

CONSUMER PREFERENCES FOR THE ORIGIN OF INGREDIENTS AND THE BRAND TYPES IN THE
ORGANIC BABY FOOD MARKET

by

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Abstract

This study investigates consumers' preferences for organic baby meals. The growth of the U.S organic industry has been notable during the last two decades. The U.S. organic farmers do not produce enough quantity to meet the increasing U.S demand for organic food, and increasingly more organic foods are manufactured from organic ingredients produced outside the U.S. Tensions have emerged in the organic sectors as large-scale companies have seized opportunities to sell products differentiated with the organic label.

The study aimed to estimate U.S. consumers' willingness to pay (WTP) for selected attributes (type of brand, production attributes, and origin of ingredients) of baby meal products using a choice-based conjoint analysis. The organic offerings represent a nontrivial share of this market. In recent years, offerings under store brands have also been increasing.

The study identified that consumers preferred a major national brand with a large market share such as Gerber (80%) to the other types of brands including store brands. In terms of product characteristics, pesticide free and non-GMO products were seen as consumers' top priorities. Consumers would not buy products that did not exhibit these two characteristics. Minimally processed products seemed not to matter for the majority of consumers, and these products (sold frozen) were expected to be a niche market. Besides, a product made with U.S ingredients (organically or non-organically grown) was associated with a higher utility. Firms can run a cost-benefit analysis to see if sourcing U.S. ingredients could increase profit. Running experimental auctions are recommended to firms that want to elicit WTP for U.S grown ingredients and implement an efficient marketing strategy. This study is a preliminary analysis that highlighted consumers' preferences in the baby food market, and future analysis would complement the findings.

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Chapter 1 - Introduction

The United States (U.S.) has experienced a significant growth in the organic food industry. The Organic Trade Association (OTA, 2006) estimated the annual growth rate for organic food sales as between 15 to 21% from 1997 to 2005 and the growth remained in this range between 2005 and 2008 (DATAMONITOR, 2008). This is extremely high since the annual growth of the U.S. total food sales was around 2 to 4%.

Processors and retailers have to rely on imports to meet the U.S. increasing demand for organic food. The work in this thesis, supported by the National Research Initiative of the National Institute of Food and Agriculture, investigates issues related to the structural change in the U.S organic food industry. The study focuses on the baby food market and baby meal products.

1.1. Emergence of organic baby food products in the U.S.

According to Harris (1997), organic baby products were first commercialized in the late 1980's. Earth's Best is the first U.S brand that started to sell organic baby products. At that time, there was no clear definition of what could be an organic product. The brand developed its own certification program by banning some agricultural practices like the use of synthetic fertilizers and pesticides. What is more, some chemicals (synthetic fumigants and preservatives) widely used in the food industry were prohibited. They also forbid the use of growth hormones or antibiotics in the production of meat and dairy products. As the organic products became more and more available to consumers, Congress passed the Organic Foods Production Act (OFPA) in 1990 that created the National Organic Program (NOP) within the

United State Department of Agriculture (USDA) to regulate this market and avoid the term “organic” to be used fraudulently.

The growth of the organic baby foods sales, based on scanner data collected in supermarkets, has been extremely high in the early 90’s; it has increased from 1.1 million dollars in 1989 to 25.1 million dollars in 1995, implying a 2,200% increase during this period. Yet, the market share of organic baby food in supermarkets was only around 2.5% of all baby food sales in 1995 (Harris, 1997).

Using the scanner data collected by ACNielsen and Information Resources, Inc. (IRI), Thompson and Glaser (2001) give a more precise overview of this market in the 1990’s. During the 1990’s, prices of organic baby products (dinners, fruits, vegetables, and juices) decreased but remained higher than conventional prices. The price decrease could have been due to more competition or economies of scale. Regardless, the lower price helped increase the market share of all organic baby products. For instance, the market share by volume for organic dinners was almost zero percent in 1988 but decreasing prices has increased that market share up to 13% of all baby food dinners in 1999. It represented the highest growth among all organic baby products. In 1996, the availability of organic baby products in mainstream supermarkets was around 25% for all products except juices, which were almost 7%. This was remarkable because Gerber and H.J. Heinz had not entered this market yet.

Since the late 1990’s, organic baby foods became more available in mainstream supermarkets as several food companies, including General Mills, Kellogg Co., Mars, Inc., H.J. Heinz Co, and Gerber, took over organic food companies and started to sell their own organic products. Gerber offered its organic products under the Tender Harvest brand which was a profitable decision benefitting from Gerber’s products being available in 90% of U.S. supermarkets (Thompson and Glaser, 2001).

The USDA implemented the NOP in 2002. This program also standardized private certification and different standards that had emerged in the late 90's. It lays a basis that consumers can refer to when buying organic multi-ingredient processed food products, as are most baby food products. Products that contain organic ingredients are classified upon their percentage of organic composition. Those that are made with "100% organic" ingredients can state so on the label. Those that contain at least 95% organic ingredients can claim to be "organic". Those that only have 70% of organic ingredients can be labeled as "Made with Organic Ingredients", and the remaining products that have less than 70% of organic ingredients can be claimed to be "made with some organic ingredients". Products made with at least 95% of organic ingredients have the right to use the USDA seal. This regulation was necessary as more companies have entered the organic market and more processed organic food products became available to consumers.

The next sections of this chapter provide information about the global U.S. baby food and drinks market in recent years. Data and market analysis are from Mintel international group. Mintel's report on baby food and drinks only looks at baby products and excludes some non-specific baby products that babies might consume. An example would be non-baby-specific juice. Mintel gives insights on the baby food and drinks market by using primary and secondary data. Segment performance, leading companies, brand shares, marketing channels, and other components need to be clarified and analyzed. Relevant information about the organic offerings is highlighted since the study focuses on this particular attribute.

1.2. Structure of the U.S. baby food and drinks market

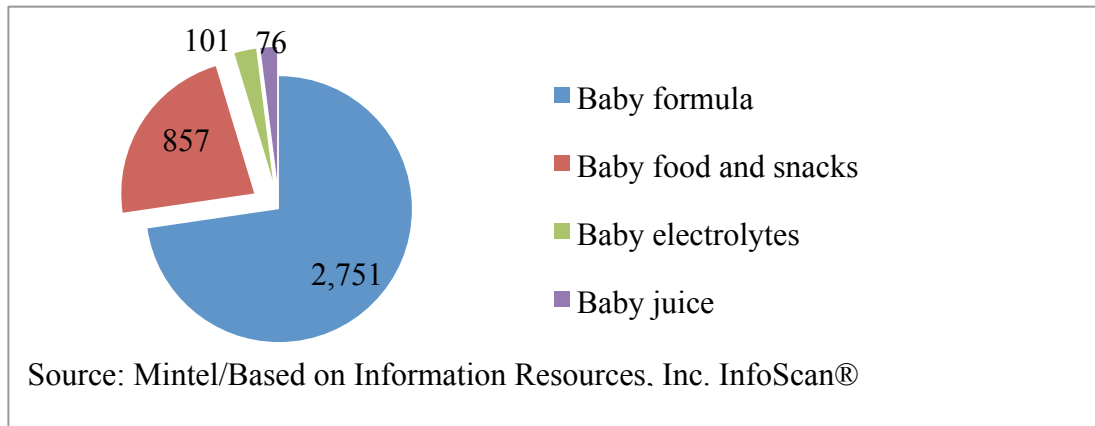
1.2.1. Market size and distribution

According to the Centers of Disease Control and Prevention, the U.S. birth rate has decreased by 2% between 2007 and 2008. This drop is not large but the downward trend is predicted to sustain in the coming years as the worldwide financial crisis may affect households to want to have fewer children. After all, having children is costly.

One of the costs that arise with newborn babies is food. The baby food and drink market was worth \$5.725 billion in 2009 at current prices. Figure 1 shows the share of each segment but the source does not include sales at Wal-Mart's stores, which accounted for 29.5% of total sales in 2009.

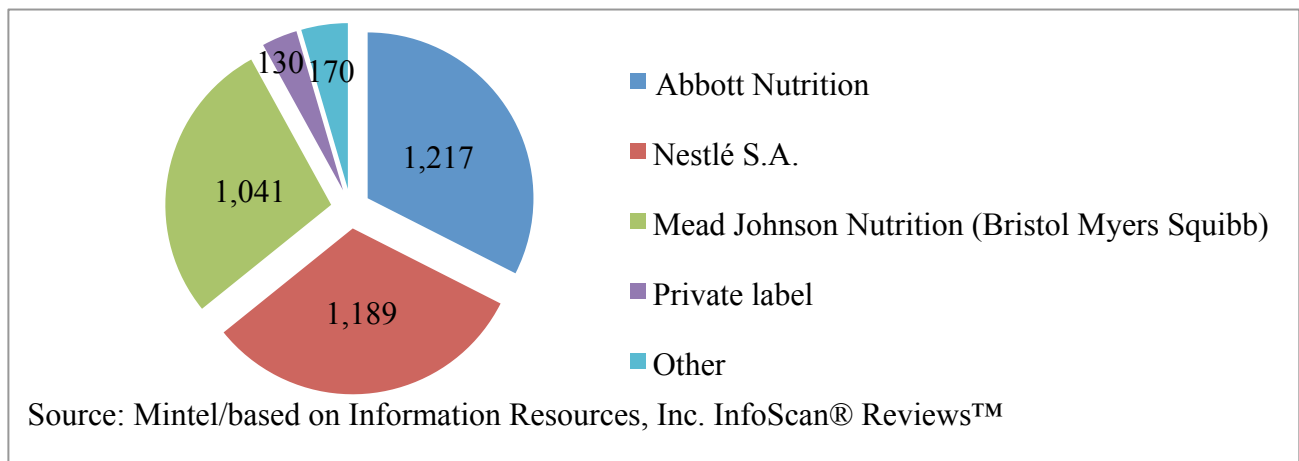
Despite the fact that medical groups and international organizations promote breastfeeding as the best nutrition for babies, baby formula is the biggest segment with almost three quarters of total sales in food, drug and mass merchandisers (retail stores that offer a broad range of product categories, including clothing and home furnishings) excluding Wal-Mart. Baby food and snack constitutes the second largest segment with about \$857 million of sales, which approximately correspond to a 23% share of the market. This is the only one segment that gained in market share from 2007 to 2009 with a 1.2% increase in sales. The two last segments, baby electrolytes and juice, have a very small share of the market. Together, they represent about 5% of this market.

Figure 1: Sales (excluding Wal-Mart) of baby food and drink by segment in 2009-10 (\$ million)



Three main companies are leading the baby food and drinks markets (Figure 2). Numbers in Figures 1 and 2 do not add up to the same number due to rounding errors. Abbott Nutrition and Mead Johnson Nutrition are infant formula specialists and share nearly equally the combined 80% of the baby formula market. Nestlé S.A account for 16% of the baby formula market but comes in as the 2nd biggest company in the overall baby food and drinks market thanks to its 80% share of the baby food and snacks market. Abbott Nutrition and Mead Johnson Nutrition dominate the infant formula segment but do not have any share in the baby food and snack segment.

Figure 2: Sales (excluding Wal-Mart) of baby food and drinks by company in 2009-10 (\$ million)



1.2.2. **Marketing channels**

Sales of baby food and drinks were the highest in supermarkets with \$3,000 million in 2009 and an 81% market share of food, drug and mass merchandisers excluding Wal-Mart. It is a 4.7% decrease in sales since 2007, which shows that some consumers are shifting to other outlets. Supermarkets have to watch their price to stay in this business. Many supermarkets (such as Winn-Dixie and Publics...) have “baby clubs” and offer coupon to keep their customers from going to other baby food outlets. Consequently, profits in supermarkets are quite low but offering discounts and cutting prices has become a necessity to maintain sales at the same level. Moreover, the organic leading brand, Earth’s Best, and private label organic brands, also known as organic store brands including Safeway’s O Organic and Supervalu’s Wild Harvest, have been emerging and have become increasingly more available to consumers. Organic baby food and drinks are seen as an opportunity for supermarkets to maintain sales.

The sales in the other retail channels were just over \$700 million in 2009. This is a 0.6% increase in sales from 2007 and a 0.8% increase in market share. This is not a large increase, but sales continued to grow at an annual rate higher than 10% from 2004 to 2007. The Mintel report argues that drugstores (such as CVS) have expanded their baby food and drinks sales because these stores are seen to be convenient. Some drug store chains are trying to differentiate themselves by being the exclusive seller of a particular baby food name brand. For example, Duane Reade is the exclusive seller of the frozen and organic HappyBaby baby food brand. Duane Reade was recently taken over by Walgreens meaning that this kind of business strategy could be growing in the future. Exclusivity would offer a great opportunity for baby food brands with small market shares to enter the baby food market nationally

through well-known retail outlets. Mass merchandisers (such as Target) took advantage of the weakened economy to gain share. Their low prices attract consumers looking to save money.

Baby food is also available in natural food stores and sales in these retail stores are only over \$10 million in 2010 at current prices. Dollar sales increased by 5.6% from 2008 to 2009 and decreased by 8.8% between 2009 and 2010. Products in natural stores are mostly organic offerings and may have not been affordable for some households during the world crisis.

The next section covers information specific to the baby meals market since this is the segment of interest in this study. Brands, leading companies and market shares are reviewed to understand the structure of this segment.

1.3. Structure of the U.S baby meals market

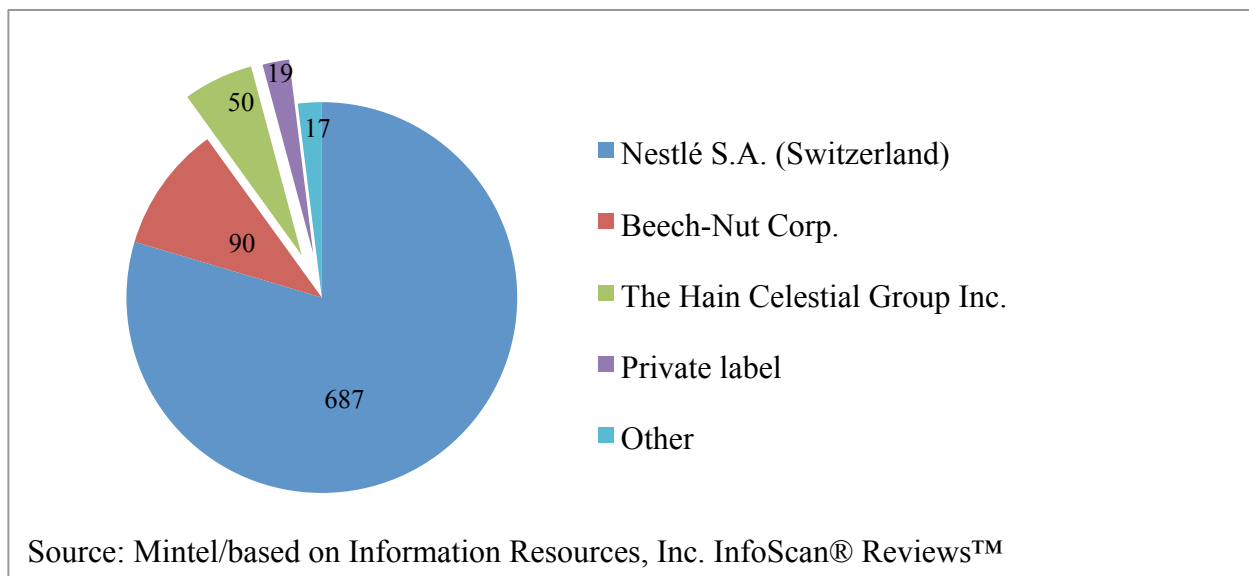
Gerber (owned by Nestlé S.A.) dominates the baby food and snacks segment with an 80% share (figure 3). The two others main players are Beech-Nut (owned by Milnot Co.) and the organic specialist Earth's Best (owned by The Hain Celestial Inc.).

Others companies have entered the baby food and snacks market in recent years as they noticed that some opportunities were still open to sell differentiated products. Plum Organics, HappyBaby, and Evie's Organic Edibles were cited as the most successful new players. These companies mainly claim that their products are made from fresh and minimally processed organic ingredients. However, their products, which are mainly in frozen, are not widely available in the U.S. due to the fact that these companies are too small to market baby food and snacks to the main retail chains. As mentioned in a previous section, some of these brands may be able to make a breakthrough by being exclusively sold in a particular retail channel such as a drug store chain.

Organic store brands (such as Safeway’s O Organic or Supervalu’s Wild Harvest) and non-organic store brands have become available on shelves. The growth in sales of various store brands was around 52% from 2009 to 2010 but these products only accounted for 2.2% of the market.

Beech-Nut Corp. kept its 10.4 % share of the baby food and snacks market from 2009 to 2010. The company claims that its products are made with natural ingredients (but not organic) and help the baby growth by being a great source of vitamins and minerals. Beech-Nut Corp. is also making product low in sodium, which is an attribute that some parents seemingly care about.

Figure 3: Sales (excluding Wal-Mart) of baby food and snacks by company in 2009-10 (\$ million)



A significant growth in sales has been observed for Earth’s Best (organic specialist) in recent years. Earth’s Best products are widely distributed in the U.S. thanks to Heinz that took over Earth’s Best in 1996. Heinz was in financial troubles a few years later and was forced to sell its organic baby brand to the Hain Celestial Group Inc. in 2000.

Earth's Best sales of baby food and snacks increased from \$31 to \$46 million between 2007 and 2008. The brand has gained 1.7 percentage points in market share to reach 5.4% in 2008. However, the recession has made things harder, and Earth's Best was not able to raise its market share between 2009 and 2010. Sixty-six percent of parents would look for good values when buying food for their baby (Mintel survey). Earth's best organic products might not be affordable or have not the greatest value for a majority of moms.

What is more, the competition in the organic baby food segment has become intensified. The organic offering is seen as a way to differentiate baby food products in order to attract consumers. Many food companies have tried to introduce organic baby food brands in the market in recent years to diversify their product range. Many locally owned brands and store brands are entering the market, while Gerber started to sell organic baby products through its Tender Harvest brand to follow the trend. It will be challenging to compete with Gerber that has the financial resources to keep innovating and follow trends easily.

Beyond its organic offerings, Gerber is making many different brands to feed baby all along their different stages of development. Its Gerber Graduates brand has been created for toddlers that are not ready for table food yet but do not eat conventional baby food anymore. Gerber Graduates Yogurt Melts and Gerber Graduates Lil Crunchies got spectacular 59.9 and 45.5% increases in sales respectively from 2009 to 2010. Gerber's marketing strategy that justified their creation of their Gerber Graduate brand was to argue that buying specific baby or toddler food is more convenient than making food.

1.4. Research objectives

All major manufacturers of baby food offer organic or natural baby food products. According to Mintel's Global New Products Database (GNPD), organic is one of the most

popular new attributes introduced between 2005 and 2010. It accounted for 37% of the introductions during this period. This percentage is much higher than the 20% of consumers who claim to be interested in organic baby product (Mintel's consumer survey). Of product categories, baby savory meals and dishes was the baby food segment that had the highest introduction of organic products, representing almost 40% of all introductions between 2005 and 2010.

Many baby food companies have invested in the organic sector to market and sell organic baby meals. This is a major change on the structure of the organic baby food market because a big firm such as Gerber now directly competes with organic established firms such as Earth's Best and other small firms. Store brands are also involved in the organic product offering. Store brands have emerged to offer consumers good deals. In a weakened economy, firms and retailers have to supply low cost products to maintain or improve their sales. A tension has emerged in the organic industry between organic industry members and new entrants during the last decade (Dimitri and Oberholtzer, 2006). Hugner et al. (2007) agree on this point and wonder how consumers are going to react to this structural change.

Some households find organic products attributes that match their preferences and expectations better than non-organic products. The demand for organic products in the U.S. has been growing very fast over the last decade. The Nutrition Business Journal (2006) indicated that organic firms face shortages for many ingredients and they rely on imports. As demand for organic is growing, the U.S. experience a shortage of domestic organic commodities and outsourcing has become a necessity. Worldwide organic standards tend to be harmonized to facilitate trade between countries as organic has been used as non-tariff barriers. In this context, a relevant question is to test (1) whether consumer's willingness to pay for organic products varies by origins of ingredients. Firms are not required to specify the

origin of ingredients, and the products packaged in the U.S. can be marketed as domestic products. The current literature has provided little insight on this issue so far.

