Consumer factors associated with purchasing local versus global value chain foods

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Abstract
Global value chains (GVCs) have grown to represent the major source of modern food and grocery items. Yet there is an increasing preference among consumers toward locally sourced and supplied foods among perceptions of health, economic and community benefits. Typically purchased in farmers' markets and specialty outlets, local foods are becoming more widely available in supermarkets, who are now interested in how they might introduce or increase that product range. We collect actual purchase data from a regional supermarket chain and analyze the drivers of higher local food proportional outcomes across a sample of consumers. Attempts to link theoretically important drivers of local food purchasing in traditional (e.g., farmers' market) outlets to supermarket settings proved difficult. Results do, however, suggest some means by which parties interested in developing local value chains between regional suppliers and supermarket outlets could be achieved. As such, the study is a useful first-step in the development of new value chains to address future potential issues of socio-economic stratification and inequality as a consequence of GVC prevalence.

Key words: local origin foods, purchase drivers, revealed preference, producer-consumer linkages

Introduction

Historically, locally produced foods such as fresh fruits and vegetables, animal products and small-scale produced packaged goods have been distributed through farmers' markets, farm shops or road-side stalls, regional specialty stores and/or other farm-related channels (Trobe, 2001; Ilbery and Maye, 2006; Pearson and Bailey, 2012). While delivering a special and often unique consumer experience such as improved feelings of connectedness with one's community, all of these outlets have common constraints from the perspective of a typical shopper. These constraints include: restricted opening or operation times (i.e., once a month, or once a week, only during harvest periods); a limited range of products (i.e., available only when in season); and inconvenient locations (i.e., usually near production regions that may be far from home). For such farm outlets these constraints may present significant barriers to the majority of consumers. Indeed,

retail outlet convenience has been claimed as one of the most important factors in grocery outlet choice (FMI, 2012; Australian Government, 2012). Similar drivers of grocery outlet choice include the often limited time that consumers can spend on food shopping and their total grocery budget (Sorenson, 2009). These factors thus constitute significant barriers to the purchase of local foods from farmers' markets and more typical retail grocery venues alike. For example, in the USA a recent survey indicated that farmers' market and farm gate food purchasing constituted the major source of grocery activity for only 9% and 2% of respondents respectively (Onozaka et al., 2010). Australian consumers report purchasing up to 11% of their fruits and vegetables from farmers' markets in an average week (Morgan, 2015).

The majority of food (about 70%) in developed countries comes from supermarket outlets (Onozaka et al., 2010; Cohen and Babey, 2012; Euromonitor International, 2015) that offer convenient locations and

operating hours, cheap prices and a broad range of products (Pearson and Bailey, 2012). It is not surprising therefore that 54% of consumers who regularly patronize farmers' markets continue to buy the majority of their fruits and vegetables in a supermarket (Morgan, 2015). However, in many contexts there is a resurgence of interest in higher dietary intake of homegrown produce (Nanney et al., 2007) and perceptions of increased healthfulness of locally sourced foods providing opportunities to address growing epidemics of obesity and diabetes in the USA (Salois, 2012), and greater health consciousness of populations more generally (Creamer and Dunning, 2012). In the past, supermarkets have enjoyed competitive advantages from increased offerings of fresh produce in countries such as Australia (Treadgold, 1996). More recently many particularly smaller supermarkets have increased their support of local foods by stocking and actively promoting local products, treating their local offer as a competitive advantage (Pearson and Bailey, 2012; Coles, 2015; Woolworths, 2015), building greater corporate social responsibility perceptions (Peloza and Shang, 2011; Armstrong and Green, 2013) and thereby building a more positive image in their communities.

This trend presents an opportunity to examine consumer choices of local versus global value chain (GVC) food products in supermarkets, to inform future industry practice and policy. Value chains characterize the set of activities required by industry to deliver valued goods or services to the marketplace (Porter, 1985). These activities can include the product conception, design, sourcing of raw materials and intermediate inputs, product marketing, distribution and after-sale support to final consumers. Where these activities span different geographic contexts the term *global value chain* (GVC) is often applied (Gereffi, 1994). GVCs prevail in most modern societies serving to improve consumer access to foods from different sources all year-round. However, improved access to GVC often means that local foods produced in smaller quantities by smaller producers are less efficient to supply and more expensive to purchase. Typically, higher purchase prices decrease consumer demand and increase the risk that GVC systems will continue to displace locally produced foods in many markets. In this study we therefore sought to understand both the drivers of consumer demand for locally produced foods and the attendant commercial benefits (if any) that may flow to supermarkets that choose to stock higher proportions of locally produced/supplied foods over typical GVC product offerings.

To the best of our knowledge no previous research has examined what factors drive consumer demand for locally produced versus GVC foods *in supermarkets*. Most studies on the topic of buying locally produced foods have examined either patronage of farmers' markets (or similar outlets) or purchases of locally produced foods at the farm gate. The main contribution of this paper therefore is an unprecedented investigation of local food purchase drivers in the supermarket context. Further, the majority

of previous studies have employed self-reported (past) purchasing behavior, attitudes or claimed intentions to purchase local foods or attend farmers' markets; measures that are known to be biased by social desirability, memory lapse and overclaiming (Brennan and Esslemont, 1994; Wright et al., 2002; Morsbach and Prinz, 2006; Ludwichowska and Romaniuk, 2012; Nenycz-Thiel et al., 2013). This paper therefore also aims to contribute to the literature by addressing those methodological challenges with data drawn from actual purchases. This research has the potential to inform producers, distributors and retailers about which consumer cohorts, and under what shopping conditions, are more likely to purchase locally produced foods in the main source for food—the supermarket. There is also the opportunity to inform policy-makers and industry about the likely demand for locally produced foods versus those provided through the GVC. In support of these claims, we turn to a more comprehensive survey of the literature.

