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Restaurants' Willingness to Pay for Tennessee Certified Beef

Lettie McKay ^a
Graduate Research Assistant
Email: lmckay2@vols.utk.edu
(Corresponding Author)

Dr. Karen L. DeLong ^a
Assistant Professor
Email: [klewis39@utk.edu](mailto:kewis39@utk.edu)

Dr. Kimberly L. Jensen ^a
Professor
Email: kjensen@utk.edu

Dr. Andrew P. Griffith ^a
Assistant Professor
Email: agriff14@utk.edu

Dr. Christopher N. Boyer ^a
Associate Professor
Email: cboyer3@utk.edu

^a Department of Agricultural and Resource Economics, University of Tennessee-Knoxville. 302 Morgan Hall, 2621 Morgan Circle, Knoxville, TN 37996-4518, USA. Phone (865) 974-7231. Fax (865) 974-7484.

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Abstract

Tennessee beef producers and consumers have shown interest in a Tennessee Certified Beef (TCB) Program. Restaurants serving local foods may serve as an important outlet for TCB but there is no knowledge on how restaurants perceive TCB and willingness to pay (WTP) for TCB. Therefore, this study examines restaurants' WTP for TCB ground beef and sirloin steak. A telephone survey of 150 Tennessee restaurants that offer locally sourced foods and beef was conducted in which the primary decision maker was asked contingent valuation questions to determine their WTP for TCB. A probit model was used to determine the factors affecting restaurants' decision to purchase TCB. Results show that the TCB price had a significant impact on restaurants' decision to adopt TCB. Preliminary results indicate if restaurants were already sourcing beef directly from a producer, selling local foods, and offering beef with no hormones added, they were more likely to indicate they would purchase TCB ground beef. Restaurants were more likely to indicate they would purchase TCB sirloin steak if they already offered beef with no antibiotics administered, natural beef, local beef, and believed offering TCB would make the restaurant more profitable. This research provides recommendations on the premium producers could receive for a TCB product purchased by restaurants as well as the business attributes of restaurants interested in providing such a product.

Keywords: Contingent Valuation, Restaurant Survey, Tennessee Certified Beef

JEL Code: Q13

Introduction

Beef cattle are the second largest commodity in Tennessee with respect to agricultural cash receipts (United States Department of Agriculture (USDA) Economic Research Service (ERS), 2017). In 2012, the number of Tennessee farms with beef cattle totaled 33,556 (USDA National Agricultural Statistical Service ((NASS), 2017a) which is roughly 50% of Tennessee farms (USDA NASS, 2017b). Within the beef industry, there are multiple marketing options available to cattle producers. In Tennessee, beef cattle farms are mostly cow-calf operations where calves are raised until they are sold as feeder cattle and then sent to a feedlot in another state to be finished (Lewis et al., 2016). However, Tennessee cattle producers have shown interest in exploring less traditional marketing avenues that would result in cattle being finished, processed, and packaged in Tennessee and then marketed to Tennessee consumers (McLeod et al., 2017).

In recent years there has been an increasing trend for buying local foods, and in many cases, consumers are willing to pay a premium price for local products (Brown, 2003; Darby et al., 2008; Carpio and Isengildina-Massa, 2009). Research determining the extent of producer and consumer interest in Tennessee branded beef suggests the development of a Tennessee Branded Beef Program (TBBP) could increase producers' revenue (Dobbs et al., 2016; McLeod et al., 2017; Merritt et al., 2017). According to McLeod et al. (2017), the majority of cattle producers surveyed in Tennessee expressed an interest in participating in a TBBP. Dobbs et al. (2016) suggest consumer demographics influence willingness to pay (WTP) a premium for Tennessee beef steaks. Merritt et al. (2017) conclude Tennessee beef consumers would be willing to pay a premium for Tennessee Certified Beef (TCB), and they place a higher value on TCB than other beef attributes such as grass fed or no hormones administered.

Although consumer and producer interest in Tennessee beef products is evident, there are other steps in the supply chain to take into consideration. Sometimes, even when there is producer interest and consumer preference for a product, other barriers exist which prevent the successful marketing of the product. Such barriers can include inadequate distribution systems, lack of processing facilities, and previously built network associations inhibiting retailers and restaurants from adopting new products (Inwood et al., 2009; Starr et al., 2003; Sharma et al., 2014; Lewis and Peters, 2011).