Gerber has been the number one brand of baby food and snacks for decades but emerging brands are trying to penetrate the market. Many small businesses have found a way to differentiate their products with the organic label and/or the freshness of their locally sourced ingredients. Thus, the second objective of the study is to test (2) whether consumers care about scale of supply chain operations.

In the weakened economy, some households are looking for low cost products. Store brand products are cheaper than the other products but currently have a small share of the baby food market. A third and last objective of this study is to evaluate (3) whether popularity of (organic) store brand baby food products can be expected to be growing in the near future.

Through a survey and a choice experiment, the study intends to learn more about these different aspects of U.S. consumer preferences for baby meal products. Chapter 2 reviews the literature (Mintel consumer surveys and journal articles) on this issue. Chapter 3 explains the methodology used to investigate the three research objectives. Chapter 4 reports the results of the survey and the choice experiment. Chapter 5 discusses the limitations of this study and mentions some implications for agribusiness decision-making.

Chapter 2 - Literature review

This part reviews studies that estimated consumers' WTP for organic baby food products, explained consumers' preferences for baby food products, and examined consumers' motivations to buy organic products.

2.1. Willingness to pay for organic baby meal products

Harris (1997) explained the price premium for U.S. organic baby foods in the mid-1990's. The study was conducted by the Economic Research Service (ERS). The ERS evaluated (based on national supermarket prices) that an organic product was priced 21-cents more per jar (a jar is one serving) than its non-organic counterpart on average. Other attributes, such as the presence of modified starch fillers and some nutrient characteristics (fat, protein and iron contents), were found to be significant factors in consumer's purchasing decisions but less relevant than the organic attribute. Harris argues that organic products are seen as healthier (reduce exposure to pesticide residues), more tasty and nutritious.

Thompson and Glaser (2001) analyzed the U.S. organic baby food consumption using scanner data from two sources (ACNielsen and Information Resources, Inc. (IRI)) to examine aggregate consumer responsiveness to changes in prices and expenditures in the early 2000's. The data were collected from across the U.S.. Due to differences between the two sets of data, two samples were analyzed, one from each source. They only considered "shelf-stable" products and conducted their analysis on ready-to-eat foods sold in jars (including dinners, fruits and desserts, vegetables, wet cereals, and juices). They used a quadratic almost ideal demand system (QUAIDS) econometric model to obtain the price elasticities of demand for organic and conventional baby products as well as the cross price elasticities. Their main

results were as follows. Demand for organic baby products were own-price elastic, implying that a decrease in organic product prices would result in a proportionally large increase of the quantity sold. Demand for conventional products was own-price inelastic, suggesting that a decrease in conventional product prices would not boost market shares. An increase of conventional product prices would increase sales of organic goods. However, a decrease of organic product prices would not lead to a significant decrease in conventional product sales. They suggested that the growth in the organic market shares would likely increase the substitution effect over time.

Maguire, Owens, and Simon (2004) conducted a hedonic price analysis. It was an improvement over Thompson and Glaser's study because they not only considered the large grocery stores, but also took into consideration all kinds of retail stores (namely, grocery stores, upscale markets, ethnics markets, discount stores, small grocery stores, convenience stores, and other outlets such as Babies R'Us). Their model was based on Lancaster's theory, which says that consumers derive utility from product characteristics. Their model did not explain the reasons that led consumers to buy organic baby foods. Indeed, explanatory variables were product characteristics such as labels, brands, baby food stages, and store characteristics (as listed previously). The data were limited to 2 particular cities. They found that consumers would be willing to pay between 10 to 15 cents (16 to 27%) per jar more for organic baby food as opposed to conventional products. This was quite close to the findings of the Economic Research Service (21 cents/jar).

Smith, Huang, and Lin (2009) also tried to elucidate the willingness to pay for organic baby foods with a hedonic pricing model. Their data were from Nielson Homescan for two years (2004 -2006). Contrary to the paper of Maguire, Owens, and Simon, data were more representative of the U.S. population and concerned food purchase for at-home consumption.

Explanatory variables were the same as the ones used by Maguire, Owens, and Simon (2004). In addition, household demographic characteristics were included. They found that household's characteristics were not good criteria to explain the price of baby food except for income in 2004. The coefficient on income was positive (and statistically significant at the 1% level) meaning that higher income was related to higher willingness to pay. The same result did not hold for 2006. The price premium for organic baby food was higher than what Maguire, Owens, and Simon (2004) obtained, ranging from around 12 to 49% in 2004 and from 30 to 52% in 2006.

All these studies attempt to estimate the price premium for organic baby meals. Prices of organic products are often higher than prices of non-organic products and organic purchasers would be willing to pay the higher price in exchange of some benefits. The organic industry has to face this challenge because if quality of organics can be assimilated to some benefits lowering prices would not differentiate organic products anymore. Consumers have to perceive the value added associated to organic versions of products but setting prices too high make products unaffordable for some consumers. Hughner et al. (2007) point out that the organic industry has to face these price and benefits forces. Firms and retailers have to find the right balance. The next part is an analysis on consumers' attitudes and preferences for baby food.

2.2. Household's attitudes and preferences for baby food

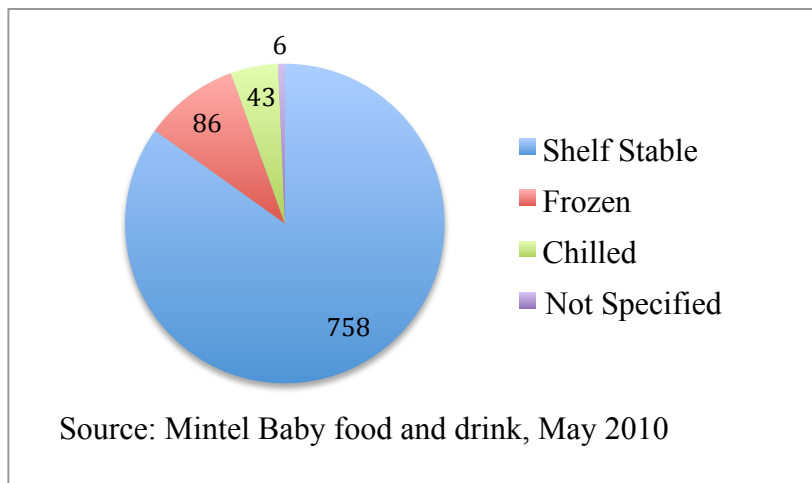
Mintel's reports (January 2009 and May 2010) on baby food and drink provide findings from different surveys they conducted to reinforce their analysis of the baby food market with primary data. Some journal articles are included to complement the analysis.

2.2.1. Shopping behaviors

According to Mintel’s report, the use of baby foods, cereals and juices was the highest for babies under one year old and declined after that stage. Needless to say that purchases of specific baby products decrease at some point since baby can be fed with regular food.

In term of storage type, 758 new products (85%) introduced between 2005-10 (Figure 4) were shelf stable. This allowed for 47% of parents to stock up on baby products when they went on sale (Table 1). Frozen baby food is a new segment that has emerged during the recent few years. Eighty-six new frozen baby food products (10%) were introduced between 2005-10. In November 2009, roughly 60% of parents surveyed by Mintel were not aware of the availability of frozen baby food, partially explained by the fact that this type of storage has not been common in the U.S.

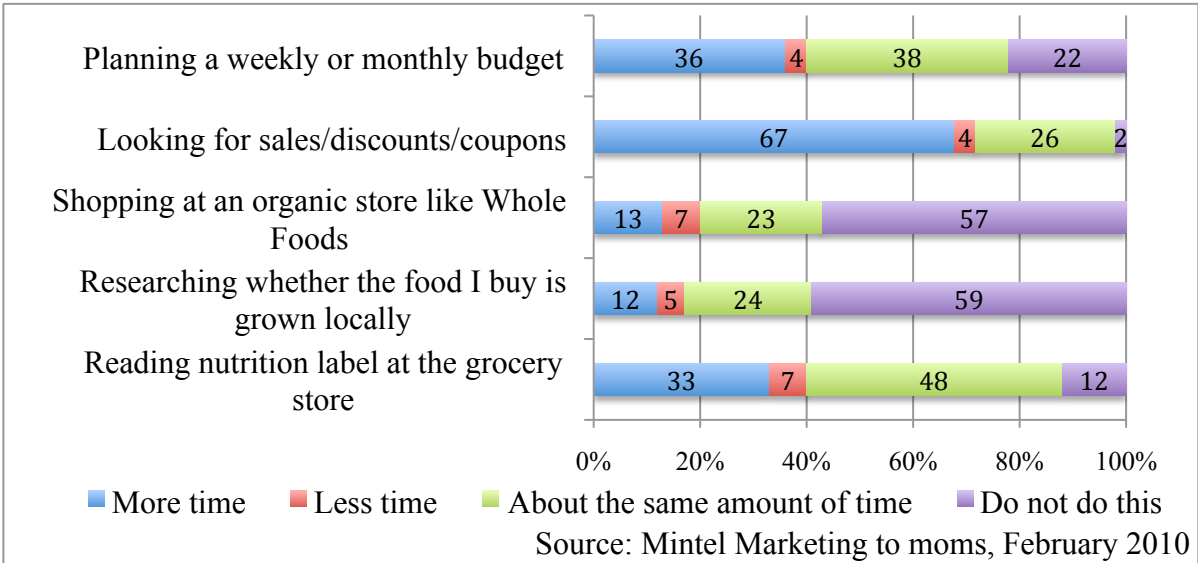
Figure 4: Type of baby food and drink products introduced between 2005-10



The origin of ingredients used to make baby food products has not been a source of concerns among shoppers yet. Fifty-nine percent of parents with children aged 3 or under do not research whether the food they buy is grown locally but 12% would do it more than they used to (Figure 5). To target these origin-conscious consumers, Gerber has already launched a

brand named “Gerber Foods Farmer’s Market vegetable Blend with DHA” sold in 4-ounce jars.

Figure 5: Shopping behaviors, 750 moms with kids aged 3 or under in household (November 2009)



57% of moms answered that they do not shop at an organic retail outlet such as Whole foods but 13% would do it more often. Only 12% of parents do not read the nutrition label at the grocery store, 48% of moms would do it the same amount of time and 33% mentioned that they are going to do it more often. Many moms (67%) were really concerned about sales, discounts, and coupons, which is reasonable as the survey was conducted in 2009, period of time that followed the global financial crisis. Thirty-six percent of parents said that they think more about planning a weekly or monthly budget.

As babies grow up, parents start to offer regular food, which increases the substitutability among food products as more products can be eventually bought. Most families believe that babies can eat almost anything that others eat as long as food is cut into small pieces. In that case, the competition is not only among baby food producers but also with non-baby-specific food producers. In a weakening economy, households are trying to

save money and some switch from store-bought baby food to making baby food at home. According to Mintel, only 13% of mothers make baby food at home for their baby. Only 33% of moms feed their baby with store bought products when the last 54% use a combination of store bought products and home-made baby food.

2.2.2. **Brand loyalty and private labels**

Store brands are seen as an opportunity for households willing to save money since they are less expensive than leading brands. Many organic and non-organic store brands have invested in the baby food market to offer low cost products. As indicated previously, these organic and non-organic store brands still account for a small share of the market but their growth has been quite significant (52% between 2009 and 2010). Moreover, 70% of moms who use store bought brands argue that store brand versions of baby food are just as good as national brands. Mintel's consumer survey also mentions that 45% of moms would have switched to store brand versions of baby food in order to save money. This percentage reached 48% for low-income people (earning under \$50,000 per year). Parents aged between 25-34 seem more interested in store brands since 76% (6% higher than the overall mean) mentioned that store brands are as good as national brands and 49% (4% higher than the overall mean) would have switched to store brands to save money.

Table 1: Brand loyalty and private label usage among moms, by age and household income, November 2009

	Sample Size	Age		Income	
		25-34	35-44	under \$50K	\$50K+
	255	164	75	119	136
Store brand of baby food versions of baby food are just as good as national brands	70	76	59	71	69
I buy different brands of baby food depending what is on sale	70	68	76	66	74
Some brands of baby food are more expensive than others, but are worth the higher price	51	45	59	44	57
I wait until my favorite brand of baby food goes on sale and then I stock up	47	45	52	42	51
I have switched to store brand versions of baby food in order to save money	45	49	40	48	42
I am loyal to one brand of baby food	16	18	13	17	16

Source: Mintel Baby food and drink, May 2010

Narasimham and Wilcox (1998) developed a model to figure out whether or not retailers should introduce private labels. Their model links retailers and consumers. The risk that consumers associate with a product can be related to whether a retailer should introduce a private label or not. They looked at this risk for more than one hundred categories through a consumer survey and classified baby food as one of the three highest “high categories risk” products along with frozen fish and feminine protection. A “low category risk” included canned beans or dried noodles. They argue that private labels baby food cannot take away the market share of the other national brands because of the high risk attributed to this product category. Generally, national brands have to cut their price to compete with private labels (Ward et al., 2002) but national brands of baby food would not take this strategy as they can expect to remain popular to consumers.

Surprisingly, Mintel survey reveals that brand loyalty does not seem to have a major effect with only 16% of parents indicating to be loyal with one brand. Fifty-one percent of parents think that some brands are more expensive than other but are worth the higher price. This percentage increases to 57% among high-income people (above \$50,000 per year).

2.2.3. **Parents seek healthy products**

Quality of products is a major issue and parents care about the nutritional content of baby food products. Mintel's consumer survey relates that the two attributes that parents care the most in terms of nutritional content are "Low/no sugar" (53%) and "No artificial colors/preservatives" (48%). Twenty-two percent of baby food shoppers would look for products certified organic. The Mintel analysis is fairly restrictive because it does not take many attributes into consideration, and it is not specific to organic baby food products.

Maguire, Owens, and Simon (2006) looked at consumers' perceptions of organic and conventional baby food regarding pesticides exposure. Data were collected from 10 focus groups in 5 U.S. cities and 6 to 9 baby food buyers composed each group to reach a total of 87 individuals. Participants had at least one child under 12 months old and were in charge of buying most of the food for their baby. Baby meals sold in jars are typically bought until the age of 12 months meaning that parent could perfectly recall their purchase behaviors. They were asked questions about organic food and also the risk for their child to die from cancer or other diseases associated to the organic and conventional baby food. Parents were uncertain about the meaning of "organic". The organic label evoked different products characteristics such as pesticide free, chemicals free, all natural, antibiotic-free, additive-free, healthier, more nutrients, and more expensive. What is more, individuals were not sure whether organic products are 100% pesticide free or if they contain fewer pesticides. Some respondents

thought that organic was only about farm practices. The perception of respondents concerning the reduction of cancer risks from pesticide exposure associated with organic and conventional baby food during the early stage of development was very close to scientific estimates. This study is fairly limited because it mainly investigates consumers' perception of organic and conventional baby food with respect to pesticides exposure.

While health concerns are commonly assumed as the primary reason for buying organic baby food, consumers may have other motivations when buying organic food for their baby. Preferences for organic baby food have not been a topic fully investigated. The following section reviews studies that have identified other reasons that matter to consumers in their organic purchase decisions.

2.3. Health concern is not the only reason for buying organic

2.3.1. Perception of organic food

There are several reasons that can lead an individual to shop for the organic version of a food product. Hughner et al. (2007) compiled different findings on organic food and they concluded that organic shoppers are not homogenous in demographics or beliefs. They searched for studies in organic food published from 1985 to 2005. They had to sort their findings because organic was cited in numerous studies. They identified 15 themes associated with consumers' preferences and perceptions of organic food; 9 themes were related to consumers' purchasing motives and 6 themes were seen as deterrents. Table 2 presents the fifteen themes, which indicate that consumers may have different reasons and their own reason to buy or not organic food. References are provided to justify this classification.

Table 2: 15 themes of motives and deterrents to buy organic food identified by Hughner et al. (2007)

Consumers' purchasing motives	Deterrents
<ul style="list-style-type: none"> • Health and nutritional concern • Superior taste • Concern for the environment • Food safety, lack of confidence in the conventional food industry • Concern over animal welfare • Support of local economy • More wholesome • Nostalgia • Fashionable/Curiosity 	<ul style="list-style-type: none"> • High price premiums • Lack of organic food availability, poor merchandising • Skepticism of certification boards and organic labels • Insufficient marketing • Satisfaction with current food source • Sensory defects

Hughner et al. (2007) state that the consumers' understanding of what organic means is crucial for researchers to study shopping behaviors. Davies, Titterington, and Cochrane (1995) looked at organic purchasers in Northern Ireland. They found that many shoppers are not familiar with organic farming practices and standards. Battle et al. (2007) conducted a survey and indicated that only 45% of consumers remembered having seen the USDA organic seal on products. The meaning of "organic food" would not be universal. Li, Zepeda, and Gould (2007) analyzed data from the 2003 University of Wisconsin's Study of Food Buying with a switching regression model that controls sub-sample heterogeneity to differentiate organic and non-organic buyers. Some variables, "awareness of the organic label", "positive beliefs toward organic foods", "a positive attitude towards cooking", and "a lack of religious affiliation" were associated to U.S. organic shoppers.

Hughner et al. (2007) attempted to identify who are the organic shoppers but argue that is very difficult to come up with consumers' profiles. They conclude from different studies (Food marketing institute, 2001; Thompson and Kidwell, 1998) that organic shoppers are

mainly female with children. Li, Zepeda, and Gould (2007) did not identify income as a significant market driver among U.S. organic shoppers. Many studies looked at the impact of family income and education on household purchases of organic food but there are mixed conclusions on these issues.

Hughner et al. (2007) noticed that most of the studies use survey questionnaire in order to relate consumers' preferences for organic and purchases of organic products but this approach is not sufficient to fully understand consumers' behaviors and actions. Thus, they recommend using more complex research methods. The following part reviews some studies that use different methods to investigate consumers' preferences.

2.3.2. **Relevant studies**

Battle et al. (2007) investigate consumers' preferences for multi-ingredient processed organic products (breakfast cereals) that have different organic content as described in the NPO. Recall that products made with at least 70% of organic ingredients cannot have the USDA organic seal but it can be still mentioned on the packaging that the product is made with organic ingredients. Using a payment card method in a consumer intercept survey, they found that consumers are willing to pay a premium price for organic even if products are not made with 100% organic ingredients. Generally, producing products with 100% organic ingredients cost more than producing products with 70% of organic ingredients. The result suggests that it would not be necessary to make products with 100% organic ingredients. Marketing a product with some organic ingredients may be sufficient.

James, Rickard, and Rossman (2009) conducted a choice experiment to evaluate the willingness to pay for applesauce made with Pennsylvania apples. They constructed the choice experiment around 5 attributes (USDA organic, Pennsylvania preferred, No sugar added, and

Low fat). The choice experiment was seen as the appropriate tool because it can investigate consumers' preferences for products that are not in the marketplace. Results were analyzed through multinomial logit models for a total of 1,521 respondents. The marginal utilities and the calculation of WTP indicated that consumers were willing to pay more for applesauce made with Pennsylvania apples than the other attributes. This result implies a possible product differentiation up on the "locally produced" attribute.

Loureiro and Hine (2002) tried to elucidate the WTP for potatoes in Colorado using a payment card method for a sample composed of 487 participants. They looked at 3 different types of potatoes, organic, locally grown and GMO-free. They found that consumers were willing to pay 10% more for potatoes locally grown over potatoes organically grown.

Pozo, Saak, and Peterson (2009) conducted a study to investigate U.S. consumers' preferences for fresh organic apples from various sources and from orchards that varied in scale. This study is related to the project of this thesis and they used a choice experiment as the method to estimate WTP. They found that the locally grown attribute was valued higher than the organic one. The WTP for apples produced in a small farm was higher than in a large farm.

Different methods can be used to study consumers' attitudes and preferences. The National Research Initiative of the National institute of food that supports and finances the work accomplished in this thesis recommends designing a survey with a stated choice method. There is evidence from the study of Carlsson and Martinsson (2001) that this method minimize the hypothetical bias. The next chapter explains the design of the survey and the models used to analyze the choice experiment that was identified as the most suitable method to elucidate WTP for different attributes of baby meal products.