Literature overview

To build our economic model of theoretical consumer demand drivers for locally produced foods we undertook a broad review of the available literature. The majority of drivers considered to date are demographic in nature. There are several cited reasons why researchers study demographic factors associated with buying local foods. First from the producers' and retailers' perspectives, understanding one's market is the fundamental principle of a successful business (Kotler and Armstrong, 2010). Understanding who the current buyers of the product are helps to segment the market and target specific subgroups; whether to better serve those current customers or understand the barriers to adoption for non-customers. Another reason is to know which innate factors consistently influence food choices, so that these variables can be taken into account in future experiments and measures of intervention effectiveness (Haines and Neumark-Sztainer, 2006).

To date a substantial body of knowledge has been developed to understand what demographic characteristics are linked to buying local foods (Table 1). We identified 15 primary studies—some including multiple regions or data collections—that directly examined the relationships between demographic characteristics and the drive to buy locally produced foods. Most of the studies used a staple suite of demographic indicators (e.g., gender, age and income); while location (rural/metro) and ethnicity characteristics were less commonly included. Table 1 (columns 4–10) indicate which characteristics were found to be associated with buying local foods in each study, while the last column summarizes common outcome measures or findings.

The data reported in Table 1 suggest that being female was a significant factor in the majority of studies

Table 1. Summary of relevant studies on demographic characteristics and propensity to buy local foods.

Reference	Location	Categories/outlets	Gender	Age	SES/income	Education	Location	Household size	Ethnicity	Outcome measure
Haines et al. (2006)	England, UK	Local food at farmers' markets	Female	55+	NS	NS	NS			Self-reported past purchase of local products and future intentions
Kennedy and Ehrenberg (2001)	North Carolina, USA	Local food at farmers' markets			Lower		Rural	Household with children	White	Self-reported past purchase of local products
Hammond et al. (1996)	Aragon, Spain	Lamb	Female							Actual bids and eventual purchases
Hu et al. (2000)	City of Guelph, Ontario, Canada	Local foods	Female	Mixed	NS	Higher		Mixed		Claimed likelihood to purchase
McGuinness and Wooden (2009)	Michigan, USA	Locally grown foods at farmers' markets	NS	NS	Part-time employment	NS		No. of adults	NS	Self-reported past purchases of local products
McGuinness and Wooden (2009)	Michigan, USA	Farmers' market participation			(-) working part-time			Single person household	White	Self-reported past market attendance
Ludwichowska (2013)	USA	Local produce at farmers' markets	Female	NS	NS	NS	NS	More adults	NS	Self-reported past patronage of farmers' markets
Hu et al. (2012)	Montpellier, France, Nottingham, UK	Commercial fruit and vegetable box schemes		Older	Have professional occupation					Description of participants in the box scheme against average adult members of census data
Jekanowski et al. (2000)	South Carolina, USA	Local produce and animal products	Female	Older	Higher		Work in agriculture	NS		Claimed willingness to pay extra for local produce and (separately) for local animal products
Morsbach and Prinz (2006)	Minnesota, USA	Eating local, organically, non-GM and non-processed	Female	NS	Low-mid				Hispanic and Asian	Attitudes towards four alternative food practices: (a) organic, (b) not processed, (c) locally grown, and (d) not genetically engineered
Ludwichowska and Romaniuk (2012)	USA	Famers' markets, farmer direct	NS	NS	Low/mid	NS	NS	>1 adult	NS	Self-reported past purchases from farmers' markets or directly from farmers
Krysan et al. (1994)	Alabama, USA	Farmers' markets	NS	NS	NS	Higher	NS	Household with children with higher income	NS	Self-reported past patronage of farmers' markets
Kotler and Armstrong (2010)	Tennessee, USA	Fruits and vegetables, food labeled organic			Higher	Higher	Farm			Self-reported past purchases of organic foods and fresh fruits and vegetables

Table 1. (*Cont.*)

Reference	Location	Categories/outlets	Gender	Age	SES/income	Education	Location	Household size	Ethnicity	Outcome measure
Koch (2010)	Indiana, USA	Locally produced agricultural products	Female		Higher	Lower	Longer rural	NS		Self-reported future intentions to purchase local products
Ilbery and Maye (2006)	Tennessee, USA	Farmers' markets and other farmer-outlets	Female	Older	Higher	Higher			White	Description of patrons of farmers' markets and other farmer-outlets against census
Summary of past studies	12/15 studies come from USA or Canada	All studies focus on farmers' markets and farmer direct delivery	Female	Older	Mixed	Higher	Rural	Mixed	Mixed	All but one study use self-reported or claimed past or future behaviors