While consumer preference, producer interest, and availability of processing facilities have been explored with respect to a TBBP or TCB program, there have been no studies on restaurants' willingness to offer such a product (Merritt et al., 2017; McLeod et al., 2017; Menard, Jensen, and English, 2012). Research shows restaurants can be "opinion leaders" when adopting local foods and are an important part of the supply chain from producer to consumer (Inwood et al., 2009). Hence, understanding restaurant owners' opinions about adopting local beef can be important to projecting viability of development away-from-home markets. In Tennessee, there were over 10,000 eating and drinking establishment locations in 2015, and projected restaurant sales for 2017 total \$12.2 billion (National Restaurant Association (NRA), 2017). Additionally, in 2014, the percentage of total food expenditures spent on food away from home matched the percentage of total food expenditures spent on food at home (USDA, 2016). Increases in food consumption away from home show the importance of the decisions restaurant owners, managers, and chefs make when a new product is introduced to the market.

Therefore, the objective of this study is to examine restaurants' WTP for TCB products and their likelihood of offering TCB to their patrons. Other components of the study will include identifying factors contributing to restaurants' WTP and understanding restaurants' perceptions

of TCB as a local product. The results of our research will help provide producers with a better understanding of the size of the market for TCB.

Literature Review

Consumer Preference for Value-Added Beef Products

The idea of producers receiving a premium for their products by adjusting to consumer preference is not a new concept. Considerable increases in demand for Certified Angus Beef since the creation of the brand demonstrate the potential for success of branded beef programs (Zimmerman and Schroeder, 2011). Consumers are often willing to pay more for beef products with certain attributes. Feldkamp, Schroeder, and Lusk (2005) examined consumer WTP for “Guaranteed Tender,” “Natural,” “USDA Choice,” and “Certified Angus Beef” steaks. They found consumers’ WTP was highest for Certified Angus Beef steaks, and the lowest for Natural steaks. Xue et al. (2010) found consumers’ WTP of \$2 per pound more for grass-fed beef as opposed to conventional beef.

Research findings also suggest consumers place importance on origin of their beef products. Mennecke et al. (2007) found several attributes to have an effect on consumers’ perceptions of beef products, such as animal breed, traceability, animal feed, and beef quality, but the region of origin was the most important beef characteristic to consumers. One study in rural areas of Alabama found consumers held positive perceptions of local beef with respect to animal welfare, societal benefits, freshness, and many other attributes (Telligman, Worosz, and Bratcher, 2017). Ridley, Davados, and Shook (2014) estimated the elasticity of demand for local beef and found demand becomes more elastic as distance from farm to place of purchase increases.

Defining Local

The term “local” can have various meanings to different consumers, producers, and retailers throughout the world. As defined by the 2008 Food, Conservation, and Energy Act, “‘locally or regionally produced agricultural food product’ means any agricultural food product that is raised, produced, and distributed in the locality or region in which the final product is marketed, so that the total distance that the product is transported is less than 400 miles from the origin of the product; or the State in which the product is produced” (Congress.gov, 2017). However, the results of many studies of producer, consumer, and retailer perceptions of the locally grown label are inconsistent. Brown (2003) finds consumers in Missouri did not define locally grown as a product grown within the borders of the state, but rather, as a product grown within a region that can cross state lines. On the contrary, Darby et al. (2008) found Ohio shoppers made no distinction between the labels “grown nearby” and “grown in Ohio.” Selfa and Qazi (2005) asked producers and consumers, in Washington, open-ended questions about their views of local markets and locally grown foods. Answers varied, and the following categories represent different ways respondents answered: proximity, within a county or adjacent county, within Washington’s state borders or the northwest region, within the U.S./World, social relations, contract/intermediary, and freshness/taste/quality.