Chapter 3 - Methodology

3.1. WTP for non-market products

Making new products can be costly. For example, a firm can decide to change the quality of its products and produce organic vegetables baby meals with ingredients grown domestically. This choice can attract consumers willing to buy these products but this strategy is associated with costs to make this kind of product available in the market (product development, sourcing of organic vegetables grown domestically, production process, marketing strategy, etc...). With the success rate of a new product introduction as low as 10%, evaluating the chance of success of new products has become a necessity. Firm can roughly forecast production costs associated with the development of a new product. However, assessing demand and WTP a new product (or changes in the quality of a good) is more complicated (Lusk and Hudson, 2004).

Many firms compete in the baby food market. Agribusinesses are trying to sell differentiated products. The overall objective of this thesis is to assess consumers' WTP for different baby meals products.

3.1.1. Methods used to evaluate WTP for new products

There are primarily three methods (experimental auction, dichotomous choice questions and choice-based conjoint analysis) used to evaluate the WTP for a new product (Lusk and Hudson, 2004). Open-ended questions are another method to evaluate WTP by directly asking how much a respondent would be willing to pay for a product. They are all based on the Lancaster's consumer theory, where the utility that a consumer gets from a good

is not evaluated from the good itself, but from the characteristics or attributes of this good (Kelvin, 1966).

An experimental auction simulates a hypothetical market. Consumers purchase non-market products (products that are not available on shelves for sale) with real money exchange. Consumers have to participate several times to reveal their true valuation of products (Lusk and Hudson, 2004).

Dichotomous choice questions are also used to estimate WTP for non-market goods. Respondents face a non-market good and are asked to say if they would buy it at a certain price. Two approaches can enable to elucidate WTP. In a single-bounded dichotomous choice framework, different versions of the survey enable to set different prices for the same product. Then, researchers are able to elucidate the WTP by looking at the percentage of YES responses for each price. In a double-bounded dichotomous choice framework, respondents face a good at a certain price. If they do not want to buy it another identical question is asked with a lower price. If they want to buy it another identical question is asked with a higher price.

A Choice-based Conjoint Analysis (CBC) or choice experiment is popular and frequently used by firms as decision tool for marketing strategy. In a CBC framework, respondents have to choose which product they would buy among several alternatives, where each product is defined by a set of attributes (price, brand, quality...). The descriptions of products vary across several and repeated choice sets.

Lee and Hatcher (2001) discuss the strengths and weaknesses of these methods used to estimate WTP for non-market products.




CBC and dichotomous choice questions are two discrete choice methods that enable a fast collection of data at a relatively low cost compared to experimental auctions. However,

studies show that experimental auctions are more robust in estimating WTP. In CBC and dichotomous choice questions frameworks, WTP may be overestimated since respondents do not have a budget constraint. Lusk and Schroeder (2004) compared the WTP between hypothetical (using CBC) and non-hypothetical responses for several attributes of beef ribeye steaks. They found that a CBC method overestimates WTP but the marginal WTP for a change in quality was not statistically different in the 2 methods. Besides, in an experimental auction the sample is restricted to a specific geographical area and cannot be representative of the entire population of a country.

Dichotomous choice questions cannot be used because this method does not examine attributes distinctly. A CBC can approximate fairly well the WTP by repeating the number of choice questions for each individual. What is more, a CBC is administered through a survey and so enables to have a representative sample of the U.S. population, which extends considerably the scope the results. The CBC method, frequently used by marketing firms, appears to be the more appropriate method to estimate WTP for many attributes of baby meal products.

In CBC, respondents of our survey are seen as decision makers. They decide which organic baby food product they would buy among several alternatives (A, B, C, D) and for repeated different questions. In figure 6, products A, B, C and the non-buy option D are defined by four attributes: price, type of brand, production process attributes and origin of ingredients.

Figure 6: Example of a choice question

	Option A	Option B	Option C	Option D
				
Brand	Store brand	Major National	Minor National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	Pesticide free No GMO Minimally processed		Pesticide free No GMO	
Origin of ingredients	U.S. grown			

The set of alternatives is also called choice set and has to satisfy three main characteristics to be efficient (Train, 2003). (1) Alternatives are “mutually exclusive” meaning than choosing one alternative lead to not choosing any other alternatives. (2) The choice set is “exhaustive” meaning that it takes into account all possible alternatives. Moreover, some respondents do not buy baby meals products at all or would not buy any of the products in the choice set. Consequently, a choice “D” defined as “I choose not to buy any of these products” was specified. (3) The number of alternatives is “countable”.

The choice experiment is an extremely powerful tool because it can enable to set up a hypothetical market. In other words, we can create products up on some attributes that are not in the market. The products in the choice experiment do not have to be realistic and this gives to the researcher some freedom. For example, the origin of ingredients used to make baby meals products is not mentioned on packaging but a choice experiment can include this attribute and the researcher can evaluate if this attribute matters to baby food shoppers. A procedure has to be followed to set up the choice experiment correctly.

3.1.2. Combination of attributes and sample size in a CBC

The choice experiment has to be set up in such a way that it gives the highest efficiency of combinations of attributes (choice sets) for given number of questions per respondent. This cannot be done randomly because we may favor one attribute more than another or we would not give good combinations of attributes over alternatives. The Optex procedure in the statistical software SAS computes the efficiency for a given model. The D-efficiency indicates how the combination of attributes makes the choice experiment efficient for a given number of repeated choices per respondent. D-efficiency measure has to be as close to 100% as possible (support.sas.com).

The D-efficiency becomes closer and closer to 100% when increasing the number of choice sets per individual. The D-efficiency will be greater if we ask 10 choice sets than 2 choice sets per respondent because 10 choice sets provides more information about respondents' choices and so this makes the set up more efficient. It can be the case that the D-efficiency gets over 95% for a pretty high number of questions per respondents, let us say 30. In this case, it is recommended to divide the 30 questions by 3 to ask only 10 questions per respondent. It creates 3 versions (3 choice experiments of 10 questions each) of the survey. Respondents cannot answer too many questions. At some point answering the repeated similar questions will become boring and they may start to answer randomly to get through the survey. Equation (1) is used to find the sample size given the number of questions per respondents (10 for example), the number of alternatives per choice set (4 in our case), and the largest number of levels in any attribute.

$$(1) N=500.NLEV/(NALT.NREP)$$

N represents the sample size needed given the number of choice question per respondent (NREP), the number of alternatives per choice set (NALT), and the largest number of levels in any attribute (NLEV) (Johnson, 2008).

In a CBC, the collected observations are discrete choices (example: 10 choices of products per respondents over 220 respondents) that can be analyzed with models that are described in the last part of this section. The following part explains how the CBC has been integrated in a survey.

3.2. Survey instrument

This part explains how the survey was designed and implemented, including a choice experiment, which was identified as the best method to answer the research objectives. The survey was composed of questions regarding respondents shopping habits, preferences for baby food, demographic characteristics and a choice experiment to estimate WTP for baby meal products.

3.2.1. Survey

A tailored design method enables to create surveys that reduce survey errors. Errors can come from coverage, sampling, measurement and non-response (Dillman, 2007). The survey has to be shaped in such a way that it gives respondents an incentive to answer all questions carefully. It is then expected that respondents will reveal their true preferences for baby food products. The survey was pretested before being administered. Survey Sampling International (SSI) sent the survey electronically to 498 households across the U.S. with children. 220 households met our criteria and fully completed the survey. The data analysis is based on these completed responses.

a) Organization of the survey (Appendix 1)

The survey consisted of three parts. To ensure all respondents belonged to the target population for the survey, the first two questions (Q1 and Q2) screened the respondents before allowing them to access to the survey. The questions ensured that respondents (1) had a baby who is between 6 and 12 months and (2) were responsible for at least half of shopping for baby's food. It would not make sense to get answers from people that do not fulfill these 2 requirements. Respondents can only provide valid responses in the choice experiment if they are currently in the practice of buying baby food products. Respondents with babies who are less than 6 months of age were not qualified for the choice experiment since babies are not expected to eat baby meals before 4 to 6 months of development. When babies are growing up, parents start switching from baby meals products to regular food to feed their baby. At some point, parents may not be able to remember precisely what kind of baby meal products they buy for their baby. A 12 months upper age limit was specified to make sure that parents have a good memory about their baby meals purchases.

The first part of the survey intended to collect information about respondents' preferences for baby food and their shopping habits (Q6 to Q24). It is important to know how respondents perceive baby food products. This part was also needed to ensure that our sample is a good proxy to represent the U.S. baby food shoppers. For example, our respondents' preference for baby meal brands should closely correspond to the U.S. market share of these brands. Then, we know that our respondents are likely to behave as the U.S. baby meal shoppers.

Then, the second part was the choice experiment. Respondents had to answer 10 choice questions (Q25 to Q34). The information provided by parents in the first part is expected to

corroborate the results of the choice experiment. The two first parts can be regarded as complementary sections.

The third and last part that followed the choice experiment contained general questions (Q35, Q36, Q37 and Q38) regarding respondents' preferences for selected categories of food products (fruit/vegetables, meats, dairy products/eggs, grain/pasta) and demographic information (Q39 to Q46: gender, age, race, income level, education, geographical location). Information from this third section is used to compare the sample to the U.S. population to assess its representativeness in terms of demographic characteristics. Moreover, demographics can help to target respondents by their preferences. For example, parents located in California or Florida could be expected to be more interested in the origin of ingredients than consumers located elsewhere in the country. Low-income people may not be willing to pay for recognized brands and may be more interested in buying store brands. Demographic information can be incorporated in discrete choice models in order to segment baby meal shoppers.

b) Questions design

Designing questions has to be done carefully. For instance, respondents may answer what they wish to buy but not what they actually buy. There are techniques that help the researchers to write questions properly, which is addressed by Dillon (2007). Questions in our survey were written according to comments and advice included in this book. Dillon explains that the survey should be written so that (1) every potential respondent will have the same interpretations of questions, (2) respondents answer accurately, and (3) respondents are willing to answer. The following discussion explains the main points that we took into consideration for the design of our survey questions.

People are not always able to recall and report past behaviors. The screening questions (Q1 and Q2) were included primarily to avoid this problem. For example, parents who are not buying food for their baby anymore might not be able to remember accurately what they used to buy for their baby, when questioned about their preferences for baby food brands. We do not want them to answer based on inaccurate recollection and being certain that they were buying baby food products at the time they took the survey was a requirement.

Social desirability is also an important issue. Respondents were asked to describe the products they buy for homemade baby food and the entire household (Q36, Q37, and Q38). They had 4 main choice possibilities (Mostly organic and locally produced, Mostly organic but produced outside the local area, Mostly non-organic but locally produced, Mostly other) for 4 food categories (fruit/vegetables, meats, dairy products/eggs, grain/pasta). Many respondents can be motivated to answer that they buy organic or local products even if in reality this is not what they do, if they believed that organic and local were socially desirable attributes of food products. These kinds of questions are difficult to address because respondents may not be able to describe what they mostly buy. The question becomes even more complicated when respondents have to distinguish different food categories. It is hard to find the right wording for this question. Using the words “mostly”, “organic” and “local” likely have allowed for wide ranges of interpretation, thus care is necessary in discussing the results. What is more, respondents may not select the option “mostly other” if they feel that the researcher does not expect this answer.

Many questions were designed in matrices with rows and columns. Respondents may skip a question if they either do not understand how to answer in the matrices frame or if there were a too large number of rows. Since data were sent electronically through the Internet it was possible to require a full answer for each question. Respondents could not skip any

question. However, we may expect respondents to answer randomly if they see that a question take too much time because they have to give a full answer to proceed into the next step. Questions 16 and 17 were identical. Respondents were asked to tell how important are some attributes (price, taste, location of ingredients' origin...) of baby food products. If the questions were presented as a single question, it would have consisted of 16 rows (16 attributes). Dividing the question into 2 questions is more appropriate. Indeed, it only makes 8 rows per question and so it reduces respondents' fatigue.

We limited the use of open-ended questions. This type of question is appropriate when the answer is a number followed by units (Q3, Q4, and Q5). Some households rely on care providers to look after their baby. We wanted to make sure that respondents provided most of the food for their baby. So, we asked how many hours a week a care provider looked after their baby and also the percentage of food provided by parents during the time the baby spent with a care provider. In many cases, an open-ended question is not adequate because it complicates the analysis of the results. In the third section of the survey we collected general information such as the income level. We could have asked an open-ended question where the individual gives his or her annual income, but decided to ask respondents to choose from various ranges of income (Q46). It categorizes people automatically, which could facilitate the analysis. Besides, income is a sensitive piece of information for many people, and creating ranges is a way to soften the question.

Most of our questions were closed-ended question with unordered response categories. Different scales have been used to evaluate respondents' preferences. We tried to avoid vague quantifiers when more precise estimates could be used. An example is questions about the frequency of purchases of baby food products at different retail outlets (Q10). The following vague scale could have been used: often, sometimes, rarely, never. But, one better way to

address this question is to use a more specific scale such as the following: more than once a week, once a week, two or three times a month, once a month, less than once a month, never. It is then easier to compare frequencies of purchases of baby food at retail outlets between all respondents (in a time frame). Some people may interpret the phrase “often” means as every day while others may think of it as once a week.

We could have asked a closed-ended question with ordered response categories to obtain a classification of attributes from 1 to 16 (if 16 attributes). It can be perceived as quite difficult for our respondents to give such a classification and in order to facilitate their answer we used a scale from “not at all important”=1 to “extremely important”=5 to get their preference for each attribute (Q16, Q17, and Q18). Then, we ordered attributes by taking the mean of each attribute. A higher mean implies greater importance of an attribute.

Some questions were designed to compare two types of products (for example, products made from organic ingredients grown in the U.S. to similar, baby food products made from organic ingredients imported from overseas) for different attributes (taste, uniformity of products...). The scale specified for this question included equal numbers of positive and negative categories as follow: highly inferior, slightly inferior, similar, slightly superior, and highly superior. The scale does not influence our respondents to answer positively or negatively (Q19, Q20, Q22, and Q23).

A period of time was indicated in many questions to be able to compare results between respondents. We ask respondents to say their preferences for different baby meal brands (scale: 1st choice, 2nd choice, 3rd choice, bought regularly along with other brands, tried occasionally, did not buy) during a past period of time (the last 2 months). In so doing, we established a basis that enables to obtain quite accurately the preferences for the different brands. If we do not include a period of time it can be possible that one respondent answer that

brand A is the “first choice” of the last 2 weeks when brand B could have been his or her “first choice” of the last 2 months.

c) Respondents’ trust and rewards

In designing the survey, we paid attention to some elements to enhance respondents’ trust. Respondents have to feel that they are being considered positively.

Opening instructions were written to thank people for agreeing to participate. We explained that the survey was being conducted as part of a research project, “The impacts of Imports and consolidation on the U.S. organic food system” funded by the National Research Initiative of the U.S. Department of Agriculture. People should be informed of why they are surveyed for. Most people would not be willing to answer to a survey if they do not know its purpose.

The research involves human subject. It was necessary to mention that participation was strictly voluntary and that responses would be kept completely anonymous. We provided the contact of the chair of the Committee on research Involving Human Subjects at Kansas State University. Respondents could contact this person if they had questions regarding the policy in this issue. We wanted our respondents to feel very confident when taking the survey.

We tried to make the survey as clear as possible. It is important that people understand the questions quickly without having to make too much mental effort. An explanation was provided regarding what the choice experiment was about. Hopefully, respondents were prepared to make choices as if they would have been at the grocery store.

We also asked people for advice. Dillman (2007) mentions that people find it rewarding to be asked for advice. Respondents could give comments, opinions or ask question about baby food or organic baby food. Many respondents (around 25%) wrote that they found the survey

to be interesting and that they appreciated the time they took to answer it. This shows that our survey has been made in such a way that respondents were confident to tell us their preferences for organic and regular baby food. Our goal was to ensure that they answer the survey carefully and that they were willing to reveal their true preferences for baby meal products.

A financial incentive was provided through the research firm to obtain respondents' responses and to compensate our respondents for the time they took to complete the survey.

3.2.2. Choice experiment

We tried to make the choice experiment as much realistic as possible. It is important that parents feel that they are in the grocery store when answering the choice questions. We defined products as 4oz containers ready-to-eat garden vegetables baby meals. These products are ubiquitous on shelves.

a) Attributes included in the choice experiment

The choice experiment allows for flexibility to include any attribute of interest. This has to be done carefully because the way the choice experiment is set up will have a high influence on the representative utility, the part of the utility that we measure.

We could not include too many attributes because our respondents would get confused if they have to face too many attributes per product. They may not be able to make fully informed purchase decision. Thus, we decided to include four attributes and each attribute had between 2 and 6 different levels as shown in table 3. All attributes were defined to our respondents before answering the choice questions to make sure that they knew what we meant.

Table 3: Attributes included in the choice experiment

Attributes		Levels included in the choice experiment
Brand		Store Brand, Minor National, Major National
Price		\$0.79, \$0.99, \$1.19
Production process	Farm level	Certified organic, Pesticide free, No GMO, Pesticide free and No GMO, No claim
	Processor level	Minimally Processed, No claim
Origin of ingredients		U.S. grown, Imported, No claim

Brand and price were two attributes that had to be included in the choice experiment because it is commonly believe that people look at these two elements when they go shopping. A preliminary work (first section of the thesis) provided some information about the baby food market and baby meal products and the three types of brands were chosen and defined according to what is available in the market. Major National is a masked reference to Gerber products. We defined Major National as “a nationally recognized brand with around 80% share of the market.” Minor National refers to nationally recognized brands (Earth’s Best, Beech Nuts...) with less than 20% share of the market. Store brand was defined as a product that is manufactured or provided by one company for offer under a retailer’s brand. It was important to include store brands in our choice experiment because their low prices attract thrifty consumers. The three price levels represent a low, medium and high level of price for 4oz baby meal containers. There were chosen arbitrarily according to the prices observed in the market and finalized after pretesting.

We included the most number of attributes in the production process. “Certified organic” was obviously included but we also included some other attributes such as “Pesticide free” and “No GMO” because these are key characteristics embedded in the certified organic claim and are major issues in agriculture and in the food industry on their own. Minimally

processed in a processor level attribute. Some (emerging) companies market their products based on these attributes and we wanted to know how consumers valued it. “No claims” options were included because some people might not care about our production process attributes and they would serve as the basis to estimate the marginal values of the production process attributes.

The origin of ingredients is an attribute that respondents’ are likely not used to seeing when they go shopping. Firms do not have to mention the origin of ingredients in the packaging. This attribute has been created because the demand for organic food is growing and U.S. firms have to rely on importations to get organic ingredients. Three levels were defined, Imported, U.S. grown, and No claim.

All these attributes included in the choice experiment are justified by the research objectives of this study.

b) Design and implementation of the choice experiment

Figure 6 in the methodology section shows an example of a choice set. Respondents could choose among four different options (three products or non buy option). A picture of 4oz baby meal containers was intended to give an image of the kind of products that respondents had to visualize.

The Optex procedure in SAS suggested asking 30 choice sets for 99% efficiency. As explained in the methodology, we cannot ask too many questions per respondents and so three versions of 10 choice sets were created. Each respondent answered 10 choice sets.

Given the set up of our choice experiment and the number of questions per respondent the formula in a previous section indicates that 70 ($N = ((500 * 10) / (4 * 6)) / 3$) respondents per versions were needed.

This makes 250 respondents for 3 versions. SSI had a panel of consumers and has been able to provide a fairly representative sample of the U.S. population. We received 84 useable responses for version 1, and 68 responses for versions 2 and 3, respectively, which constituted a sample of 220 respondents.

The next section explains the theory of discrete choice models that have been used to analyze the results of the choice experiment.

3.3. Analysis of discrete choices

This part is intended to explain the models used to analyze CBC or choice experiment data. It is mainly based on the book written by Train (2003).

The use of discrete choice models is required when dependent variables are binary, ordinal or nominal because the ordinary least square (OLS) method is no longer the best linear unbiased estimator (BLUE). Typically, regressions models are used to evaluate choices of “how much” and discrete choices models evaluate choice of “which”. The choice experiment implies the use of discrete choice models because the dependant variable is ordinary.