(Cranfield et al., 2012; Gracia et al., 2012; Angell et al., 2015), as was being of older age (Eastwood et al., 1999; Brown et al., 2009; Carpio and Isengildina-Massa, 2009; Angell et al., 2015). Living or working in a rural area, being brought up in rural or having parents from rural areas were also associated with higher propensity to buy local foods (Jekanowski et al., 2000; Brown, 2003; Carpio and Isengildina-Massa, 2009; Racine et al., 2013). More education had primarily positive associations with buying local foods (Eastwood et al., 1999; Onianwa et al., 2005; Brown et al., 2009; Cranfield et al., 2012), but was also occasionally non-significant (Zepeda and Li, 2006; Zepeda, 2009; Conner et al., 2010). All other examined characteristics produced mixed results, such as socio-economic status (SES) which provided significant driver outcomes in many studies, but often in different directions. For example, some studies find that lower income families and those with part-time employment (i.e., possibly relatively lower paid) favored local foods (Zepeda and Li, 2006; Robinson-O'Brien et al., 2009; Zepeda, 2009; Racine et al., 2013), while other studies indicate a positive association with higher incomes (Eastwood et al., 1999; Jekanowski et al., 2000; Brown, 2003). The split in these results by years of data collection—with the above earlier studies indicating that favoring of local foods was positively associated with higher income, and more recent studies (Zepeda and Li, 2006; Robinson-O'Brien et al., 2009; Zepeda, 2009; Racine et al., 2013) indicating an association with lower income—suggests a changing trend, possibly due to less well-off consumers rediscovering local marketers as a value for money proposition. Alternative explanations could be that lower income and part-time employed consumers have more free time; hence they are better placed to attend farmers' markets which have notably inconvenient hours of operation. Finally, ethnicity measures also produced mixed results with white consumers reporting a higher propensity to buy local foods in some studies (Eastwood et al., 1999; Conner et al., 2010; Racine et al., 2013) and non-white consumers reporting a higher propensity in other studies (Robinson-O'Brien et al., 2009), but most studies reporting no ethnic difference in the purchase of local foods (Onianwa et al., 2005; Zepeda and Li, 2006; Zepeda, 2009; Conner et al., 2010). These mixed results justify the need for more research into the demographic characteristics of consumers buying locally produced foods and more detail about those local food types/categories.

Some methodological shortcomings in this stream of research were also identified, which could influence the reliability of the measures and the generalizability of past results. We highlight five specific areas. First an important critique often acknowledged in previous studies derives from how the sampling frame was defined. This is particularly problematic for studies that compare demographic profiles of farmers' market patrons to the general population, as measured by the relevant national census (e.g.,

Eastwood et al., 1999; Brown et al., 2009). In these studies it is possible that the results simply capture the description of a typical grocery shopper (who is more likely to be a female) rather than describing qualities unique to those buying local foods. Thus, in our study we compare those who bought and did not buy local food products within a sample of all grocery shoppers.

Secondly, as already discussed, most of the studies outlined in Table 1 used self-reported past behavior or stated intentions as outcome measures. Studies in marketing and psychology have demonstrated that purchase recall and stated-intention surveys yield poor results for describing or predicting real in-market purchase or decision-making behavior (Wind and Lerner, 1979; Smith et al., 1991; Brennan and Esslemont, 1994; Hu et al., 2000; Wright et al., 2002; Morsbach and Prinz, 2006; Ludwichowska and Romaniuk, 2012; Nenycz-Thiel et al., 2013). Grocery purchases are one of the most habitual and mundane tasks consumers perform on a regular basis. This means consumers hardly notice the choices they make and, as a result of that and a cognitive lapse, often provide an incorrect recollection of those events (Tourangeau, 2000). This in turn leads to problems of overreporting recent events and overclaiming certain behaviors during a research interview (Ludwichowska, 2013) or survey response. This is particularly problematic for any reporting of socially acceptable behaviors, which could also suffer from social desirability bias (Krysan et al., 1994; Tourangeau and Smith, 1996; Morsbach and Prinz, 2006). An excellent example of this is where consumers tend to overclaim desired behaviors such as charitable donations (Bennett et al., 2011). We argue that buying local food is also a socially acceptable behavior, which could suffer from similar biases and inflation in self-reported or purchase intention measures. Within the local food literature surveyed above there was only one study (Gracia et al., 2012) which made an attempt to get closer to objectively capturing real choices using an experimental mock-up auction. The present study builds on that effort and attempts to offer an externally valid record of real purchases made on regular shopping trips in a supermarket.

Thirdly, we note many examples in the literature of unclear or ambiguous (left to respondents' interpretation) definitions of local foods, especially in the earliest studies where definitions were still developing. This adds to concerns over comparability of findings. Even when carefully defined by the authors, local foods usually include only one level of locality (i.e., made in a particular region). Yet following the US Institute of Grocery Distribution (IGD) definition, which reflects the distance from the production place to the place of sale, a local product can have a degree of locality ranging from being produced in the very same region to broader state and country contexts. Indeed the few studies that took the degree of locality into account (Darby et al., 2008; Hu et al., 2012) showed that consumers are willing to pay more for the food labeled from their own region versus those sourced further afield in the same state. We follow their lead and examine multiple levels of locality recorded objectively from information provided by the manufacturers or producers.

Fourthly, all of the studies in this body of knowledge to date have focused on farmers' markets or direct delivery services as the retail outlet. As we have shown above, these channels represent only a marginal food source—the majority of food consumed in developed societies comes from supermarkets (Onozaka et al., 2010; Cohen and Babey, 2012; Euromonitor International, 2015). The contribution of the current study is to uncover how demographic characteristics might influence choices of local versus GVC foods purchased *in supermarkets*. The difference between a supermarket and a farmers' market might influence how generalizable prior results are to the new context. Attendance at farmers' markets or any similar farm outlet requires substantial effort and planning on behalf of a consumer. The (often) inconvenient hours of operation and location could influence the type of shoppers who can devote such time and effort, resulting in demographically different profiles between people who purchase local food products from those retail outlets and those who do not patronize farm outlets. In theory, choices between local and GVC foods within the supermarket environment should be much easier, since all alternatives are displayed on the same shelf with clearly labeled places of origin, prices and other information. In this context, a choice between a locally produced food and imported food products could be similar to a choice between two brands of the same product.