Consumer Preference for Local Foods

Consumer preference for locally labeled foods has been widely studied, and a number of factors affect consumers’ perceptions of local products. The “local” label is considered to be a credibility attribute that can also indirectly signal other experience and credence attributes of the product to consumers (Dentoni et al., 2009; Wirth, Stanton, and Wiley, 2011). Several studies

have shown consumers are willing to pay premiums for the locally grown credence attribute. Carpio and Isengildina-Massa (2009) found consumers were willing to pay 27% premiums for local produce and 24% premiums for local animal products in South Carolina. Darby et al. (2008) found consumer WTP for locally grown products to be almost twice as much as WTP for products grown in the United States. Dentoni et al. (2009) studied both direct and indirect effects of the locally grown credence attribute. This research shows a positive relationship between consumers' beliefs that a product is locally grown and their attitude towards the product. Consumers' belief in the existence of other experience and credence attributes are also shown to have a partial effect on their attitude towards the local product.

Experience attributes consumers associate with local foods and their expectations of these experiences also influence consumer WTP for local foods. Local foods are likely to travel shorter distances than non-local foods, thus reducing the negative environmental effects of transportation. For this reason, "environmentally friendly" or "environmentally sustainable" has been considered, by many, to be an attribute of local foods (Brown, 2003; Dentoni et al., 2009). Several studies have assessed consumer beliefs regarding food miles, and the effects of transportation distance on the environment with respect to local foods. Many found the belief that local foods have an impact on the environment to be positively related to the purchase of local foods (Brown, 2003; Duram and Cawley, 2012; Megicks et al., 2012; Selfa and Qazi, 2005; Starr et al., 2003). Health benefits, support of the local economy/farmers, food safety, freshness, and quality have also been shown to be attributes consumers associate with local foods (Dentoni et al., 2009; Duram and Cawley, 2012; Selfa and Qazi, 2005; Carpio and Isengildina-Massa, 2009; Starr et al., 2003; Telligman, Worosz, and Bratcher, 2017)

Restaurants' Decisions and Barriers to Offering Local Foods

The literature on consumer preferences is abundant; however, the same cannot be stated about decisions and preferences of restaurants. Though it is uncommon, compared to consumer preference studies, some research has been conducted with respect to restaurants' decisions to offer local foods.

Starr et al. (2003) analyzed the associations between farmers and restaurants with particular focus on the barriers and opportunities of marketing local foods. For the purposes of this study, local was considered within the state of Colorado. Data from local restaurants were collected through a telephone survey. Supporting local businesses, minimizing environmental impact, choosing locally grown and processed products, and being located in an agricultural region were all important factors in the restaurants' decision to purchase or not purchase local foods. Price, dependable supply, freshness, quality, and seasonal menu changes were not significant factors. Availability of supply, lack of time, and lack of knowledge of local supply were listed as barriers to restaurants buying local foods.

Inwood et al. (2009) applied a diffusion of innovation framework to data collected in person and via telephone from Ohio restaurants concerning characteristics, motivations, and barriers of restaurants that adopt local foods. Between restaurants that did not adopt local foods and those that did, no significant differences in restaurant demographics were realized, although some support was found that cost of the restaurant was associated with adoption. Results showed restaurants already purchasing a higher volume of local foods exhibited a higher WTP for local foods. Freshness and taste were found to be restaurants' most important attributes of local foods, and price and convenience were also valued. The main barrier faced by restaurants when adopting local foods was inadequate supply, which echoes the results of the study conducted by

Starr et al. (2003). Restaurants were also found to have relationships with distributors that often prevented them from sourcing their food from another supplier regardless of price differences.

Sharma, Moon, and Strohbahn (2014) used a mail survey in Iowa to study the factors that influence restaurant managers' decisions to purchase local foods. Findings showed restaurants already purchasing local foods viewed uniqueness of product, order processing time, and nutritional value as important factors. These restaurants were more likely to perceive local foods to be higher quality, promote local foods, and view them as clean. The study suggests association of positive attitudes with local foods; however, the local label was not considered to be an important factor to restaurant management.

Survey and Data

Restaurant Contacts

A survey of Tennessee restaurants that sell local beef was administered by the Human Dimensions Research Lab, Department of Forestry Wildlife and Fisheries of the University of Tennessee. Telephone numbers for restaurants across the state were collected from the PickTN products website and TripAdvisor, which are both publicly available websites. Upon obtaining the restaurant information, restaurants were screened to verify that they offered beef products by checking resources on their websites such as photos or menus. Chain restaurants were not included in the contact list. The total number of restaurant telephone numbers on our list was 798 after screening for all of the aforementioned characteristics.