3.3.1. Some characteristics of discrete choice models

Discrete choices models are also called disaggregate models because the individual is the decision maker. In a discrete choice model, an individual faces different alternatives and choose the one that give him or her the highest utility. In the study, respondents are asked to choose between different types of baby meal products that are defined by a set of attributes (organic, national brand, price...). It is assumed that respondents maximize their utility when they are making their choice. In this sense, discrete choice models are consistent with utility maximization.

It is not possible to account for all factors that influence choices. Some factors are observed (the one included in the study) but the utility can depend on other variables that are not observed. The true utility is defined by the equation (2) to include observed variables and unobserved factors.

$$(2) U_{nj} = V(x_{nj}, s_n) + e_{nj}$$

$V(x_{nj}, s_n)$ is called representative utility. V is the part of the utility that researchers can capture with a model, where X_{nj} represents some attributes of the alternatives (n defines decision makers and j defines the alternatives) and s_n represents some attributes of the respondents. The part of the utility that is not captured by a model is e_{nj} .

Respondents are assumed to obtain a level of utility that is associated with the alternatives. A utility maximizing person would choose product i instead of product j if utility of i for the person is greater than utility of j . Therefore, the behavioral model for 2 products i and j for decision maker n is described in equation (3).

$$(3) U_{ni} > U_{nj} \quad \forall \quad i \neq j$$

The true utility (U) is not known since the only part measured is the representative utility (V). The term e_{nj} in equation (2) is defined as the part of the true utility not included in the representative utility. Thus, the specification of e_{nj} (its distribution) depends on the specification of V created by the researchers since e_{nj} is just the difference between the true utility and the representative utility.

So, the probability that respondent (n) will prefer alternative i over j is describe in equation (4).

$$\begin{aligned}
 (4) P_{ni} &= \text{Prob} (U_{ni} > U_{nj} \forall i \neq j) \\
 &= \text{Prob} (V_{ni} + e_{ni} > V_{nj} + e_{nj} \forall i \neq j) \\
 &= \text{Prob} (e_{nj} - e_{ni} < V_{ni} - V_{nj} \forall i \neq j)
 \end{aligned}$$

P_{ni} is the probability that the random term $(e_{nj} - e_{ni})$ is inferior to the observed representative utilities $(V_{ni} - V_{nj})$ of each alternative. This cumulative distribution is written in equation (5) assuming the density $f(e_n)$. Note that we use a probability to estimate the choice of alternative i by an individual n since we have some level of uncertainty specified in the error term.

$$(5) P_{ni} = \int_e I(e_{nj} - e_{ni} < V_{ni} - V_{nj} \forall i \neq j) f(e_n) d(e_n)$$

$I(\cdot)$ is called an indicator function. It takes the value of 1 when the inequality is true and 0 otherwise.

The unobserved part of the utility plays a major role to estimate the true utility. In other words, the representative utility of good i can be greater than the representative utility of good j but the true utility of good i can be lower than the true utility of good j. This would happen if the unobserved factor of good j can overcome the greater representative utility of good i compared to good j. It is clear that the distribution of the unobserved factors that affect the true utility has a high impact on the analysis of choice probabilities. The specification of the density $f(e_n)$ that describes the unobserved part of the utility will define several types of discrete choice models.

Utility is commonly written assuming a linear functional form (equation 6) where X_{ni} are observed variables associated with the alternative and decision maker and β_n is a vector of coefficients of these variables for person n (it represents the individual's preferences). The

coefficients can be estimated under different assumptions and methods, which will also impact the specification of the model used to analyze discrete choices.

$$(6) U_{ni} = \beta_n x_{ni} + e_{ni}$$

A general understanding of the derivation of all choice models was necessary to explain the characteristics of the multinomial logit and mixed logit models used to analyze the results of the choice experiment.

3.3.2. Multinomial Logit model

A multinomial logit model is a logit model that has more than 2 alternatives. The following part will define the logit model and is intended to show its limitations.

a) Characteristics of logit models

Equation (6) clearly shows that discrete choice models take into account the complexity of human behavior. The error term capture some uncertainty that a researcher does not observe with the variables specified in a given model. In a logit model, the error term (e_{ni}) in equation (1) is assumed to be independent and identical distributed (iid) extreme value for all i . Each unobserved component of the utility has the density in equation (7.1) and the cumulative distribution in equation (7.2).

$$(7.1) f(e_{ni}) = \exp(-e_{ni}) * \exp(-\exp(-e_{ni}))$$

$$(7.2) F(e_{ni}) = \exp(-\exp(-e_{ni}))$$

In this model, the difference between 2 extreme value variables (e_{nj} and e_{ni} where $e^*_{nji} = e_{nj} - e_{ni}$) follows a logistic distribution (equation (8)).

$$(8) F(e^*_{nji}) = (\exp(e^*_{nji})) / (1 + \exp(e^*_{nji}))$$

Train (2003) mentions that the extreme value distribution is not too different than assuming that errors are independently normal. It just gives fatter tails that allow for more aberrant behavior.

Starting from equation (4), the specification of the error term of a logit model and some algebraic manipulation lead to a closed form expression. Equation (9) gives the logit probability for an alternative i chosen by an individual n .

$$(9) P_{ni} = \exp(\beta x_{ni}) / (\sum_j \exp(\beta x_{nj}))$$

b) Limitations of logit models

In the model specified above, errors are independent of each other. It means that the unobserved portion of the utility for one alternative is unrelated to the unobserved portion of the utility of another alternative. This assumption can be very restrictive because the error for one alternative does not give any information about the error for another alternative. If the representative utility is well specified this assumption become less restrictive. Many attributes can define a product but in the choice experiment only a few attributes (the most relevant for the study) are included. However, there might be other attributes not included in the choice experiment that influence people's choices. In a choice experiment, a set of questions is asked to see the change in choices when attributes change. Thus, the part of the utility that is not observed has to be correlated with different choices made by our respondents over time.

A logit model estimates systematic taste variation, which means that this is only based on the observed factors. If we want to allow tastes (β 's) to vary with respect to unobserved factors or randomly, a logit model is inappropriate. For example, an attribute "A" included in the choice experiment can vary with an attribute "B" not included in the choice experiment.

The attribute “B” not included in the choice experiment will be captured in the error term but will not be taken into account to calculate the parameter β associated with the attribute “A”.

The last but not least limitation of a logit model deals with substitution pattern. If one attribute of an alternative is changed, the probability of this alternative to be chosen changes. For example, if the price of an alternative is set higher, the probability associated with this alternative is expected to decrease. Since all probabilities sum up to 1 the change in one probability leads to a change in all remaining probabilities. The specification of the pattern of substitution among all alternatives is very important and the way this is specified in a logit model will make it inappropriate in some situations. If you consider 2 alternatives i and j , the ratio of these alternatives P_{ni}/P_{nj} and does not depend on anything else than the alternatives i and j . In other words, the relative probability of i and j is the same regardless of the attributes of other alternatives. The ratio only depends on i and j and this is said to be Independent from Irrelevant Alternatives (IIA).

Red blue bus is a famous example that illustrated this point. A traveler has to choose between 2 modes of transport, a car and a red bus. Assume that these 2 possibilities (choosing a car: P_c or choosing a red bus: P_r) are associated with the same probability $\frac{1}{2}$ ($P_c/P_r = 1$). Now, assume that a blue bus is introduced and this blue bus is identical to the red bus. The probability of taking the red bus (P_r) is identical to the probability of taking the blue bus (P_b), which means that $P_b/P_r = 1$. In a logit model, the ratio P_c/P_r is the same regardless other alternatives (blue bus). If we do not want to violate the IIA property of logit models ($P_c/P_r=1$; $P_b/P_r=1$) we have to set the probabilities as follow: $P_c=P_r=P_b=1/3$. A logit model predicts these probabilities but this is not realistic because we can expect that 50% of people will still prefer their car to the buses options. Since the buses provide the same service we can expect that the probabilities that people take either the bus red or the blue will be $P_r=1/4$ and $P_b=1/4$.

This example shows that the way a logit model will change the probabilities of the alternatives is not going to be always realistic. The ratio of P_c/P_r changes as the result of the introduction of the bus blue but this should not be done this way. Thus, a logit model can over predict some probabilities with respect to others.

A multinomial logit model is not appropriate to analyze a choice experiment because some assumptions (taste variation, uncorrelated unobserved factors over time and IIA) are inconsistent with the set up of a choice experiment. The estimation of the WTP for some attributes cannot be evaluated with a multinomial logit model because the limitations of this model would create a bias. However, many researchers recommend testing a multinomial logit model before a more complicated model like the mixed logit model to see how the panel data behave in these restricted conditions (Hensher and Greene, 2001).

3.3.3. **Mixed Logit model**

A mixed logit model is appropriate to estimate any random utility model of discrete choices (McFadden and Train, 2000). It improves the limitations of the standard logit model previously described. It is defined by its own specific characteristics about the random term (ϵ), the coefficients (β 's), and the calculation of the probability P_n by simulation.

a) Preference heterogeneity

A mixed logit model considers that different people have different taste. One difference with a standard logit model is that now instead of having the coefficients be fixed (the same for everyone in the population) we allow these coefficients to vary randomly over people. There is a distribution of these preferences in the population.

In equation (10), $f(\beta_n|\theta)$ describes the density of the coefficients of utility in the population. It is defined as “given θ ”, where θ are the parameters of the population distribution (mean and standard deviation).

$$(10) U_{ni} = \beta_n x_{ni} + e_{ni}$$

$$e_{ni} \sim \text{iid extreme value}$$

$$\beta_n \sim f(\beta_n|\theta)$$

Two types of parameters are introduced. Each individual has his or her own taste, representing by his or her own β 's which determine that person choices and utility. But, there is also a distribution of those tastes in the population and that distribution has parameters (θ) that describe it (such as its mean and variance).

The iid term is extreme value as it is in a standard logit model. Assuming we know the β 's for each individual (we condition on that) the probability simply become logit since the iid term is extreme value. We just have a logit model for this individual person. The conditional probability (we do not know β 's but we pretend we know) is the logit formula evaluated with coefficients β 's (equation (11)).

$$(11) L_{ni}(\beta_n) = \exp(\beta_n x_{ni}) / (\sum_j \exp(\beta x_{nj}))$$

In reality we do not know what any β is but we recognize that there is a distribution of β 's in the population. We integrate that formula over all possible values of β . The choice probability is the logit probability (if we knew β) evaluated for all possible values of β over the distribution of those β 's in the population. The choice probability is an integral of the logit formula over a density of β 's in the population and that density depends on the parameters (equation (12)).

$$(12) P_{ni} = \int L_{ni}(\beta) f(\beta_n|\theta) d(\beta)$$

We calculate the integral of a statistic ($L_{ni}(\beta)$) over a density $f(\beta_n|\theta)$. This choice probability is easy to simulate. We draw a β from its density. We calculate the logit formula based on that β . We repeat this many times and we average the results. It gives a simulated value of the choice probability (equation (13)).

$$(13) P_{ni}^* = \sum_r L_{ni}(\beta^r) / R$$

The issue is to determine the density of β . We can set the density to we want. A normal distribution is often used but sometimes it may not be appropriate. A normal distribution is not suitable for price coefficients because we expect them to be only negative (people do not like spending money).

This property of mixed logit models is powerful because it considers that people have different tastes in the calculation of the choice probability.

b) Correlation in unobserved factors over time and substitution patterns

In a choice experiment we have repeated choices for each individual (10 choice sets). The model is specified in equation (14) to account for repeated choices over time.

$$(14) U_{nit} = \beta_n x_{nit} + e_{nit}$$

$$e_{nit} \sim \text{iid extreme value}$$

$$\beta_n \sim f(\beta_n|\theta)$$

We can still condition on β 's to find the conditional logit probability but since we observe many choices per individual the conditional probability becomes a product of logit probabilities as specified in equation (15).

$$(15) L_{ni}(\beta_n) = \prod_t (\exp(\beta_n x_{nit}) / \sum_j \exp(\beta_n x_{nj}))$$

The choice probability for a sequence of choices (10 repeated choices) is identical as equation (12) except that we have a product of logit probabilities (equation (15)) instead of an individual logit (equation (11)). This specification allows the mixed logit model to capture repeated choice situations.

The utility is specified differently to create correlations among utilities for different alternatives (equation (16)).

$$(16) U_{nit} = \beta'_n x_{nit} + \mu' z_{ni} + e_{nit}$$

$$\eta_{ni} = \mu' z_{ni} + e_{nit}$$

The part of the utility that is not observed is η . z_{ni} can be specified to be correlated over alternatives.

A mixed logit model has another desired characteristic. It does not have the restricted substitution patterns described in the logit model. The ratio of probabilities P_{ni}/P_{nj} depends on all data and not only on alternatives i and j .

Chapter 4 - Results

4.1. Respondent demographics and shopping habits

4.1.1. Demographics

The sample (220 respondents) is compared to the U.S. population in terms of gender, age, racial composition, educational attainment and income in table 4. Respondents were mostly female (92.7%) aged between 24 and 34 years old and with at least a high school diploma. In the sample, gender and age are not distributed as the U.S. population but this was expected. Mothers may be more in charge of attending to their baby's needs including food shopping than fathers and this explain why a few male answered our survey. In terms of age, 59.1% of respondents were in the 24-34 years bracket. This is higher than the U.S. population (14.4%) but this range of age is naturally the time for individuals.

The racial composition of the sample is similar to the U.S. population. The percentage of white people in our sample was 5% higher than the U.S. population, while the percentage of Hispanics was 5% lower than the U.S. population. The percentage of black/African American in the sample (11.8%) was similar to the U.S. population (12.4%).

In terms of income, our sample is comparable to the U.S. population. Percentages are slightly different for all ranges of income but the overall income distribution of the sample is consistent with the U.S. population.

Respondents are slightly more educated than the U.S. population. The percentage of respondents with at least a high school degree (94%) is 10% higher than the U.S. population (84%).

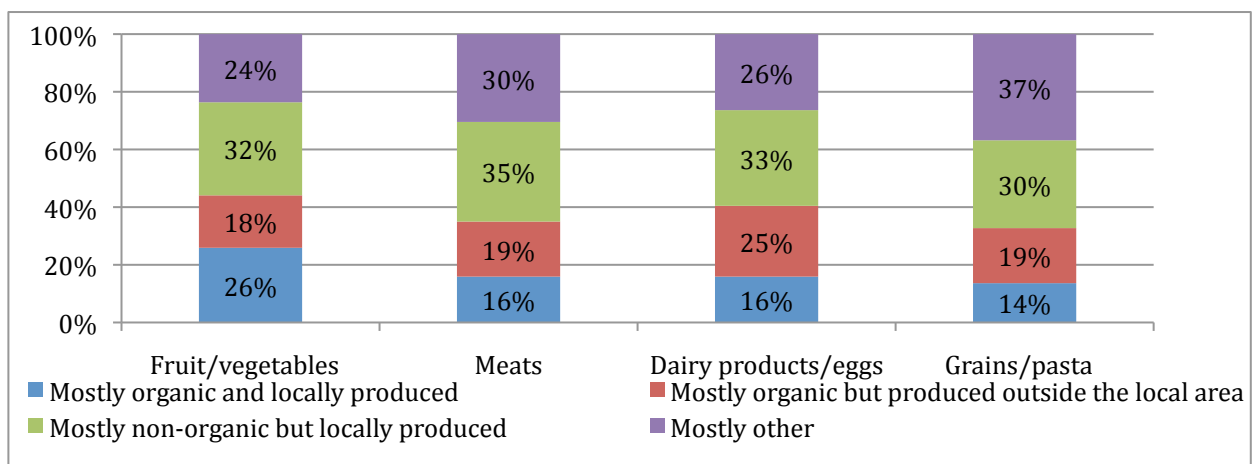
Table 4: Characteristics of the sample (n=220) compared to the U.S. population

Characteristics	U.S. Population	Respondents	
	(U.S. Census, 2007) % Frequency	n	%Frequency
<u>Gender</u>			
Male	49.2	16	7.3
Female	50.8	204	92.7
<u>Age</u>			
18-24	10.6	30	13.6
25-34	14.4	130	59.1
35-44	15.3	47	21.4
45-54	15.6	10	4.5
55-64	11.6	3	1.4
65 and older	13.5	0	0
<u>Race and Ethnicity</u>			
White	74.1	174	79.1
Black/African American	12.4	26	11.8
Hispanic	14.7	20	9.1
American Indian/Alaska Native	0.8	0	0
Asian	4.3	7	3.2
Native Hawaiian/Pacific Islander	0.1	0	0
<u>Education</u>			
Elementary school (through 8th grade)	6.5	0	0
Secondary school (9th through 11th grade)	9.5	9	4.1
High school or equivalent	30	48	21.8
Some college or associate degree	27	79	35.9
Bachelor's degree	17.1	69	31.4
Graduate or professional degree	9.9	15	6.8
<u>Household Income</u>			
Less than \$10,000	7.6	13	5.9
\$10,000 - \$24,999	16.9	31	14.1
\$25,000 - \$49,999	25.6	72	32.7
\$50,000 - \$74,999	18.8	54	24.5
\$75,000 - \$99,999	12.1	24	10.9
\$100,000 - \$200,000	15.3	24	10.9
More than \$200,000	3.7	2	0.9

4.1.2. Respondents shopping habits

Some questions were designed to know how respondents describe the products that they buy for the entire household and also to make baby food, and how often they go shopping for these products. These questions enable to identify if the food bought for the household differs with the food bought to make baby food. The chart column in figure 7 describes the types of products that respondents buy for their entire household.

Figure 7: Type of products bought for the entire household by food category



Around 15% of households claimed to buy organic meats, dairy products and eggs, and grains grown in the local area for the entire family, but this was the smallest share of households for these products. These products may not be affordable or available for many households. The percentage of households buying mostly organic and local food was higher for fruit/vegetables (26%), which is a result that could be expected as organic fruit/vegetables is the primary U.S. organic segment accounting for 37% of total organic sales (OTA, 2010).

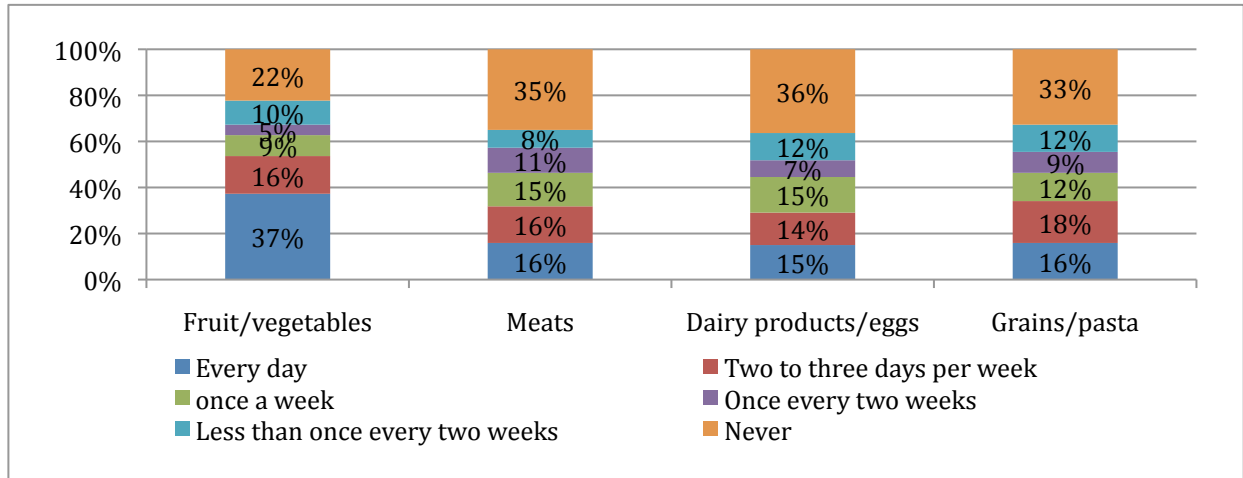
The share of households buying mostly organic products produced outside the local area was quite similar across food categories (18% for fruit and vegetables, 19% for meats and for grain and pasta) except for dairy products and eggs (25%).