On that issue a substantial body of marketing knowledge offers insights into choices between brands within the same category. It indicates that while different consumer groups buy different product categories (i.e., those buying nappies would differ in some ways to those buying dog food) there is often very little demographic difference between buyers of competing brands within the same product category (Hammond et al., 1996; Kennedy and Ehrenberg, 2001; Uncles et al., 2012). This point is particularly important for the present study, which considers choices made in a supermarket. Once inside a supermarket, the quality differences between locally produced versus GVC produced foods becomes just one of the many factors that may influence consumer choices. These factors include: brand preference and loyalty; price, unit price and price promotions on the day; any other point-of-sale communication; pack size; buying occasion; and nutritional information. It is therefore conceivable that the relationship between demographic characteristics and local food product purchases in supermarkets could follow the known brand-choice patterns as reported in the marketing literature. Those results typically show *no difference* in demographic profile for decisions across completing brands. This study may also fail to find similar purchasing patterns to those

observed in studies focused on farmers' markets, as discussed above and in Table 1.

Finally, the majority of local food purchasing driver studies (12 out of 15 studies reviewed) came from North America. This potentially limits knowledge generalizability to those markets with different retail and legislative structures. Noting this limitation, Pearson and Bailey (2012) call for more research in markets outside of the USA, such as Australia. A recent study by Bianchi and Mortimer (2015) has examined markets in Australia and Chile; however, they did not model demographic characteristics as factors influencing choices of local food purchases. Following the advice of Pearson and Bailey, we examine local food selection outcomes using actual purchase decision data about the proportion of local foods bought from an Australian supermarket as part of the total grocery spend.

Methods

Context

The study was undertaken in a typical suburban supermarket located in the Barossa Valley region of Australia near Adelaide, in October 2014. Australia's two major supermarkets do not have a presence in the Barossa region. The Barossa Co-op store is the therefore a main source of supermarket sales, and represents an independent (i.e., unaffiliated with the two largest supermarket chains) community-owned retail cooperative with several food and non-food outlets in the region. It is the third-largest independent supermarket in Australia with multiple-awards for community service. It is the region's largest employer and supports business and training opportunities for local producers and smaller retailers. As a cooperative, many of the consumers play an active role in the store's operation; although this is not the majority of its customers. The Barossa region is well known locally, nationally and internationally for its wine production, as well as for food growing and production across multiple categories including fresh fruits and vegetables, jams, pickles, marinades and dried fruits, dairy (milks, yoghurts and cheeses), bakery and animal products (fresh, cut, pre-processed and cured meats). The demographic profile of the Barossa Region is similar to the typical profile of the rest of the state of South Australia. Based on the 2011 Australian Bureau of Statistics census the population of the Barossa region has median age of 40 (same as in the state), 51% females (same as in the state) and US$1125 per week average family income (slightly higher than the state average of US$1044). The Barossa region also borders other food-producing regions, including the Riverland (known for its citrus, stone fruit, nuts and potatoes growers, as well as Murray River fishermen), the Adelaide Hills (apples, cherries, berries and wine) and Virginia (with large-scale growing of fresh vegetables,

herbs and olives). Products from these regions are stocked with clear place of origin labels on shelves in the local supermarkets, including the Barossa Co-op store examined in this study. While the region also has a farmers' market, it has very limited hours of operation (4 h/week) and is primarily patronized by tourists, not local residents. In our sample only two people said they go to the farmers' market. Hence, the proportion of local foods in the observed data is a good representation of consumers' local purchases.

Data

The data for our model was sourced from two places: (i) a unique record of 3351 actual supermarket items purchased by participant consumers over a 2-month period; and (ii) a store-intercept survey using a convenience sample of shoppers in the supermarket. Both data sources were matched at the individual shopper level using loyalty card identification. Matching of actual purchase data to the (later) intercept data provided us with a total of 128 shoppers to include in our models—and a unique dataset given most other studies employ individual purchases from different groups of shoppers over time.

The actual shopping-trip transaction data comprised purchases from various food groups, including fresh fruits and vegetables, animal products and non-food product categories. For each item the data contained a description, unique Stock Keeping Unit (SKU) code, price, volume, and price-promotion information (if applicable). This data was then aggregated for each shopper to calculate the characteristics describing the entire shopping trip, which included basket size (defined as the total number of items bought on a shopping trip), total spend on the trip (in AUD$), and the time and date of transaction Although analysis of local purchases for different food categories (e.g., fresh fruits and vegetables) and across different definitions of local (e.g., Barossa region) was originally planned, limited observations meant that such models could not be reliably or robustly estimated. We therefore had to employ aggregated data analysis approaches. An intercept questionnaire captured other key demographic characteristics for those included in the study. These characteristics were: household income, occupation and number of household members, the presence/absence of a shopping list, and characteristics of the shopping party. We also collected data on a series of attitudinal questions, based on prior literature that covered a range of statements regarding consumers' beliefs about grocery shopping, price sensitivity and quality preferences. Final questions included how many nights per week participants ate home cooked meals as a behavioral indicator for cooking preference; a variable noted to be a predictor in some prior studies (Robinson-O'Brien et al., 2009).

Following ethics approval, the questionnaire was extensively pre-tested on a different sub-set of shoppers, and the section used in this study took on average 7 min to

complete. The shopper sample was obtained using several pre-recruitment methods (email followed by a media release in the local newspapers, and an advertisement on the notice board in-front of the store) and via intercepting shoppers at the entrance of the store. The response rate to the pre-recruitment was around ten percent. To compensate consumers for their time, each participant was given a 30% discount voucher to use in selected retail stores and a chance to win a US$500 grocery voucher from the cooperative. The screening criteria included that participants were the main household shopper and were 18 years of age or older.

