 2006. *Nutrient Reference Values for Australia and New Zealand Including Recommended Dietary Intakes*. Canberra, Australia: National Health and Medical Research Council. Available online: https://nhmrc.gov.au/sites/default/files/images/nutrient-refererence-dietary-intakes.pdf

Queensland Department of Health. 2015. *2014 Healthy Food Access Basket Survey*. Brisbane, Queensland, Australia: Queensland Health. Available online: https://www.health.qld.gov.au/research-reports/reports/public-health/food-nutrition/access/overview

StataCorp. 2019. *Stata Statistical Software: Release 16*. College Station, TX: StataCorp LLC.

The Nielsen Company. 2016. *Moving on up: Premium Products Are High in Demand around the World*. Available online: https://www.nielsen.com/content/dam/nielsenglobal/eu/docs/reports/nielsen-global-premiumization-report-december-2016.pdf

Tsolakis, N.K., C.A. Keramydas, A.K. Toka, D.A. Aidonis, and E.T. Iakovou. 2014. "Agrifood Supply Chain Management: A Comprehensive Hierarchical Decision-making Framework and a Critical Taxonomy." *Biosystems Engineering* 120: 47–64.

Ward, P.R., L. Mamerow, J. Henderson, A.W. Taylor, and J. Coveney. 2012. "The Social Determinants of Food Purchasing Practices: Who Chooses Price-before-Health, Taste-before-Price or Organic Foods in Australia?" *Food and Nutrition Sciences* 3(4): 461–470.

Zander, K., and U. Hamm. 2010. "Consumer Preferences for Additional Ethical Attributes of Organic Food." *Food Quality and Preference* 21(5): 495–503.