Non-organic, local products have the highest share of households for fruit and vegetables (32%), meats (35%), and dairy products and eggs (33%). The most common type of grain and pasta products purchased by 37% of households were other (non-organic, non-local).

Caution is necessary to analyze the response to this question as the words “mostly” and “local” can have different meanings among consumers. Local can be interpreted as the county, the state or even the country. Moreover, respondents may have answered what they wish to buy and not what they effectively buy. Respondents may have answered that they mostly buy organic products because they buy some organic products when they go shopping, but the share of organic products in the household food budget can be quite small. Organic food has become quite popular over the last decade. The organic penetration (organic food as a percentage of total U.S. food sales) has been constantly increasing, from 0.81% in 1997 to almost 3.5% in 2008 (OTA, 2010). Three fourths of U.S. consumers are used to purchasing organic products. One third buy organic products on monthly basis (The Hartman Group, 2010). It is likely not appropriate to interpret our results literally, but they show that food products being organic and locally produced are attributes that around 70% of households care about.

Homemade baby food is an important issue as regular food is a substitute of specific baby food products when parents make baby food at home. Figure 8 represents frequency of regular food purchased to make baby food. 53% of parents buy fruit and vegetable regularly during the week (37% every day). Fruit and vegetables have the highest frequency of purchases among all types of products. 32% of parents buy meats at least two to three days per week. This percentage reaches 34% for grains and is down to 29% for dairy products and eggs. Perishability of products likely explains this result at least partially.

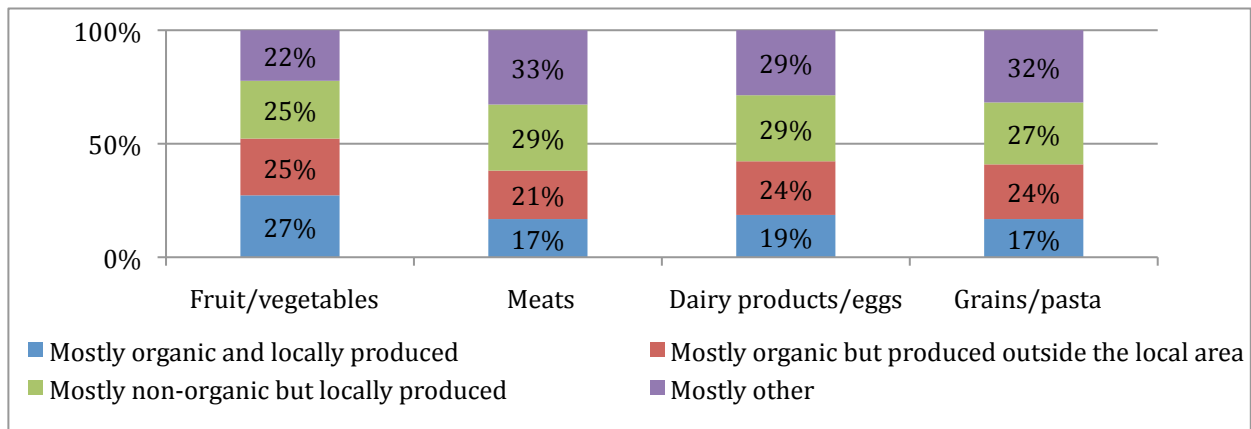
Figure 8: Frequency of regular food purchased to make baby food



Many households do not buy any food to cook for their baby. 35% of respondents do not buy any meat products, 36% do not buy any dairy and eggs products, and 33% do not buy grains or pasta. This result shows that about a third of the surveyed households buy exclusively specific baby food products. On the other hand, it is clear that regular food is a major substitute for baby food products for the majority of sample households.

The chart in figure 9 give more insights as it analyzes the type of products bought by parents for homemade baby food. It can be related to figure 7, which illustrates the responses to a similar question about general food purchases by the household.

Figure 9: Type of products bought for homemade baby food by segment



Results in figure 9 were statistically equivalent to figure 7, as t-tests reported in table 5. Indeed, p-values are higher than 0.05, which implies that the difference between the means for homemade baby food and the one calculated for the household for each food categories is equal to zero for all food categories at the 10% level. The similarities in the 2 column charts (Figures 9 and 7) and the t-tests may indicate that parents do not get different types of products when buying food for their baby or the entire household.

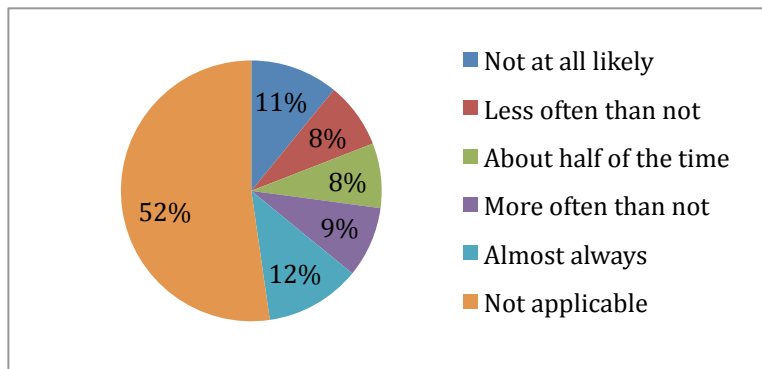
Table 5: Comparison of food bought for homemade baby food and the entire household

	Grains/pasta	Dairy products/eggs	Meats	Fruit/vegetables
Difference	-0.164	-0.023	-0.018	-0.109
t (Observed value)	-1.611	-0.226	-0.179	-1.026
t (Critical value)	1.965	1.965	1.965	1.965
DF	438	438	438	438
p-value (Two-tailed)	0.108	0.821	0.858	0.305
alpha	0.05	0.05	0.05	0.05

4.1.3. Likelihood to buy organic food

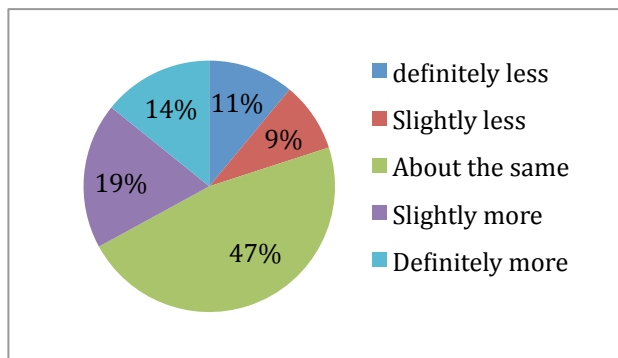
Figure 10 evaluates the likelihood to buy the organic version of a baby product when shopping for baby food. Fifty-two percent of parents answered that they never shop for organic. Eleven percent of respondents said that it is not at all likely that they purchase organic baby food. Eight percent would do less often than not and another 8% would do it about half of the time. Twelve percent of parents buy organic food almost every time they go shopping and 9% buy organic food more often than not. These 21% of parents are the potential organic buyers more than half of the time they go shopping. This result is similar to Mintel’s consumer survey where 20% of moms claimed to be interested in organic baby food.

Figure 10: Likelihood to purchase organic baby food when shopping for baby food



Having babies can possibly change the food pattern consumed by households. Parents may be introduced to organic food if they feed their baby with organic baby food. Figure 11 shows that 47% of parents state that they do not expect to change their shopping habits. Thirty-three percent mention that they buy definitely or slightly more organic products as their babies grow up. Organic baby food can be identified as a way to promote regular consumption of organic products. Household may want to switch partially to organic versions of products if they perceive some benefits when feeding their baby with organic foods. As their baby gets older, 9% of respondents state that they would buy slightly less organic products and 11% would buy definitely less of these products.

Figure 11: As their baby grows up, do parents expect to buy more or less of the organic versions of products for the household when all family members start eating the same food



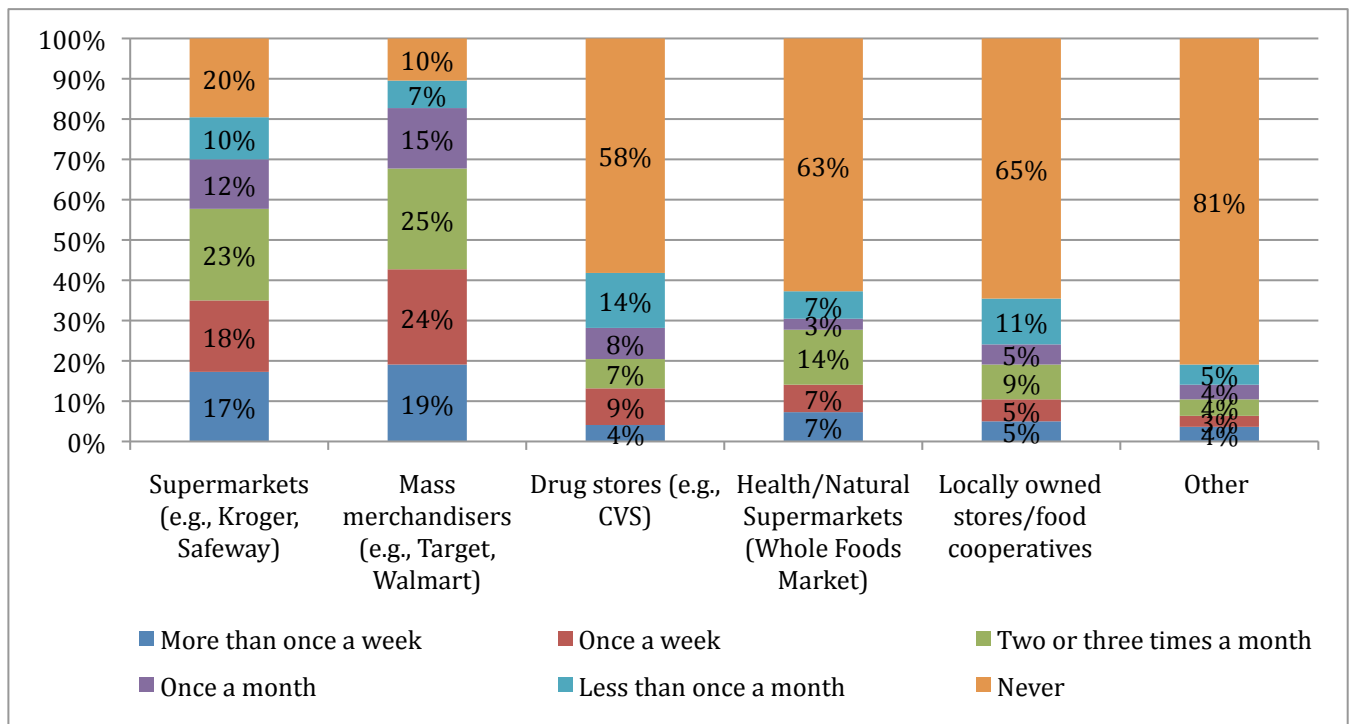
It is unclear to which extent organic baby food would lead households to buy more organic products for the entire family when babies are growing up. This result is not conclusive since it is not based on market data. A German market research institute (GfK) found that the share of expenditures for organic food decreases as babies grow up. The share of organic baby products in Germany is around 60% but family's expenses for organic foods start decreasing when babies reach the school age (Riefer and Hamm, 2008).

4.2. Marketing channels and preferences for baby meals brands

4.2.1. Marketing channels

Data concerning marketing channels were collected to discover where and how often parents shop for baby food, and also to examine the likelihood of organic baby products being purchased at retail outlets.

Figure 12: Type of retail outlet and frequencies for purchases of baby food products



As showed in figure 12, frequencies of baby food purchases are the highest in supermarkets and mass merchandisers. Thirty-five percent of households shop in supermarkets at least once a week. The percentage reaches 43% for mass merchandisers, which must be partially explained by the 29.5% market share of Wal-Mart in the baby food market.

These results are consistent with Mintel report that ranks supermarkets and mass merchandisers as the main places for purchases of baby food items. Since supermarkets and mass merchandisers account for a large percentage of U.S. groceries sales, it is expected that households buy food for their baby while they are buying food for the entire household.

However, 10 to 15% of parents go at least once a week to drug stores (13%) or natural supermarkets (14%) to get food for their baby. Drug stores and natural supermarkets can be targeted by small businesses aiming to enter the market. The nationwide availability of some drugstores or natural supermarkets can be an opportunity to make a breakthrough into the baby food market.

4.2.2. **Preferences for baby meals brands**

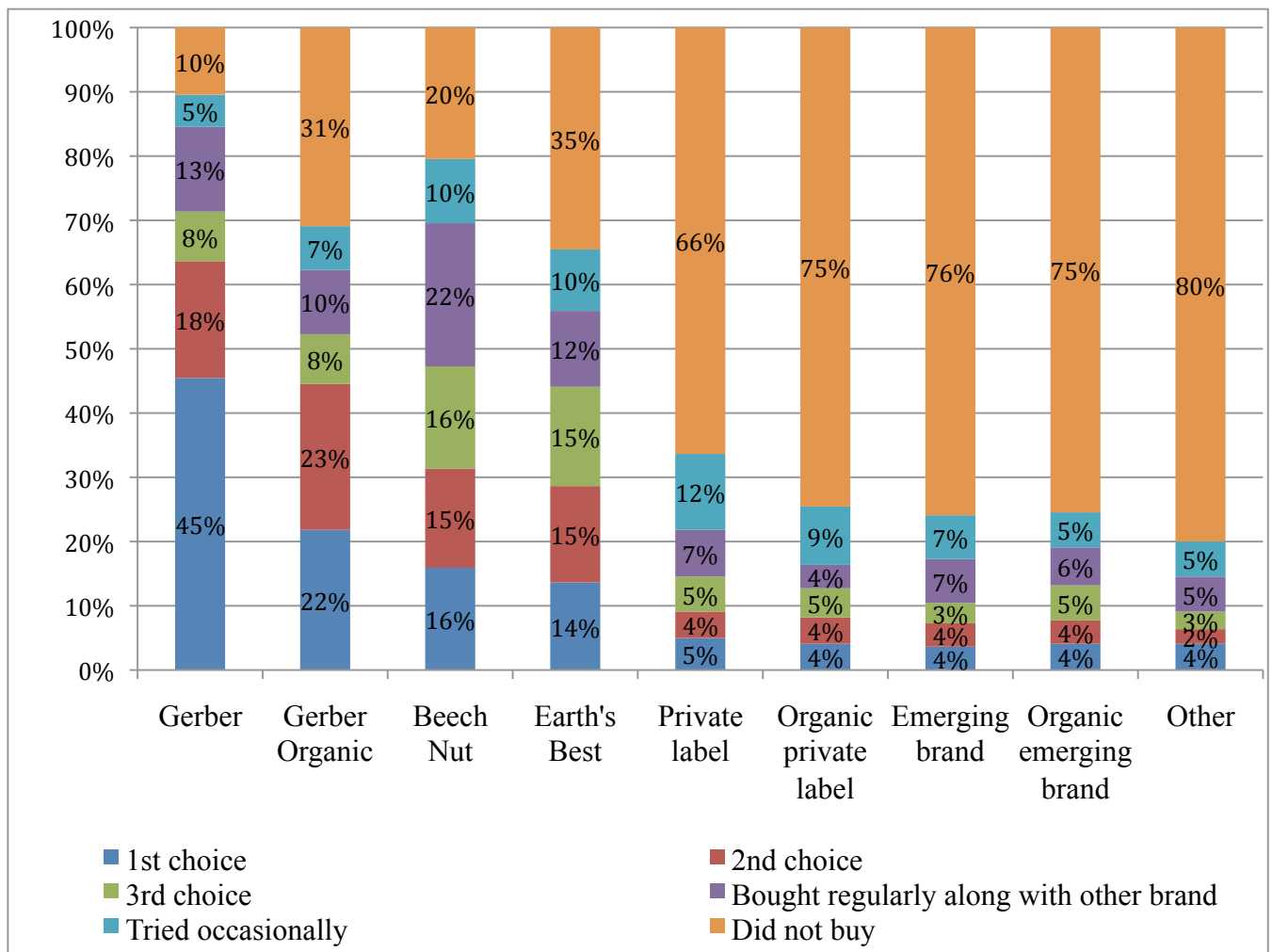
Respondents were asked to identify baby food brands based on their choices when they go shopping for ready-to-eat and shelf-stable baby meals products. Brands were ranked in the following order in term of the percentage of parents' identifying as their first choice: (1) Gerber, (2) Beech Nut, (3) Earth's Best, (4) Private labels and emerging brands (Figure 13). This order is highly correlated with the market share of these different brands meaning that the sample is a good proxy to estimate preferences of all U.S baby food buyers. It should be noted that respondents could choose several brands as their "first choice."

Gerber's products received the highest rate. More than 67% of respondents consider Gerber's products (regular and organic products) as their first choice. Only 10% of moms

would not buy Gerber regular baby food products and 31% would not buy Gerber organic products.

The availability of the three major brands (Gerber, Beech Nuts and Earth's best) across many national retail chains can partly explain their popularity. Beech Nuts and Earth's Best products are less preferred than Gerbers but 16% of parents would buy Beech Nuts meals as their first choice. The percentage of first choice is 14% for Earth's Best products. 35% never bought Earth's Best products and 20% never bought Beech Nuts products. The result is consistent with the baby meals market as Beech Nuts has a higher share than Earth's Best.

Figure 13: Preferences for baby food brands



Private labels (store brands) and emerging brands were not bought as often as the three major brands. Nature’s Goodness, Parent’s Choice, Hy Vee baby food are examples of store brands bought by some of our respondents. Happy Baby and Baby Mum Mum are examples of emerging brands bought by some moms.

4.3. Valuation of baby food

Firm market their products highlighting several attributes. Table 6 shows which attributes matter the most to consumers when they buy baby food products (average rating). For each attribute respondents gave a score based on a 5-point scale (1-not at all important, 2- slightly important, 3-moderately important, 4-very important, 5-extremely important).

Table 6: Average rating of attributes related to baby food products

Statistic	Rank	Mean		Std dev
Nutritional content	1	4.255	a	1.061
Risk from food-borne illnesses	2	4.145	a,b	1.147
Taste	3	4.055	b,c	1.06
Health claims (e.g., DHA , probiotics)	4	3.918	c,d	1.129
Use of chemicals in farm production of ingredients	5	3.864	c,d	1.221
Minimally processed	6	3.8	d,e	1.238
Use of artificial flavors/colors	7	3.786	d,e,f	1.238
Price	8	3.741	d,e,f	1.206
Where the ingredients were produced (e.g., locally or in the US or overseas)	9	3.627	e,f	1.257
Where the product was manufactured (e.g., locally or in the US or overseas)	10	3.582	e,f,g	1.228
Use of genetically modified organisms	11	3.55	f,g,h	1.373
Brand	12	3.377	g,h	1.317
Organic or 100% organic (ingredients are at least 95% organic)	13	3.327	h,i	1.363
Made with organic ingredients (ingredients are at least 70% organic)	14	3.318	h,i	1.341
Convenient packaging	15	3.105	i,j	1.262
Retail store where it is sold	16	2.909	j	1.258

a,b,c,d,e,f,g,h,i,j Shared superscripts imply that the values are not statistically different at 5% level

The mean and the standard deviation have been calculated for the 16 attributes in order to establish a ranking. Standard deviations are greater than one for all attributes meaning that there is a fairly high dispersion around the means, suggesting heterogeneity in preferences, which is important to keep in mind for the analysis.

Pairwise t-tests were computed to see if the means of attributes are statistically equivalent or different at the 5% level. Shared superscripts indicate the attributes that have no statistical difference in means. For example, the superscript “a” implies that the difference of the means between the 2 attributes “nutritional content” and “risk from food borne illnesses” is equal to zero at the 5% level.

The first three attributes, nutritional content, risk from food-borne illnesses, and taste are very important to consumers (means greater than four). This is understandable since these three attributes can be regarded as essential attributes for quality food products.

The scores for the remaining attributes averaged in a range between three and four. They are considered as moderately important to consumers. Price is in 8th position meaning that it does matter to consumers but to a less extent than other attributes. Parents do care about their expenditures but they do care first about feeding their baby with healthy food. Organic is towards the bottom ranking, but the major attributes that define a product as organic are in the higher rankings. Indeed, the use of chemicals in farm production of ingredients and use of artificial flavors/colors are respectively 5th and 7th with means around 3.80.