After recruitment, participants were instructed to do their normal shopping trip, pay for their purchases and come back to complete the follow-up questionnaire, which was designed using Qualtrics.com software and administered by a trained researcher face-to-face using a laptop as a prompt. It is important to note, as acknowledged in past studies, that the shopper population will have different characteristics to the general population, and so any comparison with the census data is less relevant. In support of this, our sample comprised 71% females, where in past Australian shopper studies this proportion was 72% (Bailey, 2013) and 73% in the study conducted in a supermarket in the same state as the current project (Phua et al., 2015). The mean age was 52 years (min 20, max 79), with 63% aged over 45 years. This age profile was also in line with a previous shopper study in the same state where 61% were aged over 45 years (Phua et al., 2015).

Ultimately, the actual grocery item selection (shopping basket) and shopping trip information data were matched with each consumer's demographic characteristics and attitudinal responses. This matching allowed us to objectively measure revealed purchases (as opposed to self-reported or intended behaviors) and the precise place of origin of all the foods as indicated by the manufacturer on the packaging or on the shelf, which were photographed and coded for each item. Clear unbiased coding is necessary, as the literature suggests significant consumer confusion can occur in viewing the labeling and understanding what constitutes a local food. Previous examinations of the issue have consistently highlighted ambiguity among consumers over what could be considered local food, raising issues of reliability in previous research studies (Angell et al., 2015). The most recent studies (Racine et al., 2013; Angell et al., 2015; Bianchi and Mortimer, 2015) broadly follow the definition of the US IGD, which focuses on the distance between where the food was grown or produced and the retail outlet where it is sold.

We adopted a similar approach and considered the degrees of locality based on the proximity of the place of production to the supermarket. Alternative models of local production were planned, but limited available data at various sub-levels (e.g., within the Barossa region or within immediate proximity to the store) meant we could not reliably estimate models for these

regions. We therefore used the South Australian regional definition as our basis. To the best of our knowledge there is no available database that details place of origin information for each item sold in Australian supermarkets (i.e., an equivalent to the FoodSwitch.com.au database of nutrition facts for Australia). Therefore, the research team manually coded the place of origin for each item purchased by the study participants by taking photos of the place of origin information as indicated on a package or on a shelf next to the product. The data covered all product categories, including those typical for local production such as fresh fruits and vegetables, fresh and pre-cut meat and deli products, dairy, bakery, and small-scale packaged foods (jams, pickles and dried goods). On packaged products the product origin was indicated on the package, while for loose items and fresh produce the product origin was indicated by the supermarket signage on the shelf below or above the product as required by law.

Open-coding techniques were applied to code the product origin information, which allowed researchers to add new codes wherever we observed original information. This procedure resulted in four codes ranging from 1 representing the closest place of origin to the place of sale [South Australian (SA) food producing regions] to 4, which represented products 'made entirely outside of Australia' or GVC products. Some 635 purchased items were excluded from analysis because they either did not have clear place of origin information or represented categories outside of our interest (cigarettes, phone cards, newspapers, gift cards). The resulting sample of purchased items was $n = 3351$. Table 2 shows prevalence of each region of origin in the data and some examples of production location labeling.

The first three categories represent degrees of locally made, while GVC channels supply the last group. The descending order of locality of production compared to non-local food choices provides a unique set of comparative analysis options. This level of detail is therefore a new contribution to the existing body of literature. An important methodological innovation in the open-coding technique was to record (by photographing) region-of-origin labeling on each package. It is important to note for future research, that regulatory and marketing environments regarding region-of-origin labeling and communication have to be taken into account during the data collection, as they will influence how many levels of locality are present in the market. In our case, there was a law about which products could have a unified 'Australian-made' label (kangaroo in green triangle), and a less clear rule about how to communicate parts of the product being made in Australia (an issue currently being addressed through a revised country-of-origin labeling law). However, there was no rule regarding how to communicate the smallest level of locality in our study—state, yet, there was a voluntary Government initiative which promoted all products made in South Australia (see first illustration). The regulatory and

Table 2. Prevalence of foods with different levels of locality and examples of local logos.

Code	Description of product origin on pack	Prevalence in the data (*n*)	Prevalence in the data (%)	Examples of visual representation of region of origin
1	Made in South Australia (SA) (including the Barossa region)	218	6.5	
2	Australian (AU) made, produced, grown, packed (excl. SA)	1863	55.6	
3	Partially made in Australia (packed in AU from local and imported ingredients, packed from just imported ingredients)	639	19.1	
4	Internationally made or global value chain products	631	18.8	
	Total	3351	100	

marketing environment influences how many different visual cues consumers face as signals of region-of-origin. The less regulation there is—the higher is the potential for different visual cues to exist in the marketplace, which could confuse consumers resulting in lower trust to such labeling, and hence less willingness to act on it.

Model variables

Independent variables in the analyses were specified in two steps: first demographic characteristics and then shopper trip characteristics. The dependent variable was the proportion of code 1 local foods (those made in South Australia, including the Barossa region) present in the shopping basket sample. The literature review enabled us to settle on a list of theoretically viable independent variables as possible drivers of local food purchasing decisions in Australian supermarkets. These include: the gender of the consumer; their age; their education level; their household size; total household income; their level of employment; the total basket size and sale amount in AUD$ for that shopping trip, and how long they have lived in Australia as a possible proxy for ethnicity. However, it was not expected that

ethnicity issues would affect the results for Australian shoppers, as they might be expected to do so in the North American context. This provides a key difference between typical studies and this research. To this we add a range of additional variables expected to influence the consumer's purchasing decisions including: the make-up of their shopping party (i.e., individuals or primary shoppers accompanied by children, which may reduce total time in store); whether they have recently observed any relevant promotional material; whether they have compiled a shopping list to minimize time spent in the store; how often they prepare and consume meals at home; and a range of questions aimed at measuring consumer attitudes to expending effort to achieve lower prices; comparing brands to achieve better value for money; and any general pleasure attributed to the act of shopping. The summary statistics for these variables are provided in Table 3.