Survey

Before questions pertaining to TCB were asked, respondents were provided with the following information, "TCB declares that the animal was born, raised, and harvested in Tennessee and

graded USDA Choice or Prime.” The survey contained two contingent valuation questions, one for 85% lean, 15% fat ground beef and another for sirloin steak. Respondents were assigned one of four price levels per pound for TCB ground beef and asked if they would purchase the TCB ground beef at the given price level or non-TCB ground beef at a base price of \$3.00 per pound. Respondents were also given the option to choose neither product. The assigned price levels for TCB ground beef were \$3.00, \$4.00, \$5.00, or \$6.00 per pound. Next, they were asked the same question for purchasing TCB sirloin steak compared to non-TCB sirloin steak at a \$5.00 per pound base price. For TCB sirloin steak the price levels assigned were \$5.00, \$6.50, \$8.00, or \$9.50 per pound. Prices were determined based on the National Retail Report (USDA-Agricultural Marketing Service (AMS), 2017) for beef, discussion with local restaurants, and local market observation.

Methodology

Contingent Valuation Method

Multiple methods for determining consumer WTP for a good or service have been employed, such as, contingent valuation, conjoint analysis, or experimental auction (Grunert et al., 2009). The contingent valuation method is often used to determine WTP for goods and services not in the market. Although it has primarily been used in environmental economics, researchers in other fields such as healthcare and agriculture have utilized this method (Neumann et al., 2012; Hailu, Ying, and Yu, 2017). There are multiple formats that can be used when implementing the contingent valuation method such as open ended questions, bidding game, choice based conjoint analysis, discrete choice experiment, and many more (Hoyos and Mariel, 2010). According to Hoyos and Mariel (2010), closed ended contingent valuation questions are considered more reliable than open ended questions because of the potential for biases. Three types of closed

ended contingent valuation dichotomous choice methods are widely accepted: single bounded, double bounded, and one-and-one-half bounded (Hoyos and Mariel, 2010).

Questioning restaurants' decision makers over the phone is similar to the way they make actual purchasing decisions when speaking to suppliers but limits the type of methods that can be used to determine WTP. Any of the revealed preference methods along with conjoint analysis, experimental auctions, and choice experiments, are not feasible when using a telephone survey. Therefore, the single bounded dichotomous choice contingent valuation method was used in this study which is similar to Dobbs et al. (2016).

Econometric Model

In accordance with the random utility model (McFadden, 1974), a consumer will purchase one product over another when his or her utility for that product is greater than the utility for the other product. Following the same basic framework as the random utility model, a restaurant, r , will choose TCB rather than unlabeled beef if its expected profit from purchasing TCB, represented by Π_{rTCB} , is greater than its expected profit from purchasing unlabeled beef, represented by Π_{rULB} (e. g., $\Pi_{rTCB} > \Pi_{rULB}$).

Determining the probability that a restaurant will choose TCB, represented by $\Pr[y_{rTCB} = 1]$, reveals the probability that the restaurant expects its profit from TCB is greater than its expected profit from unlabeled beef. Price of TCB and characteristics such as restaurant demographics are factors hypothesized to affect the probability that a restaurant chooses TCB rather than unlabeled beef. A probit model is appropriate to estimate parameters for price of TCB, restaurant demographics, and other factors. Two separate probit models were developed with the dependent variable of restaurants' choice to purchase TCB ground beef or sirloin steak,

represented by y_{rTCB} . This general form of the model is used for both the choice to purchase TCB ground beef and sirloin steak. Independent variables included in the ground beef model are listed in Table 1, and independent variables included the sirloin steak model are listed in Table 2.

Table 1. Independent variable definitions for ground beef model

Variable Name	Description
<i>GB_price</i>	price assigned to TCB ground beef in contingent valuation question
<i>location_type</i>	type of area the restaurant is located in: city, suburb, small town, or rural
<i>offer_local</i>	1 if the restaurant currently offers local beef, 0 otherwise
<i>offer_grassfed</i>	1 if the restaurant currently offers grassfed beef, 0 otherwise
<i>offer_nohorm</i>	1 if the restaurant currently offers beef with no hormones added, 0 otherwise
<i>meal_price</i>	average price a customer pays for a meal at dinner
<i>current_gbprice</i>	price the restaurant currently pays for ground beef
<i>inf_quality</i>	1-5 influence of better quality on the decision to purchase TCB ^a
<i>inf_environment</i>	1-5 influence of the environment on the decision to purchase TCB ^a
<i>inf_farmsupport</i>	1-5 influence of supporting farmers in the state on the decision to purchase TCB ^a
<i>Safer</i>	influence of knowledge of origin and safety on the decision to purchase TCB
<i>farmer_direct</i>	1 if the restaurant currently purchases beef directly from a farmer, 0 otherwise
<i>pounds_purch</i>	current volume of ground beef purchased by the restaurant