The location of the production (3.627) and the manufacture (3.582) would be more important to consumers than the organic certification (3.327) since the means are statistically different. On average, respondents do not care about the retail store where the products are sold (smallest mean inferior to 3). Good products would result in a mix of some of these

attributes. Firms have to find the right combination to make a new product introduction a success.

4.4. Valuation of organic baby food

In table 7, consumers were asked to rate attributes related to organic baby food (the same scale as table 6 was used). Attributes have mean scores between 3 and 4 meaning that there are all moderately important to consumers. Standard deviations are greater than 1, which imply that answers were quite variable among respondents.

Table 7: Average rating of attributes related to organic baby food products

Statistic	Rank	Mean		Std Dev
Taste	1	3.850	^a	1.261
Risk from food-borne illness	2	3.827	^a	1.299
Limited use of chemicals in farm production of ingredients, including pesticide, hormones, and antibiotics	3	3.827	^a	1.347
Contains no genetically modified organisms	4	3.682	^{a,b}	1.388
Environment impact	5	3.486	^{b,c}	1.299
Where the ingredients were produced (e.g., locally or in the US or overseas)	6	3.445	^{b,c,d}	1.356
Where the product was manufactured (e.g., locally or in the US or overseas)	7	3.436	^{b,c,d}	1.352
Supporting the farming community	8	3.259	^{c,d,e}	1.345
Promotion of social justice	9	2.964	^e	1.334

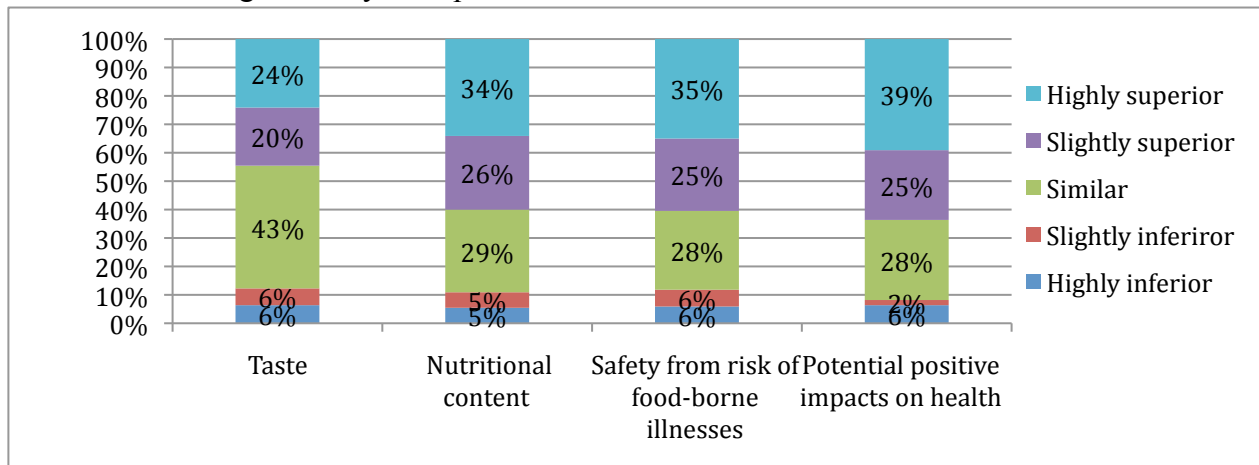
^{a,b,c,d,e} Shared superscripts imply that the values are not statistically different at the 5% level.

Results in table 6-7 are consistent since taste and risk from food borne illnesses are ranked 3rd and 2nd in table 6 respectively, and 1st and 2nd in table 7 respectively. T-tests reveal that the pairwise difference of the means of the first 4 attributes is zero at the 5% level. The ranking does show that some attributes are preferred to others. Supporting the farm community and promotion of social justice are two attributes with the lowest means and are statistically different than the means of the first attributes. It indicates that health concerns

may be more important than social issues related to organic farming. Again, firms have to find the right combination of organic-related attributes to market their product.

Households were asked to compare organic products to similar non-organic products. Results in figure 14 reveal that parents believe that organic products are superior (slightly-highly superior) to similar non-organic products in terms of nutritional content (60%), safety from risk of food-borne illnesses (60%) and positive impacts on health (64%). 44% of respondents believe that organic products have better taste. The organic label serves as a guarantee to consumers. The responses suggest that consumers perceive products labeled as organic as products that are made in such a manner to have an overall greater quality. Percentages are very similar across all categories except for taste. Respondents may have had a hard time to clearly distinguish these three categories and gave similar answers.

Figure 14: Comparison of perceived quality differences between organic baby food products and similar non-organic baby food products



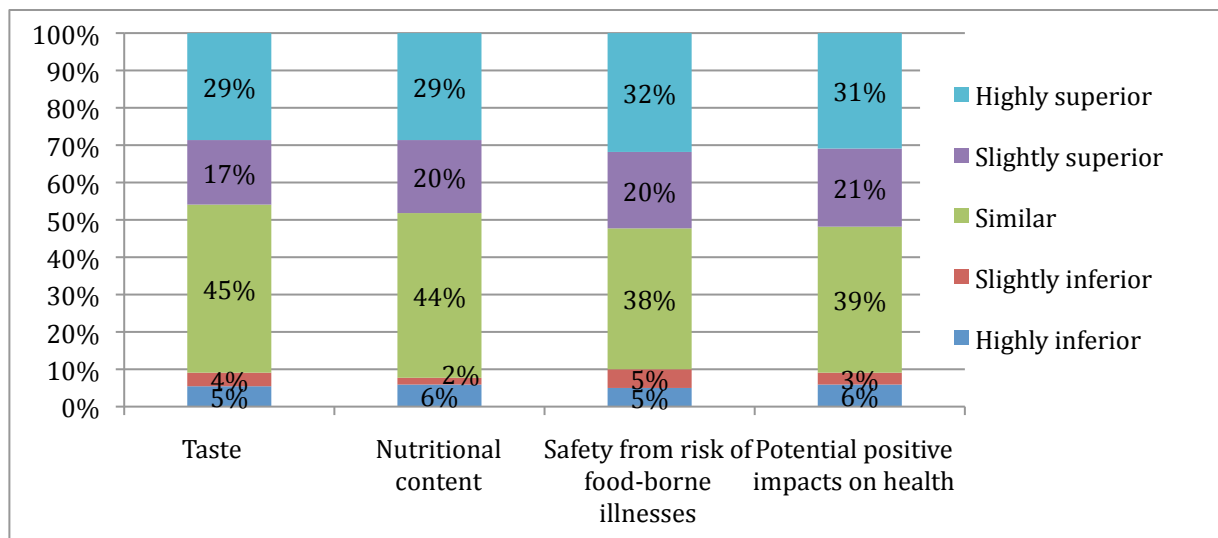
4.5. Perceptions of organic and locally grown baby food

Respondents have been asked to compare baby food made from ingredients grown in the U.S. to similar products made from organic ingredients imported from overseas. The

answers were not necessarily based on their experience with these different kinds of products since the origin of ingredients is rarely mentioned on baby food products.

Results are quite similar across attributes included in the survey, i.e., taste, nutritional content, and safety from risk of food-borne illnesses (Figure 15). It seems that respondents could not really perceive differences in quality across different attributes for organic ingredients from different origins, perhaps because they have not thought about, as firms do not market their products based on these characteristics. Results can be analyzed as an overall perception of quality of organic ingredients grown in the U.S. compare to imported ingredients.

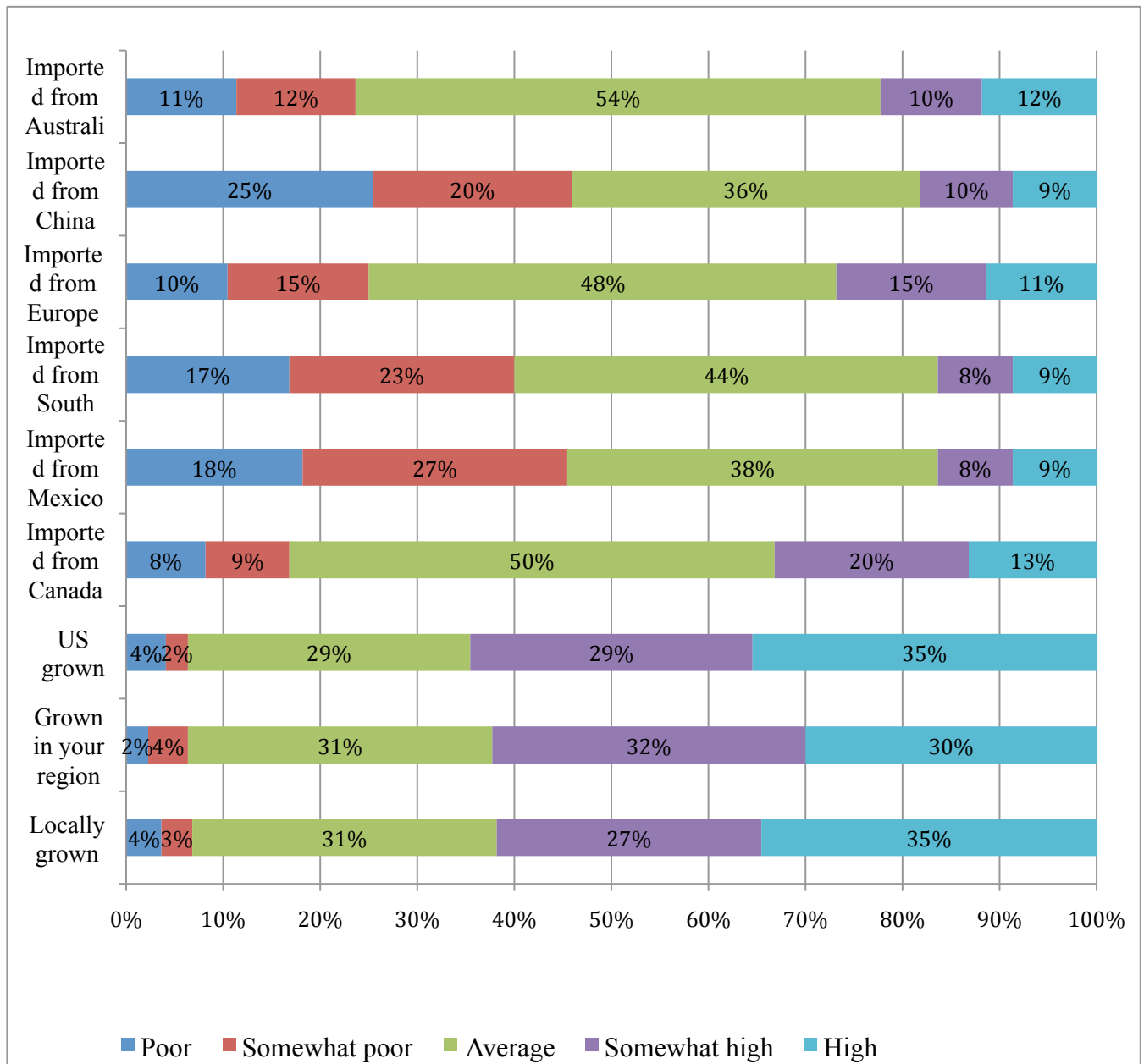
Figure 15: Comparison of baby food products made from organic ingredients grown in the U.S. to similar products made from organic ingredients imported from overseas



Many households responded that products from imported ingredients versus products from locally grown ingredients are similar in terms of taste (45%), nutritional content (44%), safety from food-borne illnesses (38%), and potential positive impacts on health (39%). The percentage of households who consider that products with local ingredients are superior to products with imported ingredients is greater for all categories.

Respondents expressed their opinion on the overall quality of ingredients commonly used to make organic baby food imported from different locations. Results are summarized in figure 16. U.S. consumers give more credits to ingredients organically and domestically grown but it does not mean that they are willing to pay more for that. However, it does indicate their interest in the origin of ingredients.

Figure 16: Quality of ingredients used to make baby food originating from different locations



It confirms that ingredients grown in the U.S. are seen to have a higher quality than ingredients imported from overseas. Ingredients grown domestically at different levels (local, region, U.S.) are perceived to have similar quality by consumers. The quality of U.S. ingredients is rated high or somewhat high by 64% of respondents. This percentage is 62% for ingredients grown in the region and also 62% for ingredients grown locally.

Forty-five percent of respondents rated ingredients from Mexico and China as poor or somewhat poor. According to respondents, these two locations have the worst quality of ingredients. The graph indicates an opportunity to differentiate product based on the origin of ingredients used to make baby meals products.

4.6. Valuation of scale of supply chain operations and store brands

Another objective of this study is to assess consumers' perception for scale of supply chain operation. In the baby meals market Gerber has the leadership but many brands compete to get recognition and market shares. Eight types of stylized brands have been created to collect respondents to create a hypothetical baby meals market. The responses are summarized in figure 17.

Nationally recognized brands are seen to have a higher quality than the other brands for 64% of parents. An organic division of a national recognized brand has a higher quality for 57% of parents. This is very consistent with results in figure 13 where Gerber products are the main first choice for consumers. However, around 50% of consumers believe that the remaining types of brands have a quality that is "average" meaning that these consumers are potentially interested in emerging brands and private labels.

Figure 17: Perception of the overall quality of products marketed under different types of brands

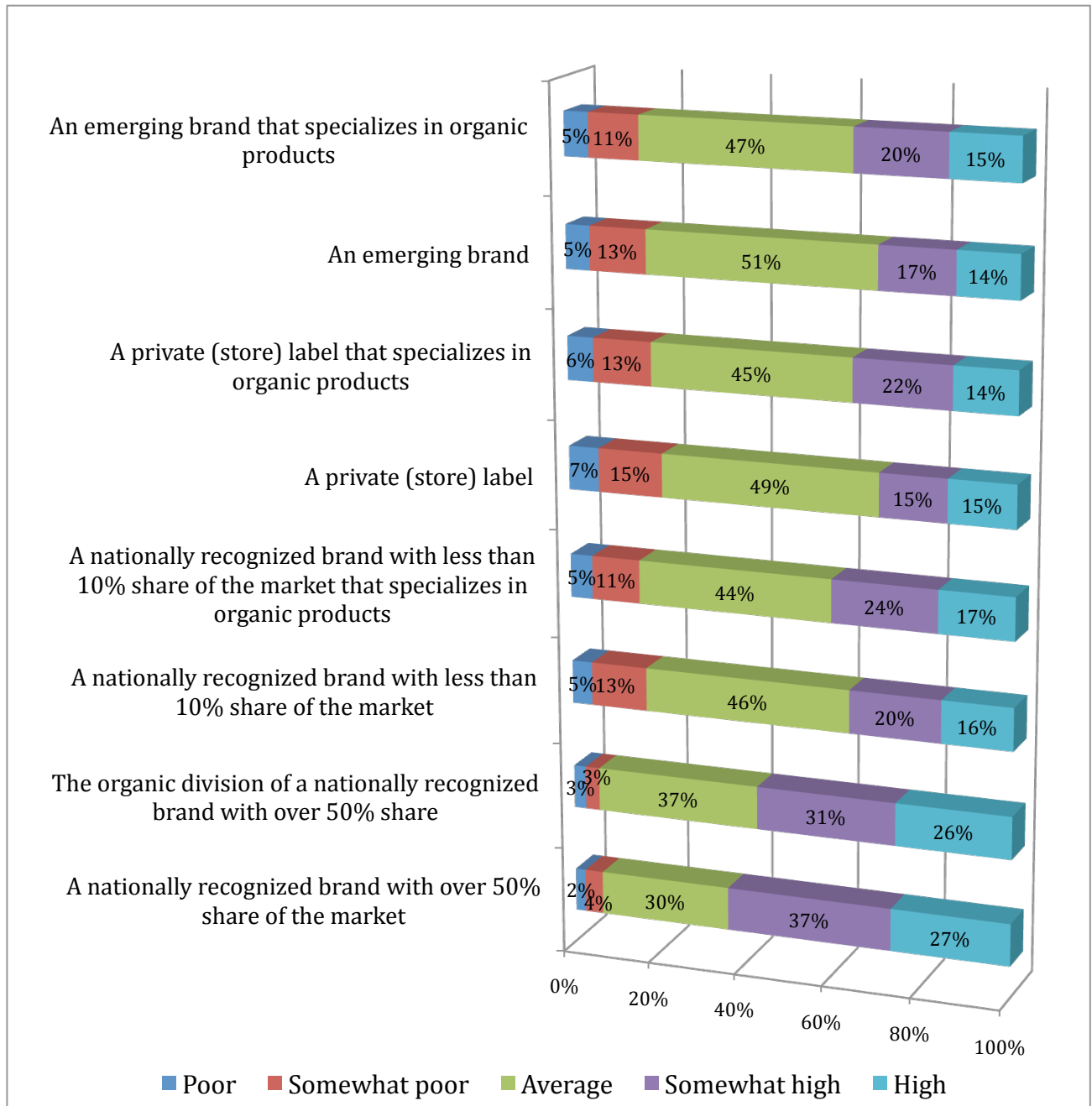


Table 8 gives the average rating of the different types of baby meal brands. In figure 18, “poor” corresponds to the rating 1 and it goes all the way up to “high” that corresponds to 5. Standard deviations are around 1 suggesting dispersion for all means. Note that the

subscripts a and b are reported to identify the scores of brand types that are statistically equivalent or not to that of another type of brand.

An organic and non-organic nationally recognized brand with over 50% share of the market like Gerber has by far the highest mean. T-tests indicate that these 2 types of brands received scores that are statistically different than all the remaining brands at the 5% level.

According to t-tests, the other brands have no difference in their mean at the 5% level. Basically, it suggests that the pairwise difference between the means is zero and so one type of these brands is no preferred to another. For example, it cannot be said that a nationally recognized with less than 10% share of the market that specializes in organic products is superior to any other brands like private labels or emerging brands. For example, Earth’s Best would face more competition than Gerber with respect to the other brands.

Table 8: Average rating of type of baby meal brands

Statistic	Rank	Mean		Std dev
A nationally recognized brand with over 50% share of the market	1	3.82	a	0.95
The organic division of a nationally recognized brand with over 50% share	2	3.75	a	0.97
A nationally recognized brand with less than 10% share of the market that specializes in organic products	3	3.36	b	1.04
A nationally recognized brand with less than 10% share of the market	4	3.30	b	1.03
An emerging brand that specializes in organic products	5	3.29	b	1.04
A private (store) label that specializes in organic products	6	3.25	b	1.05
An emerging brand	7	3.20	b	1.01
A private (store) label	8	3.17	b	1.07

^{a,b} Shared superscripts imply that the values are not statistically different at the 5% level.

4.7. Results of the choice experiment

The responses to the choice experiment have been analyzed to evaluate respondents' preferences for baby meal products. The respondents were asked to choose from baby meal products, which were specified as 4-ounce ready-to-eat, shelf-stable, garden vegetable baby meal with various combinations of attributes. The model results presented below were estimated using the statistical software LIMDEP 4.0 (Greene, 2007).

Three models, which are nested (a multinomial logit, a mixed logit, and a mixed logit with demographic variables), were specified and estimated (Appendix 2). The general model is specified in the following equation (17):

$$(17) U_{ij} = \beta_1 PRICE_{ij} + \beta_2 STORE_{ij} + \beta_3 MINNAT_{ij} + \beta_4 ORG_{ij} + \beta_5 PFREE_{ij} + \beta_6 NOGMO_{ij} + \beta_7 PFREENOGMO_{ij} + \beta_8 MINIP_{ij} + \beta_9 IMP_{ij} + \beta_{10} USA_{ij} + e_{ij}$$

Two dummy variables represented the type of brands (*STORE*=store brand; *MINNAT*=Minor national brand) with the attribute “major national brand” as the base. The production process at the farm level was defined with 4 dummy variables (*ORG*=certified organic; *NOGMO*= no GMO; *PFREE*=pesticide or chemical free; *PFREENOGMO*=pesticide free and no GMO) with the attribute “no claim” as the base. The production process at the industry level was specified by 1 dummy variable (*MINIP*=minimally processed) with the attribute “no claim” as the base. The origin of ingredients was also determined by 2 dummy variables (*IMP*=imported ingredients; *USA*=ingredients grown in the U.S.) with the attribute “no claim” as the base.