With the independent variables thus specified we included them in a fractional multinomial logit (*fmlogit*) regression using Stata-SE version 13 to identify any drivers of higher local food item purchases (i.e., South Australian origin) by the participant consumers, as a proportion of their total basket size/spend.

Table 3. Summary statistics.

Variable name	Obs.	Proportion/mean	SD	Min	Max
Gender: 0 = male, 1 = female	128	71% female	0.46	0	1
Age: actual age in years	127	51.53	14.12	20	79
Higher Education: reported TAFE (post-secondary college), University or post-graduate qualifications	128	39%	3.97	0	9
Household size: total household size, including children	128	2.76	1.33	1	7
Higher income: >US$60,000 per annum	128	31%	0.46	0	1
Fulltime employment status	128	30%	0.46	0	1
Promotions noted: 1 = yes, 2 = no, 3 = don't know	128	1.43	0.51	1	3
Presence of a shopping list: 1 = yes, 0 = no	128	85%	0.36	0	1
Basket size: total number of items purchased	128	31.14	22.96	3	119
Sale Amount: total spent for that shopping trip	128	121.29	94.91	9.18	471.72
Australian born	128	78%	0.48	1	4
Number of children in the shopping party, where 0 = 0, 1 = 1,…,5 = 5+	128	0.14	0.54	0	4
Low prices not worth extra effort: 1 = Strongly Agree; 2 = Agree; 3 = Neither; 4 = Disagree; 5 = Strongly Disagree; 6 = don't know	128	3.13	1.25	1	6
I like to compare brands and get value for money: 1 = Strongly Agree; 2 = Agree; 3 = Neither; 4 = Disagree; 5 = Strongly Disagree; 6 = don't know	128	2.18	1.01	1	6
I like shopping generally: 1 = Strongly Agree; 2 = Agree; 3 = Neither; 4 = Disagree; 5 = Strongly Disagree; 6 = don't know	128	2.95	1.30	1	6
Eat at home/home cooked meals regularly: How many nights a week	128	6.15	1.14	0	7

Estimation approach using fmlogit

Problems that require modeling the determinants of proportional data occur frequently. Proportional data is by definition a component of some whole value; for example, 0.5 as a proportion of 1.0, which is subject to a constant-sum constraint (Aitchison and Egozcue, 2005). As such, proportional data provide information about relative, not absolute, values of components that can be stated in terms of component ratios (Aitchison, 1984). This may be akin to one option being relatively more or less favored than another in the composition of total budget expenditure, or apportioned across numerous policy options. Since proportions are bounded by 0 and 1 the effect of variables explaining those proportions tends to be non-linear. Further, because of boundary conditions in the distribution, the variance decreases as the mean lies closer to one of those boundaries. These features of proportional data suggest that linear regression approaches to explaining how those proportions arose are inappropriate. Cook and Kieschnick (2008) describe in detail how censored regression techniques for proportional analysis are similarly flawed.

To illustrate, suppose that a choice variable (e.g., preferences for local foods as part of a total shopping basket) y, given $0 \leq y \leq 1$ is to be explained by a $1 \times K$ vector of explanatory variables $x \equiv (x_1, x_2, \ldots, x_k)$ with the convention that $x_1 \equiv 1$. The population model is:

$$E(y|\mathbf{x}) = \beta_1 + \beta_2 x_2 + \cdots + \beta_k x_k = \mathbf{x\beta}$$

But binary limits of x_1 rarely provide the best description of $E(y|\mathbf{x})$. That is, since y is bounded between 0 and 1 the

effect of any particular x_j cannot be constant throughout the range of x (unless the range of x_j is very limited). It is possible to specify models for $E(y|\mathbf{x})$ by assuming a particular distribution—e.g., for fractional or proportional y we could use the beta-distribution—for y given $\mathbf{x}$ and estimating the parameters of the conditional distribution by maximum likelihood. Again though, since a beta-distribution implies that each value in [0, 1] is taken on with probability 0 it is difficult to justify the use of such a distribution where the values of y can take on extreme values of 0 or 1.

In response, Papke and Wooldridge (1996) suggest quasi-likelihood distributional assumptions to address limitations raised above with regard to proportional y dependent variables. In their approach, there is an assumed proportional sequence of independent (though not necessarily identically distributed) observations $[(x_i, y_i): i = 1, 2, \ldots, N]$ for each respondent, where $0 \leq y_i \leq 1$ and N is the sample size. Then, for all i:

$$E(y_i|x_i) = G(\mathbf{x_i\beta}),$$

where $G(.)$ is a known function that ensures that the predicted values of y lie somewhere between the interval (0,1). Typically, $G(.)$ would be expressed as a cumulative distribution function (cdf), but hereafter an assumption of logistic functional form is made about the underlying structure used to obtain y_i (Oberhofer and Pfaffermayer, 2009), such as:

$$G(z) = \frac{\exp(z)}{(1 + \exp(z))},$$

which maps z to the [0,1] interval. Ultimately, y_i could be a continuous variable, a discrete variable or have both continuous and discrete characteristics. In addition, this functional form assumes a marginally diminishing return over time for the dependent variable(s) under consideration, holding other variables constant. Stata analysis software allows estimation for proportional $(y_i|x_i)$ dependent variables using the command *fmlogit*, which calculates the parameters for $E(y_i|x_i) = G(\mathbf{x_i\beta})$ and automatically includes robust standard error estimations to perform asymptotically valid inferences that deal with the heteroskedasticity issue (Buis, 2010).