^a 1=Not at All, 2=Influence Slightly, 3=Influence Moderately, 4=Influence A Lot and 5=Influence Extremely

Table 2. Independent variable definitions for sirloin steak model

Variable Name	Description
<i>SS_price</i>	price assigned to TCB sirloin steak in contingent valuation question
<i>believe_prof</i>	1 if the restaurant believes TCB would make them profitable, 0 otherwise
<i>offer_noanti</i>	1 if the restaurant currently offers beef with no antibiotics, 0 otherwise
<i>offer_natural</i>	1 if the restaurant currently offers natural beef, 0 otherwise
<i>offer_CAB</i>	1 if the restaurant currently offers Certified Angus Beef, 0 otherwise
<i>inf_sustainable</i>	1-5 influence of sustainable product on decision to purchase TCB ^a
<i>offer_local</i>	1 if the restaurant currently offers local beef, 0 otherwise
<i>location_type</i>	type of area the restaurant is located in: city, suburb, small town, or rural
<i>years_business</i>	number of years the restaurant has been in business
<i>food_retailer</i>	1 if the restaurant currently sources beef supply from a food retailer, 0 otherwise

^a 1=Not at All, 2=Influence Slightly, 3=Influence Moderately, 4=Influence A Lot and 5=Influence Extremely

The equation for this model is

$$y_{rTCB} = \begin{cases} 1 & \Pi_{rTCB} > \Pi_{rULB} \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

$$\Pr[y_{rTCB} = 1] = \phi(\beta_0 + \boldsymbol{\beta}'\mathbf{X}_r + \beta_p Z_p + \boldsymbol{\varepsilon}_r) \quad (2)$$

where y_{rTCB} is the choice between TCB ground beef (sirloin steak) and unlabeled ground beef (sirloin steak) for each restaurant, r ; ϕ is the standard normal cumulative distribution function; β_0 is the intercept; $\boldsymbol{\beta}$ is a vector of parameters; \mathbf{X}_r is a vector of independent variables for each restaurant; β_p is the parameter for price of TCB ground beef (sirloin steak); Z_p is the price assigned to TCB ground beef; and $\boldsymbol{\varepsilon}_r$ is a random error term that follows a standard normal distribution. Assuming TCB is a normal good, the likelihood of a restaurant indicating they will purchase TCB should decrease as the price increases, ceteris paribus. The formal hypothesis is

$$H_0: \beta_p < 0 \quad (3)$$

$$H_A: \beta_p \geq 0. \quad (4)$$

Results

Tennessee Restaurant Preferences for TCB

Figure 1 shows the percentage of restaurants indicating they would purchase TCB ground beef at each price level, and Figure 2 shows these percentages for TCB sirloin steak. The relationship in Figures 1 and 2 shows what would be expected of any normal good. Price of TCB has a negative impact on the number of restaurants indicating they would purchase TCB.



Figure 1. Percentage of Restaurants Choosing TCB Ground Beef over \$3/lb Unlabeled Beef



Figure 2. Percentage of Restaurants Choosing TCB Sirloin Steak over \$5/lb Unlabeled Beef

Results from the probit model for ground beef are in Table 3. TCB price had a significant impact on restaurants’ decision to adopt TCB ground beef. Restaurants were more likely to indicate they would purchase TCB ground beef when the price assigned to TCB was lower. If restaurants were sourcing beef directly from a producer, selling local foods, and offering beef with no hormones added, they were more likely to indicate they would purchase TCB ground beef¹. Meanwhile, restaurants purchasing larger quantities of ground beef were less likely to indicate they would purchase TCB ground beef. Restaurants located in a city were more likely to indicate they would purchase TCB ground beef than restaurants located in a suburb, small town, or rural area. Restaurants whose customers pay more per meal at dinner were less likely to

¹ To check for multicollinearity the variance inflation factors (VIF) were calculated for both probit models. None of the variables had a VIF above 10, and the mean VIF was 2.61 for the ground beef model and 1.51 for the sirloin steak model which indicates there is not a problem with multicollinearity in the models.

indicate they would purchase TCB ground beef. Restaurants influenced more by the idea that TCB has better quality were more likely to indicate they would purchase TCB ground beef. Influence of the environment, supporting farmers in the state, and the knowledge of origin and safety of beef as well as offering grassfed beef and current price paid for beef were not significant factors.