4.7.1. Multinomial and mixed logit models

The results of the multinomial logit model are summarized in table 9. All coefficients were statistically significant at the 1% level. Four coefficients (*PRICE*, *MINNAT*, *STORE*, and

IMP) had a negative sign. Price should have a negative sign assuming that people do not like spending money. A negative sign was expected for store brand and imported ingredients as these attributes may have a lower utility with respect to their base (major national brand and no claim). It was not certain to obtain a negative sign for minor national brands. As it was expected, the other coefficients (*PFREE*, *NOGMO*, *PFREENOGMO*, *USA*, *ORG*, and *MINIP*) were positive. It is not meaningful to give an interpretation of the magnitude of the coefficients because the multinomial logit model has restrictions about taste variation, correlation of errors over time and substitution patterns. The log likelihood function was -2,684.641 and can be expected to be higher with mixed logit models.

As explained in the methodology section, a mixed logit is more appropriate to analyze the panel data of the choice experiment. Two mixed logit models were estimated. The first one included only the attribute variables of the choice experiment as stated in equation (17). A normal distribution was specified for all attribute coefficients, which were specified as random, and 100 simulations were done to estimate each parameter. The coefficient on the price variable was estimated as fixed. Results are reported in table 9. The log likelihood function was higher than the multinomial logit (-2,676.864) for 19 degree of freedom. The sign of each coefficient was identical to the ones obtained from the multinomial logit model. All coefficients were statistically significant at the 1% level meaning that the means of all coefficients are statistically different than zero. Note that standard deviations for the random coefficient distributions are estimated for each coefficient. Two coefficients (*PFREENOGMO* and *IMP*) have standard deviations that are statistically significant at the 1% level indicating heterogeneity in preferences associated with these two attributes.

Table 9: Multinomial and mixed logit models (2200 observations)

Variable		Mixed logit estimates	Multinomial logit estimates
<i>PRICE</i>	Mean	-0.490*** (0.117)	-0.439*** (0.101)
	Standard deviation	0.700 (0.439)	
<i>STORE</i>	Mean	-0.303*** (0.098)	-0.258*** (0.071)
	Standard deviation	0.700 (0.439)	
<i>MINNAT</i>	Mean	-0.282*** (0.084)	-0.255*** (0.067)
	Standard deviation	0.047 (0.376)	
<i>ORG</i>	Mean	1.012*** (0.132)	0.965*** (0.098)
	Standard deviation	0.359 (1.229)	
<i>PFREE</i>	Mean	0.591*** (0.178)	0.645*** (0.098)
	Standard deviation	0.804 (0.696)	
<i>NOGMO</i>	Mean	0.742*** (0.105)	0.676*** (0.094)
	Standard deviation	0.039 (0.328)	
<i>PFREENOGMO</i>	Mean	1.350*** (0.129)	1.263*** (0.092)
	Standard deviation	1.616*** (0.458)	
<i>MINIP</i>	Mean	0.455*** (0.082)	0.373*** (0.057)
	Standard deviation	0.155 (0.332)	
<i>IMP</i>	Mean	-0.527*** (0.143)	-0.290*** (0.074)
	Standard deviation	1.145*** (0.315)	
<i>USA</i>	Mean	0.936*** (0.114)	0.789*** (0.069)
	Standard deviation	0.106 (0.524)	

Estimated standard errors are in parentheses; *, **, *** indicate the level of significance at the 1,5, and 10%, respectively.

In the second mixed logit model, means were specified to vary by demographic variables. Thus, the parameters are specified as:

$$(18) \beta_{ki} = \beta_k + \delta_k Z_i + \sigma_k V_i$$

where β_k is the population mean, Z_i is a vector of individuals characteristics with parameter δ_k , and V_i is an iid error term with parameter σ_k .

Three demographics were considered. The household income variable was specified to equal the mid-point for each level of income, scaled by 1,000, selected by the respondent in the survey ($income = INC$). For example, an individual chose the \$10,000-25,000 income range, the observation for INC was associated with a value of 1.75. A binary variable was defined for the education attainment, equaling 1 if the individual had a bachelor degree or higher and 0 otherwise. Three regional dummy variables were specified: central part of the U.S (*CENTRAL*), North East (*NORTHE*), South East (*SOUTHE*) with the West coast as a base.

The results for this mixed logit model that includes demographic variables are summarized in table 10. The log likelihood function (-2,636.336) was even higher than the mixed logit model without demographic variables. A likelihood test ratio was performed and indicated that the mixed logit with demographic variables (64 degree of freedom) is more robust than the mixed logit without the demographic variables. The computed ratio was equal to 81.056¹, which is higher than the critical value (61.6) in the chi-squared table for 45 degree of freedom.

The coefficients have the same signs as the earlier models, although the coefficients on minor national brands, pesticide free products, and imported ingredients are no longer statistically significant, while the other coefficients are still significant at different levels of

¹ $(-2) (-2,676.864 - (-2,636.336)) = 81.056$

significance. The magnitudes are comparable to the ones in the mixed logit variables without demographic variables. As described in the mixed logit model without demographics variables, pesticide free and no-GMO products and products with imported ingredients have standard deviations that are statistically significant at the 1% level showing respondents' heterogeneity in preferences for these 2 attributes, even after accounting for the demographics.

Table 10: Estimated coefficients of a mixed logit model with demographic variables (2200 observations).

Variable	Mean	Std dev
<i>PRICE</i>	-0.481*** (0.118)	
<i>STORE</i>	-0.521* (0.295)	0.728 (0.456)
<i>MINNAT</i>	-0.390 (0.245)	0.005 (0.378)
<i>ORG</i>	0.806** (0.331)	0.525 (0.764)
<i>PFREE</i>	0.243 (0.351)	0.657 (0.670)
<i>NOGMO</i>	0.705** (0.295)	0.047 (0.340)
<i>PFREENOGMO</i>	1.420*** (0.353)	1.662*** (0.475)
<i>MINIP</i>	0.356* (0.214)	0.100 (0.337)
<i>IMP</i>	-0.180 (0.310)	1.216*** (0.325)
<i>USA</i>	0.787*** (0.262)	0.111 (0.474)

Estimated standard errors are in parentheses, *,**,*** indicate the level of significance (1,5,10%)

Table 11 presents the results related to the demographic variables. Each attribute coefficient is crossed with the demographic variables to estimate if the demographic variable

has an influence on the attribute. A few coefficients reported in table 11 are statistically significant at some levels.

For example, respondents with higher income are less likely to buy store brands, which means that they buy more expensive products that may be perceived as being healthier. Respondents with higher education attainment are willing to buy store brands and products with imported ingredients. Perhaps, the educated individuals perceive value in obtaining similar quality products for lower price. It also shows that people from the east coast (North and South) are less likely to buy products made with imported ingredients.

Table 11: Heterogeneity-in-Mean Parameters, mixed logit model with demographic variables.

	<i>EDU</i>	<i>INC</i>	<i>CENTRAL</i>	<i>SOUTHE</i>	<i>NORTHE</i>
<i>STORE</i>	0.430** (0.208)	-0.063** (0.025)	0.349 (0.286)	0.894* (0.341)	0.449 (0.304)
<i>MINNAT</i>	0.064 (0.171)	-0.001 (0.020)	0.056 (0.235)	0.313 (0.276)	0.051 (0.253)
<i>ORG</i>	0.251 (0.226)	0.004 (0.026)	0.072 (0.309)	0.041 (0.364)	0.190 (0.331)
<i>PFREE</i>	-0.127 (0.226)	0.013 (0.025)	0.567* (0.324)	0.561 (0.370)	0.045 (0.337)
<i>NOGMO</i>	0.239 (0.203)	0.000 (0.023)	0.111 (0.282)	0.040 (0.331)	-0.380 (0.304)
<i>PFREENOGMO</i>	0.361 (0.249)	-0.046 (0.029)	-0.050 (0.336)	0.422 (0.398)	0.085 (0.359)
<i>MINIP</i>	0.111 (0.151)	0.001 (0.017)	0.040 (0.209)	0.201 (0.246)	0.033 (0.223)
<i>IMP</i>	0.376* (0.213)	-0.034 (0.024)	-0.147 (0.287)	-0.652* (0.346)	-0.559* (0.315)
<i>USA</i>	-0.009 (0.172)	-0.018 (0.020)	0.454* (0.248)	0.163 (0.282)	0.170 (0.261)

Estimated standard errors are in parentheses, *, **, *** indicate the level of significance (1,5,10%)

4.7.2. Respondents' WTP for baby meals

Magnitudes of the coefficients are analyzed through the WTP for the two mixed logit models. Dividing the coefficient of an attribute by the price coefficient and taking the negative sign of this outcome gives the WTP of the attribute. The WTP for each attribute are reported in table 12. The WALD command in LIMDEP 4.0 uses the variance covariance matrix and the coefficients of the mixed logit model as input for calculating the WTP and its associated standard error.

Table 12: WTP estimated from the mixed logit models in dollars

Variable	Demographic variables		No demographic variables	
	Mean	WTP adjusted (divisor=3)	Mean	WTP adjusted (divisor=3)
<i>STORE</i>	-1.084 (0.672)	-0.361	-0.618** (0.258)	-0.206
<i>MINNAT</i>	-0.810 (0.565)	-0.270	-0.575** (0.251)	-0.192
<i>IMP</i>	-0.374 (0.655)	-0.125	-1.075*** (0.398)	-0.358
<i>USA</i>	1.636*** (0.637)	0.545	1.908*** (0.445)	0.636
<i>MINIP</i>	0.740 (0.464)	0.247	0.928*** (0.231)	0.309
<i>NOGMO</i>	1.465** (0.653)	0.488	1.514*** (0.320)	0.505
<i>PFREE</i>	0.505 (0.729)	0.168	1.206 (0.418)	0.402
<i>ORG</i>	1.675** (0.733)	0.558	2.063*** (0.440)	0.688
<i>PFREENOGMO</i>	2.952*** (0.931)	0.984	2.753*** (0.582)	0.918

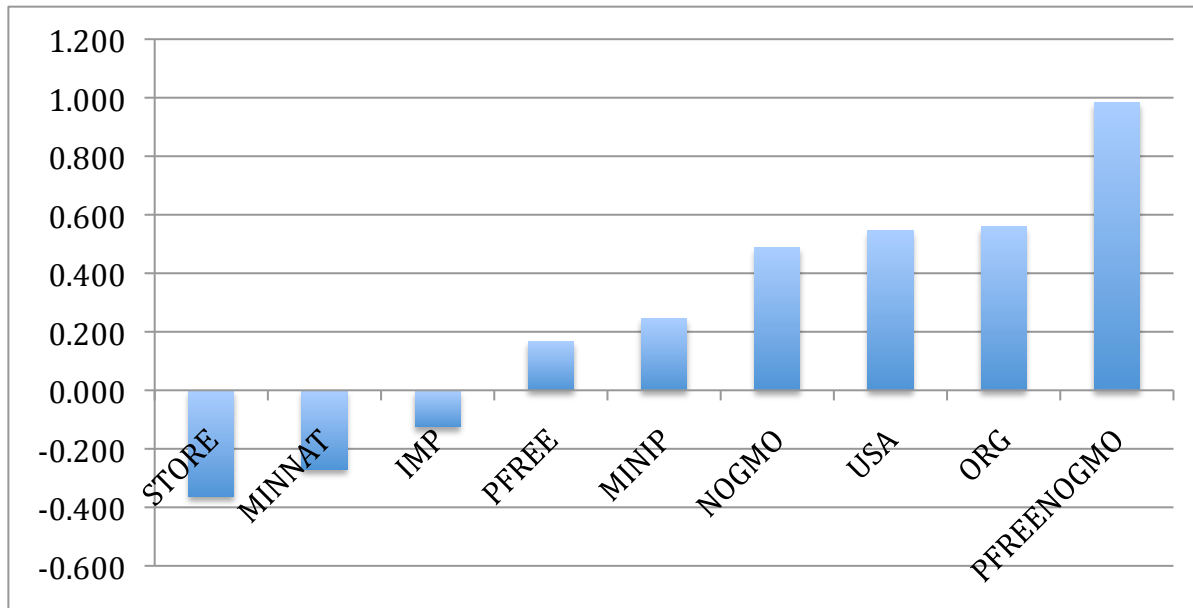
Estimated standard errors are in parentheses; *, **, *** indicate the level of significance at the 1, 5, 10% levels, respectively.

WTP for all attributes of the mixed logit model without demographic variables were statistically significant at the 5% level or more. In the model with demographic variables, the

mean WTP for two attributes (*PFREENOGMO* and *USA*) were statistically significant at the 1% level and the mean WTP for two other attributes (*ORG* and *NOGMO*) were statistically significant than zero at the 5% level. The mean WTP for the remaining 5 attributes (*STORE*, *MINAT*, *IMP*, *MINIP*, and *PFREE*) were not statistically significant at the 10% level. The WTP of 4 of these 5 attributes (*STORE*, *MINAT*, *IMP*, and *MINIP*) were significant in the mixed logit model without demographic variables at the 10% level showing that demographic variables has induced a loss of statistical significance.

The estimated WTPs seem large and over-stated for all these attributes. The extreme case reveals that on average respondents would be willing to pay \$2.952 more for the 4-ounce baby food meal that is pesticide free and non-GMO attribute. Murphy et al. (2004) mention that people overstate the value of goods by a factor of 2 or 3 in hypothetical methods. This seems to be the case in our results and the WTP adjusted was obtained by dividing all WTPs by 3. This gives a more reasonable average value of WTP. Figure 18 shows graphically the WTP of each attribute with respect to its corresponding base.

Figure 18: Adjusted WTP (\$) across attributes in the mixed logit model with demographic variables



The WTP of store brands and minor national brands were negative relative to major national brand, but these values were not statistically significant at the 10% level meaning that these WTP would not be different from zero. The WTP of the store brand attribute was statistically significant in the mixed logit model without demographic variables, but by adding the demographic variables, it lost its statistical significance. Table 11 shows that demographic variables (education, income, and South East) partially explain the mean of the store brand coefficient.

Regarding the origin of ingredients, the WTP for *USA* (0.545) was significant at the 1% level meaning that consumers care about this attribute. The WTP for imported ingredients was not statistically significant relative to no claim. Yet, demographic variables (education, South and North East) were found to have influence on this attribute.

Minimally processed products have an insignificant WTP meaning that the WTP for this attribute is no different from zero. There is no premium identified for this attribute in the mixed logit model with demographic variables.

Regarding production process attributes, the WTP for *PFREENOGMO* was significant at the 1% level while the WTP for *ORG* and *NOGMO* was significant at the 5% level. The WTP for organic was \$0.688 per 4oz container, which was less than the WTP for pesticide free and no GMO products (\$0.918) relative to no label. The WTP for no-GMO (0.488) had the lowest WTP among the statistically significant WTP but standard deviations indicate that WTP for no-GMO, and organic are relatively all similar.

Chapter 5 - Conclusion-Discussion

5.1. Issue investigated in the study

The growth of the U.S organic industry has been significant during the last two decades. The U.S. organic farmers do not produce enough quantity to meet the increasing U.S demand for organic food and a large majority of organic food comes from organic ingredients produced outside the U.S. Tensions have emerged in the organic sectors as large-scale companies have seen opportunities to sell products differentiated with the organic label. The USDA implemented the NOP (2002) to establish a basis that consumers can use when deciding to buy or not organic products. The certified organic label states that an organic product meets the USDA requirements.

This study looked into consumers' preferences for organic products in the baby food market, more precisely in the baby meal markets. Earth's Best was the first firm to sell organic baby products in the late 1980's and many firms followed this trend. The growth of the organic baby foods sales has been extremely high in the early 1990's. Market data mention an increase from 1.1 million dollars in 1989, to 25.1 million dollars in 1995, and to \$268 million in 2007 (NB, 2008). All major manufacturers of baby food offer organic or natural baby food products. Mintel's Global New Products Database (GNPD) reveals that organic accounted for 37% of the new products introductions to the baby food market from 2005 to 2010. In this context, the study investigated issues related to the evolution of organic sales in the baby food industry.

The study aimed to investigate three issues. First, the evidence suggests that the U.S. relies on imports for the supply of organic ingredients. One objective of this study was to test

whether consumer's willingness to pay for organic varies by ingredient origins. Second, the baby food market is characterized by the dominance of Gerber's products (a large firm owned by Nestle with 80% share of the baby meals market) but emerging brands are trying to enter the market by marketing their products with the organic label and/or the freshness of their ingredients locally grown. A second objective of the study was to test whether consumers care about scale of supply chain operations. Third, the recent weakened economy (2008-2010) has contributed to the development of store brands. These products are an alternative to recognize brands and little is known regarding consumers preferences for baby meals store brands. A third objective was to evaluate whether popularity of (organic) store brand baby food products can be expected to be growing in the near future.

A survey has been designed to collect information about respondents' preferences for baby food and to evaluate the WTP for different characteristics of baby meal products through a choice experiment. The survey method enables to collect data for the entire U.S. population. SSI provided a sample of the U.S population with babies between 6 and 12 months years old and administrated the survey with a reward for respondents who completed it. Responses from 220 poeple were usable in the analysis. Respondents simulated their shopping behavior in a choice experiment for a 4-ounce shelf-stable garden vegetable baby meal that varied across different attributes (brand, price, production attributes, and origin of ingredients). Econometrics models (multinomial and mixed logit models) were used to analyze the output of the choice experiment in order to obtain the WTP for the attributes out of it. The following sections present conclusions on these issues backed up with the results of the survey, but first, the limitations of the study are noted.

5.2. Reliability of the results

An understanding of the baby food market was required to design a survey that was relevant. Market data and any kind of information were not readily available and it was challenging to obtain relevant information for free. Many market research agencies sold reports on baby food and organic food, but these reports were costly. Kansas State University had a subscription with the Mintel report database and their three reports provided a good overview of the baby food market. However, Mintel reports did not cover sales at Wal-Mart's stores. Other references were added to complement the background information. Efforts had been made to overcome this issue but the study could be limited if any relevant information had not been found and taken into consideration.

According to table 4, respondents were more educated than the U.S. population. The percentage of respondents with at least a high school degree (94%) was 10% higher than the U.S. population (84%). This may create a bias in the interpretation of the results, as the U.S. population is not well represented in the sample. Education had some influences on the variables of the choice experiment (store brands and imported ingredients). If the sample was more representative (with proportionally more people with less education), the average WTP would be lower for store brands and imported ingredients. The estimates can be interpreted as the upper bounds of the WTPs.

The hypothetical bias arises when surveying people. It is a problem that researchers have to face and ignoring this major issue may lead to erroneous conclusions. There is a gap between intention and action. Weinstein (1998) separates the decision process into stages and describes how people make decisions. Using a survey to investigate consumer purchasing behaviors may not reveal relevant information if respondents do not answer as they would act

at the store. For example, to know if there is a potential product differentiation with the origin of organic ingredients being produced domestically or outside the U.S, a binary, YES or NO question could evaluate the interest in this attribute. But, the percentage of people who answer YES may not convert their intention into action at the grocery store. A choice experiment has been included in an attempt to come up with reliable estimations of WTP. However, the output of the mixed logit model reveals that the marginal WTP were overestimated and the need of a divisor to make an adjustment was required.

These three issues, (1) the availability of market-related information, (2) the sample failing to represent the U.S. population, and (3) the hypothetical bias that occurs when surveying people, may affect the reliability of the results. Nevertheless, the results obtained in this thesis were consistent with what has been observed in the baby food market and it brings more insights in terms consumers' preferences for baby food. Robust conclusions have been drawn regarding the objectives of the study.

5.3. Implication for agribusiness decision making

The study finds that consumers associate pesticide-free and no-GMO products with the highest utility. Firms would certainly want to introduce products that exhibit these two characteristics. Results also imply that minimally processed products were not important for the majority of consumers, and these products (mainly sold frozen) are expected to remain a specialized, niche market. Besides, the analysis revealed a clear preference for U.S ingredients, regardless of whether they were organically or non-organically grown. In terms of brands, consumers showed strong preferences for a dominant national brand, implying Gerber, and this dominance is not expected to change. The question is how agribusinesses can compete around this dominance.