Examples of proportional data analysis via quasi-likelihood distributional assumptions suggest wide application possibilities: Papke and Wooldridge (1996) use the approach to model participation rates in US pension plans; McGuinness and Wooden (2009) use a fractional logit model approach to examine overskilling and mobility issues with labor in Australia; Koch (2010) uses a fractional multinomial response model approach to examine household budget expenditure preferences; and Mu and McCarl (2011) employ the fractional multinomial logit approach to estimate marginal effects for land use changes between cropping a pasture under climate change scenarios. However, we are not aware of any examinations of actual supermarket consumer preferences for local foods using the fractional logit approach.

Results

As discussed, the fractional logit is a non-linear approach. We therefore estimate and present marginal effects results in Table 4. The average proportion of local foods from South Australia (including the Barossa region) in a shopping basket was 7.6%, which is slightly less than the average volume of fruits and vegetables purchased in Australia through farmers' market outlets (11%, as discussed above). This suggests reduced access to local foods through supermarkets, and as we might expect similar purchasing of local foods as a proportion of total basket items if availability was the same. The estimation results, however, provide only a limited explanation for the drivers of consumer choices toward those local foods. For example, in contrast to the other studies of farmers' market local food purchases factors such as gender, age and higher education do not provide statistically significant higher drivers of local food purchases in supermarkets. Further, while consumers with higher incomes and fulltime work appear to prefer local food purchasing as expected, the results are not statistically significant. Finally, promotional materials, preparing a shopping list, shopping with children, and holding positive attitudes to shopping trips seem also to drive positive proportions of local food purchasing, but without any statistical significance.

Table 4. Marginal effect estimation results for proportion of local South Australian (SA) food.

Variables	SA regional products (dy/dx)
Gender	−0.206 (0.232)
Age	−0.008 (0.008)
Higher education	0.012 (0.026)
Household numbers	−0.304** (0.108)
Higher income	0.239 (0.226)
Fulltime employment	0.031 (0.222)
Promotions noted	0.239 (0.209)
Shopping list taken	0.280 (0.284)
Basket size	−0.031** (0.015)
Sale amount	0.009** (0.004)
Always lived in Australia	−0.367* (0.221)
Shopping with children	0.170 (0.190)
Low prices not worth extra effort	−0.242** (0.084)
I want brand value for money	−0.197* (0.108)
I like shopping generally	0.059 (0.079)
Eat at home regularly	−0.088* (0.092)
Observations	127

SE in parenthesis. Significance reported as ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

Interestingly, the higher the total spend on supermarket purchases the higher the proportion of local food items (∼1% more). This may indicate higher prices of local food selections, and tally with positive preferences from consumers with higher incomes and fulltime work. Conversely, a larger total basket size results in a 3% reduction in the proportion of local food items purchased, with moderate statistical significance. Factors that drive larger reductions in local food purchasing include consumers who like to compare brands and achieve value for money (∼20% reduction); consumers who don't like to make price comparisons (24% reduction); households with larger numbers (30% reduction); and consumers who have lived their whole life in Australia (∼37% reduction). Finally, consumers who eat/prepare home cooked meals more frequently are also less likely (∼9% reduction) to purchase higher proportions of local food products despite their expected fresher or healthier product characteristics. Implications from these findings are discussed below.

Discussion

As an innovative study of local food proportional purchasing in supermarket contexts, this research provides some important first-step evidence of potential targets to increase local food purchasing in such retail environments. We would expect to find differences between supermarket and farmers' market customer demographics in relation to their local food purchases, as indicated here. Although it is likely that some consumers would utilize both supermarket and farmers' market outlets for local

food consumption, we should expect to find in this study of supermarket customers more generally a different demographic profile and outcomes to that of the average farmers' market customer. Our demographic results are, however, consistent with two prior studies in the place of origin literature, which found that most demographic characteristics had no relationship with self-reported propensity to buy local foods (Onianwa et al., 2005; Zepeda and Li, 2006). Both studies covered a wider scope of retail outlets comprising farmers' markets, farmer direct buying and agricultural membership combined; making these outlets closer to mainstream shopping channels. The authors of these studies suggested that the wider scope was more likely to cover the entire shopper population, resulting in no significant differences across shoppers who do and do not patronize the outlets included in their studies.

Similarly, another study suggested that none of the usual demographic characteristics were associated with higher awareness of a promotion campaign encouraging higher local food purchases via point-of-sale advertising in some supermarket chains (Patterson et al., 1999). This suggests that when considering main-stream shopping channels, consumer demographic characteristics only play a minor role in predicting choices of local versus GVC products. Our results would appear to provide some additional evidence to support this claim given our positive but statistically insignificant promotional results. However, more varied promotional strategy inclusions in future models may result in different conclusions. This could be especially true for the negative proportional outcomes associated with Australian-born consumers. Our finding that Australian-born consumers are not as concerned about local produce purchasing as they may be about Australian made products is interesting, as Australia has considerable experience of promotions to increase purchases of Australian-made products in recent decades.

While not statistically significant in our model, a positive local food purchasing trend from the use of a shopping list is also interesting. There may be opportunities for supermarkets to link their promotional campaigns to electronic shopping lists (e.g., a store-provided smartphone application) which could increase local food proportions. It may also provide an opportunity for local food producers to promote their products via such electronic means and to dispel price or brand imparity perceptions. Given the statistically insignificant results for paper-based promotional materials in these models, the exploration of alternative promotional drivers is also worth further examination in future research.