Table 3. Probit model results for the ground beef model

Variable Name	Estimated Coeff.	Std. Error
Intercept	0.046	2.985
<i>TCGB_price</i>	-1.233	0.351***
location_type		
Suburb	-3.794	1.4215***
small town	-2.1898	0.821***
rural area	-1.655	0.949*
offer_local	1.713	0.856**
offer_grassfed	-1.247	0.918
offer_nohorm	1.954	0.976**
meal_price	-0.072	0.025***
current_gbprice	0.368	0.295
inf_quality	1.256	0.601**
inf_environment	-0.603	0.375
inf_farmsupport	-0.046	0.614
Safer	0.583	0.631
farmer_direct	1.692	0.952*
pounds_purch	-0.002	0.001*

N=73

Pseudo R²= 0.6071

LR $\chi^2(15)=61.23$

***=significant at $\alpha=.01$, **=significant at $\alpha=.05$, *=significant at $\alpha=.10$.

Results from the probit model for sirloin steak are in Table 4. TCB had a significant impact on restaurants' decision to adopt TCB sirloin steak. Restaurants were more likely to indicate they would purchase TCB sirloin steak when the price assigned to TCB was lower. Restaurants were more likely to indicate they would purchase TCB sirloin steak if they offered beef with no antibiotics administered, natural beef, local beef, and believed offering TCB would make the restaurant more profitable. Restaurants that offered Certified Angus Beef, however, were less likely to indicate they would purchase TCB sirloin steak. Higher influence of the belief that TCB is sustainable increased the likelihood the restaurant would indicate they would purchase TCB sirloin steak. Opposite of results for ground beef, restaurants located in small towns were more likely to indicate they would purchase TCB sirloin steak. The longer a restaurant had been in business, the less likely the restaurant was to indicate the purchase of TCB sirloin steak. Restaurants receiving supply from a food retailer, such as a supermarket, big box store, or wholesale club, were less likely to indicate they would purchase TCB sirloin steak. This research provides insight regarding the premium producers could receive for a TCB product purchased by restaurants as well as the business attributes of restaurants interested in providing such a product. Of restaurants surveyed, 95% stated they would consider offering TCB given it is profitable.

Table 4. Probit model results for the sirloin steak model

Variable Name	Estimated Coeff.	Std. Error
Intercept	27.7115	11.976**
<i>TCSS_price</i>	-4.805494	1.984699**
<i>believe_prof</i>	7.745	3.312**
<i>offer_noanti</i>	3.555	1.812**
<i>offer_natural</i>	3.243	1.722*
<i>offer_CAB</i>	-4.253	2.123**
<i>inf_sustainable</i>	.6392	.353*
<i>offer_local</i>	2.493	1.054**
<i>location_type</i>		
Suburb	-2.111	12.676
small town	2.929	1.465 **
rural area	1.235	1.423
<i>years_business</i>	-.0877	.0384**
<i>food_retailer</i>	-3.369	2.025*

N=79		
Pseudo R2=0.8235		
LR chi2(12)=90.09		

***=significant at $\alpha=.01$, **=significant at $\alpha=.05$, *=significant at $\alpha=.10$.

Conclusions

Before a program is developed for TCB, research needs to confirm that the premium restaurants are willing to pay for TCB will outweigh the costs of participating in a program. The results of this research can determine the feasibility of a TCB program and help in developing a profile of the characteristics of restaurants that would be likely to purchase TCB. Producers looking to sell directly to a restaurant can have a better idea of which type of restaurants to contact. This research provides evidence that there could be a successful niche market for TCB even at a high premium because a certain percentage of restaurants still chose the TCB at the highest price levels.

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