There are some other barriers to increased local food purchasing that supermarkets could investigate. For example, participants who regularly compare brands as a value for money exercise, but who also don't make price comparisons, actually purchased less local food. This is logical: local foods would enjoy lower brand recognition (where available) than GVC foods, and likely appear in higher price-level categories. Our results support previous findings in the marketing literature, which indicate a lack of demographic profile differences between consumers of directly competing brands within similar categories in supermarkets (Hammond et al., 1996; Kennedy and Ehrenberg, 2001; Uncles et al., 2012). In contrast to prior studies where the outcome variable tracked attendance at farmers' markets—an act that required a particular effort of consumer behavior due to (often) inconvenient locations and hours of operation— our study examined consumer choices in the supermarket context. This is where the choice between a local food product versus an imported product is likely to be made within seconds [about 75% of all choices take <10 s (Anesbury, 2014)] and where factors such as price, brand loyalty, pack size and previously known or disclosed product information may play important roles.

Overall however, price is an especially prominent factor in the supermarket context, since locally produced foods are more expensive and this price difference is more apparent in a supermarket context that displays products from different origins next to each other with clearly labeled prices. These results support our earlier theoretical prediction that consumer selections between local and GVC food options might be made easier in a supermarket context; although consumer skepticism about local food labeling accuracy would need to be measured and accounted for in future models. Further, we have no measure of whether participants selected local foods over other options as a deliberate or conscious act. These issues would need to be addressed in future work to answer such research questions more fully. Interestingly our model does not suggest any link between those variables used to denote time limits for consumers and/or convenience factors in our models, which is at odds with many of the previous studies discussed above. This suggests that supermarkets may be able to support greater offerings of local foods in their product range. The lack of relevance for time limiting variables also suggests an opportunity to explore the issue of convenience more deeply to get at the heart of how these two issues could interact.

In general this study highlights several important issues for research into drivers of local food purchases in supermarket settings that are useful to producers, distributors, retailers and regional/state policy-makers. First, any reliance on previous, largely North American-based drivers of local food purchase choices will not necessarily apply to other contexts, as might logically be expected. Secondly, local food purchase drivers differ greatly between farmer's market and supermarket contexts, again as might be expected. As supermarkets increasingly endeavor to differentiate themselves from one another along fresh produce lines, as has been the case to date in Australia, their focus may turn to greater offerings of locally produced foods requiring careful consideration

of consumer purchase drivers. We have only begun to scratch the surface of that issue in this paper. Thirdly, the difference in results between self-reported study findings and those where actual purchases are included, as in this paper, is clear. This innovative study highlights an important contribution for further research along similar lines to that outlined here; particularly where greater local food purchasing can be robustly linked to health, employment and socio-economic benefits as reported in some of the literature (Thaler and Sunstein, 2008). Finally, this study provides an important first-step away from research in the North American context toward investigations of local food purchase drivers in alternative countries; particularly with regard to supermarkets where 70% or more of food purchasing takes place.

There are important limitations to this study, though, that should not be overlooked. The relatively small sample size and limited focus on one supermarket as a basis for the data collection are obvious constraints that can be overcome in future work. More targeted data collection including further information as to whether consumers purposely selected local foods, or otherwise, would be useful to determine as a test of local food attractiveness and/or promotional strategies. Coupling this with reasons for seeking out local foods (e.g., healthier option perceptions, supporting local industry, etc.) may also be useful issues to pursue. Better measures of the consumers' occupations, their past or current links to rural and/or regional experiences, more appropriate measures of ethnicity and wider inclusion of theoretical variables not previously considered would all assist to improve this research. Such a focus would also highlight important contrasts with theoretical drivers of purchases in the Northern American context, which might be useful in other regions where interest in increased local food consumption/purchase is relevant. In that regard the results from such studies would provide helpful insight and evidence for use by farmers, distributors, retailers and policy-makers seeking to increase the consumption of local food products.

Conclusion

This study offers a useful comparison of consumer proportional preferences for local food items as an alternative to GVC product offerings in supermarkets; in direct contrast to typical outlets such as farmers' markets and regional specialty stores. We highlight important opportunities for local producers to team with supermarkets in value chain development, driving regional food systems and potentially higher economic outcomes where supermarkets play a significant employment and community development role, as in the Barossa region of South Australia. Greater access to local foods at competitive prices may increase health and socio-economic benefits across a larger proportion of the population who use supermarkets as their primary source of grocery items, which offers significant positive outcomes at the micro and macroeconomic levels.

Our approach describes a novel methodological innovation of recording and classifying region-of-origin information through using photographs and an open-coding technique. This method offers future researchers a roadmap for identifying levels of locality relevant to their context, which also captures regulatory and marketing environments. Using this approach allows the data to reflect exactly what consumers are exposed to, offering researchers a tool for highlighting consistencies or disparities in labeling conventions to uncover problems and opportunities to improve the clarity of region-of-origin communication.

We conduct the first investigation of actual item purchases in supermarket settings to identify consumer drivers of higher local food proportions in the shopping basket. Attempts to link theoretically important drivers of local food purchasing in traditional (e.g., farmers' market) outlets to supermarket settings proved difficult, with limited overlap as might be expected. Statistically significant drivers in this study tend toward negative influences in the proportion of local food purchased. Results do, however, suggest some means by which parties interested in developing local value chains between regional suppliers and supermarket outlets could be achieved. Importantly, the findings show there is the potential for further work based on these preliminary results, with the development of appropriate measures for local food purchasing drivers in supermarket contexts. As such the study is a useful first-step in the development of new value chains to address future potential issues of socio-economic stratification and inequality as a consequence of GVC prevalence.

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