5.3.1. **Product differentiation through the origin of ingredients**

The study has shown that consumers give a higher value to baby meal products made with ingredients produced domestically. Many findings cited in the literature have drawn similar conclusions for different products (applesauce in Pennsylvania, potatoes in Colorado, apples produced in the U.S.), and the results of this study support this claim for baby food.

Since firms are not required to mention the origin of ingredients on packaged, processed products consumers may not effectively know where ingredients of the food they buy is grown. At the same time, the majority of respondents (78% for fruit and vegetables, 67% for meats, 71% for dairy products and eggs, and 68% for grains and pasta) described the food bought for the entire household and for homemade baby food as being mainly locally produced and/or certified organic across different food categories. While this result likely reflects their intentions or beliefs and consumers may not act at the grocery store as they state, it suggests their preferences for the “locally grown” and the “organically grown” attributes, and opportunities for firms in developing their strategies.

Sixteen attributes related to baby food products were ranked according to the survey responses. The location of the production and the location of the manufacture were ranked 9th and 10th respectively. While these attributes were not among the most important, t-tests reveal that these two characteristics were perceived not differently from price, the use of artificial colors, and minimally processed by consumers. For organic baby food, the locations of production and manufacture were not statistically different from containing no genetically modified organisms and environmental impact.

The quality (taste, nutritional content, safety from food borne illnesses, potential positive impact on health) of baby food made from organic ingredients grown in the U.S. was globally superior to similar products made with ingredients produced outside the U.S. through

the eyes of the respondents. Ingredients produced domestically were perceived to be of higher quality than ingredients produced outside the U.S., but there was no statistical difference in perceptions among ingredients produced locally, in the region or in the country. What is more, the average WTP for U.S ingredient (\$0.545 per 4-ounce jar) was close to the willingness for organic (\$0.558) suggesting that consumers value ingredients grown domestically as equally high as certified organic ingredients. Besides, respondents with higher education attainment were more willing to buy products with imported ingredients.

Mintel report indicated that 12% of parents would look more often to see whether the food for their baby aged less than 3 years old is grown locally. The results of this thesis would also support that a product differentiation of this processed product through the origin of organic ingredients or even non-organic ingredients could attract consumers willing to pay for it.

5.3.2. **Brand loyalty for Gerber drives sales**

Gerber dominates the baby meals market. The study has investigated the preferences for brands besides Gerber (objectives 2 and 3). On average, major national recognized brands (like Gerber) were associated with higher utility than with respect to minor national brands and store brands. This was expected for store brands because these brands have been created to be a cheap alternative to national brands. However, the outcome for minor national brands was uncertain. The study findings showed that organic and non-organic nationally recognized brands were preferred to the other brands. However, respondents with higher education attainment were more likely to value store brands than their counterparts suggesting that they were aware of the similarity in quality between these brands. At the same time, respondents with higher income were less likely to buy store brands. Respondents that can afford premium products seemed not to consider this alternative.

Market data indicate that sales of baby meal store brands are expanding, and 70% of consumers argue that store brands are at least as good as national brands. However, parents may want to feed their baby with “nothing but the best” and even if they consider store brands as good products they may stick to brands they trust. Our results are consistent with the study of Narasimham and Wilcox (1998) who predicted that store brands could not compete with national brands in the baby food market. Besides, emerging brands appear to be not differentiated enough to be associated with higher quality than Gerber’s products.

Brand loyalty for Gerber’s products seems to be very strong in the baby meal market. According to Mintel, Heinz decided to leave the U.S baby market for the Chinese baby food market that is expected to be growing in the coming years. Heinz attempted to take over the natural brand Beech Nuts but this failure led Heinz to change its strategy. Gerber that has a quasi-complete control of the market can follow any trend.

5.3.3. **Opportunity for further research**

This study identified the possibility to differentiate products up on the origin of ingredients. However, the WTP for ingredients grown in the U.S estimated from this study cannot be used directly to decide how much a firm can charge consumers for this attribute. The choice experiment can be used as a first step to identify consumers’ preferences for organic baby food. But, the magnitudes of the WTP cannot be interpreted is likely better to be interpreted relatively.

To obtain more WTP estimates that are comparable to costs, firms should conduct experimental auctions to elicit WTP under monetary constraint, so that the estimates are not subject to hypothetical bias. A cost-benefit analysis can then be conducted to see if differentiating products with the U.S grown ingredients attributes is profitable. What is more,

reliable WTP estimates will allow for developing and implementing an effective marketing strategy.

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Appendix A - Survey on organic baby food

ORGANIC BABY FOOD v.3

Opening Instructions

Thank you for agreeing to participate in our survey. The survey is being conducted as part of the project, “The Impacts of Imports and Consolidation on the U.S. Organic Food System”, which is funded by the National Research Initiative of the U.S. Department of Agriculture. You may have noticed that increasingly more food products are labeled with information on how they have been produced and handled. This survey is designed to better understand what aspects of baby food products are important to shoppers. This survey will take you about 20 minutes to finish.

As you start the survey, please note that there is no option to go back to previous pages.

Your participation is strictly voluntary, and your response to this survey will be kept completely anonymous. If you have questions about the rights of research subjects or about the manner in which the study is conducted, please contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.

Sincerely,

Hikaru Hanawa Peterson, Associate Professor
Xianghong Li, Research Assistant Professor
Franck Lonca, Masters Candidate
Department of Agricultural Economics
Kansas State University

Page 1

Question 1 * required *****

Do you have at least one baby who is between 6 and 12 months old?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

Page 2

Fill out this page only if you answered:

- **Yes** on question **1. Do you have at least one baby on page 1 .**

Question 2 * required *****

How much shopping for your baby's food do you personally do?

<input type="checkbox"/>	All or most of it
<input type="checkbox"/>	About half of it
<input type="checkbox"/>	Less than half of it

Page 3

Fill out this page only if you answered:

- **No** on question **1. Do you have at least one b.. on page 1 .**

Thank you for your time. Please click the following link to receive your credit.

<http://dkr1.ssisurveys.com/projects/end?rst=2>

Please ignore the next button and log out

Page 4

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Question 3 * required *****

How many hours a week does a care provider look after your baby?

If your baby stays with you, type in "0". If you have more than one baby between 6 and 12 months old, please use the space to explain your situation.

Question 4 * required *****

Do you have more than one care provider for your baby? If so, please explain how many hours a week the baby spends with each care provider. If not, type in "N/A".

Question 5 * required *****

During the time your baby spends with a care provider, what percentage of food s/he consumes do you provide? Your answer should be a number between 0 and 100.

If you have more than one care provider, please use the space to explain the percentage of your baby's food you provide for each care provider.

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question 2. *How much shopping for your.. on page 2.*

Question 6 * required *****

How often did you shop for baby food products from each of the following categories during the last 2 months?

1 - More than once a week | 2 - Once a week

3 - Two or three times a month | 4 - Once a month | 5 - Less than once a month | 6 - Never

	1	2	3	4	5	6
9.1 Liquid/powdered baby formula products						
9.2 Baby meals						
9.3 Baby snacks/cereals						
9.4 Baby juices/yoghurt						

Question 7 * required *****

How often did you shop for the organic versions of the baby food products in each of the following categories during the last 2 months?

If you did not buy any product from a given category during the last 2 months, choose "6" for "Not applicable."

1 - Not at all likely | 2 - Less often than not

3 - About half of the time | 4 - More often than not | 5 - Almost always | 6 - Not applicable

	1	2	3	4	5	6
10.1 Liquid/powdered baby formula products						
10.2 Baby meals						
10.3 Baby snacks /cereals						
10.4 Baby juices/yoghurt						

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Question 8 * required *****

Consider the ready-to-eat, shelf-stable, baby meals. What are the brands you bought during the past 2 months? Choose the closest description for each row.

If you do not buy baby meals, choose "6" for "Did not buy". In the items below, the “private label” is also known as the “store brand” and refers to products that are typically those manufactured or provided by one company for offer under another company's brand (e.g., Parent's Choice available at Walmart). An “emerging brand” refers to product or brand that are only available in limited distribution or were until recently (e.g., Plum Organic and HappyBaby Food) .

1 - My first choice | 2 - My second choice | 3 - My third choice

4 - Bought regularly along with other brands | 5 - Tried occasionally | 6 - Did not buy

	1	2	3	4	5	6
8.1 Gerber						
8.2 Gerber Organic / Tender Harvest						
8.3 Earth’s Best						
8.4 Beech Nut						
8.5 A private (store) label						
8.6 A private (store) label that specializes in organic products						
8.7 An emerging brand						
8.8 An emerging brand that specializes in organics						
8.9 Other						

Question 9 * required *****

If you ranked any of the private, emerging or other brands, please specify your brand(s): Otherwise, type in "N/A".

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your..** on *page 2.*

Question 10 **** required ****

How often did you purchase **baby food products** at the following retail outlets during the last 2 months?

1 - More than once a week | 2 - Once a week

3 - Two or three times a month | 4 - Once a month | 5 - Less than once a month | 6 - Never

	1	2	3	4	5	6
10.1 Supermarkets (e.g., Kroger, Safeway)						
10.2 Mass merchandisers (e.g., Target, Walmart)						
10.3 Drug stores (e.g., CVS)						
10.4 Health/Natural Supermarkets (e.g., Whole Foods Market, Trader Joe's Company, Wild Oats Market)						
10.5 Locally owned stores/food cooperatives						
10.6 Other (Please see question #11)						

Question 11

If you shopped at other outlets (question 10.6), please specify the name or type of outlet.

Question 12 * required *****

How often did you shop for the *organic* version of the baby food products when you shopped at the following retail outlets during the last 2 months?

If you do not shop at a particular retail outlet, choose "6" for "Not applicable".

1 - Not at all likely | 2 - Less often than not

3 - About half of the time | 4 - More often than not | 5 - Almost always | 6 -

Not applicable

	1	2	3	4	5	6
12.1 Supermarkets (e.g., Kroger, Safeway)						
12.2 Mass merchandisers (e.g., Target, Walmart)						
12.3 Drug stores (e.g., CVS)						
12.4 Health/Natural Supermarkets (e.g., Whole Foods Market, Trader Joe's Company, Wild Oats Market)						
12.5 Locally owned stores/food cooperatives						
12.6 Other (Please see question #13)						

Question 13

If you shopped at other outlets (question 12.6), please specify the name or type of outlet.

Question 14 * required *****

How would you describe the roles of the following retail outlets during the last 2 months?

Choose the description that fits the best for each.

1 - Primary outlet for household groceries

**2 - Primary outlet for non-food baby products (such as diapers) | 3 -
Secondary outlet for household groceries**

**4 - Secondary outlet for non-food baby products | 5 - Primary outlet for
household groceries & non-food baby products**

**6 - Primary outlet for household groceries & secondary outlet for non-food
baby products**

**7 - Secondary outlet for household groceries & primary outlet for non-food
baby products**

**8 - Secondary outlet for household groceries & non-food baby products | 9 -
Not applicable**

	1	2	3	4	5	6	7	8	9
14.1 Supermarkets (e.g., Kroger, Safeway)									
14.2 Mass merchandisers (e.g., Target, Walmart)									
14.3 Drug stores (e.g., CVS)									
14.4 Health/Natural Supermarkets (e.g., Whole Foods Market, Trader Joe's Company, Wild Oats Market...)									
14.5 Locally owned grocery stores/food cooperatives									
14.6 Other (Please see question #15)									

Question 15

If you shopped at other outlets (question 14.6), please specify the name or type of outlet.

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Question 16 ** required **

How important to you are the following attributes of baby food products?

1 - Not at all important | 2 - Slightly important

3 - Moderately important | 4 - Very important | 5 - Extremely important

	1	2	3	4	5
16.1 Brand					
16.2 Price					
16.3 Convenient packaging					
16.4 Retail store where it is sold					
16.5 Taste					
16.6 Nutritional content					
16.7 Use of artificial flavors/colors					
16.8 Health claims (e.g., DHA that helps brain and eye development, probiotics that promotes properly functioning intestines)					

Question 17 * required *****

**How important to you are the following attributes of baby food products?
(continued)**

1 - Not at all important | 2 - Slightly important

3 - Moderately important | 4 - Very important | 5 - Extremely important

	1	2	3	4	5
17.1 Use of genetically modified organisms					
17.2 Risk from food-borne illnesses					
17.3 Organic or 100% organic (ingredients are at least 95% organic)					
17.4 Made with organic ingredients (ingredients are at least 70% organic)					
17.5 Minimally processed					
17.6 Use of chemicals in farm production of ingredients					
17.7 Where the product was manufactured (e.g., locally or in the US or overseas)					
17.8 Where the ingredients were produced (e.g., locally or in the US or overseas)					

Question 18 * required *****

How important to you are the following attributes related to organic baby food products?

1 - Not at all important | 2 - Slightly important

3 - Moderately important | 4 - Very important | 5 - Extremely important

	1	2	3	4	5
18.1 Supporting the farming community					
18.2 Promotion of social justice					
18.3 Risk from food-borne illness					
18.4 Taste					
18.5 Contains no genetically modified organisms					
18.6 Limited use of chemicals in farm production of ingredients, including pesticide, hormones, and antibiotics					
18.7 Environment impact					
18.8 Where the product was manufactured (e.g., locally or in the US or overseas)					
18.9 Where the ingredients were produced (e.g., locally or in the US or overseas)					

Question 19 * required *****

How do you compare organic baby food products to similar, non-organic baby food products for the following attributes and categories?

Your answer does not need to be based on your experience with these products.

1 - Highly inferior | 2 - Slightly inferior | 3 - Similar

4 - Slightly superior | 5 - Highly superior

	1	2	3	4	5
19.1 Taste					
19.2 Nutritional content					
19.3 Safety from risk of food-borne illnesses					
19.4 Potential positive impacts on health					

Question 20 **** required ****

How do you compare baby food products made from organic ingredients grown in the U.S. to similar, baby food products made from organic ingredients imported from overseas for the following attributes?

Your answer does not need to be based on your experience with these products.

**1 - Highly inferior | 2 - Slightly inferior | 3 - Similar
4 - Slightly superior | 5 - Highly superior**

	1	2	3	4	5
23.1 Taste					
23.2 Nutritional content					
23.3 Safety from risk of food-borne illnesses					
23.4 Potential positive impacts on health					

Question 21 * required *****

What are your perceptions of the overall quality of ingredients, commonly used to make *organic* baby food products originating from the following locations?

Your answer does not need to be based on your experience with the products from these locations.

1 - Poor | 2 - Somewhat poor | 3 - Average | 4 - Somewhat high

5 - High

	1	2	3	4	5
24.1 Locally grown					
24.2 Grown in your region					
24.3 US grown					
24.4 Imported from Canada					
24.5 Imported from Mexico					
24.6 Imported from South America					
24.7 Imported from Europe					
24.8 Imported from China					
24.9 Imported from Australia					

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your..** on **page 2** .
Question 22 ** required **

Gerber Products Company account for about 80% of the overall baby food and snack market in North America. How do you compare organic baby food products manufactured by companies with small market shares (less than 20%) to similar products manufactured by a dominant company such as Gerber for the following attributes?

Your answer does not need to be based on your experience with these products.

**1 - Highly inferior | 2 - Slightly inferior | 3 - Similar
 4 - Slightly superior | 5 - Highly superior**

	1	2	3	4	5
25.1 Quality of ingredients					
25.2 Uniformity of products					
25.3 Taste					
25.4 Nutritional content					
25.5 Safety from risk of food-borne illnesses					
25.6 Potential positive impacts on health					

Question 23 * required *****

An increasing number of baby food and snack products are being offered under retail store labels. How do you compare *organic* baby food products with retail store labels to similar products sold under a nationally recognized brand such as Gerber for the following attributes?

Your answer does not need to be based on your experience with these products. It can also be based on your perception.

**Highly inferior | 2 - Slightly inferior | 3 - Similar
4 - Slightly superior | 5 - Highly superior**

	1	2	3	4	5
26.1 Quality of ingredients					
26.2 Uniformity of products					
26.3 Taste					
26.4 Nutritional content					
26.5 Safety from risk of food-borne illnesses					
26.6 Potential positive impacts on health					

1 -

Question 24 * required *****

What is your perception of the overall quality of products marketed under the following types of brands?

Your answer does not need to be based on your experience of these products. In the items below, the “private label” is also known as the “store brand” and refers to products that are typically those manufactured or provided by one company for offer under another company's brand (e.g., Parent's Choice available at Walmart). An “emerging brand” refers to product or brand that are only available in limited distribution or were until recently (e.g., Plum Organic and HappyBaby Food) .

**1 - Poor | 2 - Somewhat poor | 3 - Average | 4 - Somewhat high
5 - High**

	1	2	3	4	5
27.1 A nationally recognized brand with over 50% share of the market					
27.2 The organic division of a nationally recognized brand with over 50% share					
27.3 A nationally recognized brand with less than 10% share of the market					
27.4 A nationally recognized brand with less than 10% share of the market that specializes in organic products					
27.5 A private (store) label					
27.6 A private (store) label that specializes in organic products					
27.7 An emerging brand					
27.8 An emerging brand that specializes in organic products					

Page 12

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

In the following, you are asked to respond assuming a situation when you're buying baby food products at a store. ***There is no back button to return to this page, so please read carefully.*** Suppose you need to buy **ready-to-eat, shelf-stable, baby meals**. To make the following discussion concrete, let's say you're looking for **garden vegetables baby meals in 4oz containers**. Suppose you find that the product is offered by the following **types of brands**: **Major national**: A nationally recognized brand with around 80% share of the market. **Minor national**: A nationally recognized brand with less than 20% share of the market. **Store brand**: A product that is manufactured or provided by one company for offer under a retailer's brand.

Page 13

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Further, you find that the product can be labeled for **how it was produced**. The labels you see include:

Pesticide-free: The ingredients for the product were produced without chemical pesticides on the farm.

no GMO: The ingredients contain no genetically modified organisms.

Certified organic: The organic label signifies that the ingredients were produced, processed, and packaged according to the National Organic Standards regulated by the U.S. Department of Agriculture.

Minimally processed: The ingredients for the product were fresh and minimally processed.

Lastly, you note that some of the products indicate **where the ingredients originate**.

Specifically,

Imported: The ingredients for the product were sourced from overseas.

U.S. grown: The ingredients for the product were sourced from U.S. farms.

In questions 25 through 34 below, you are asked to choose from **3 baby meal products that vary in price, brand, production process attributes, and origin of ingredients. Besides these attributes, the baby meal products are identical** (e.g., the same flavor and expiration date).

It is important that you make your selections like you would if you were actually facing these choices in your shopping decisions.




Question 25 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Minor National	Store brand	Store brand	NONE
Price (per 4oz container)	\$0.99	\$0.99	\$0.79	
Production process attributes	Pesticide free Minimally processed	Pesticide free Minimally processed	Minimally processed	
Origin of ingredients	Imported	Imported	U.S. grown	

Question 26 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Major National	Store brand	Store brand	NONE
Price (per 4oz container)	\$0.99	\$0.99	\$0.99	
Production process attributes	Pesticide free No GMO		No GMO	
Origin of ingredients	U.S. grown	Imported	Imported	




Question 27 * required *****

Choose from the following three baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Minor National	Major National	Major National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	Certified organic		Pesticide free Minimally processed	
Origin of ingredients	Imported	U.S. grown	U.S. grown	




Question 28 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Minor National	Major National	Major National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	Pesticide free No GMO Minimally processed	Certified organic	Certified organic Minimally processed	
Origin of ingredients		Imported		




Question 29 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Major National	Minor National	Minor National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	Pesticide free No GMO	No GMO Minimally processed	Minimally processed	
Origin of ingredients	U.S. grown	U.S. grown	Imported	




Question 30 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Store brand	Store brand	Major National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	No GMO	Pesticide free Minimally processed	Pesticide free No GMO Minimally processed	
Origin of ingredients		U.S. grown	Imported	




Question 31 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Major National	Major National	Minor National	NONE
Price (per 4oz container)	\$1.19	\$1.19	\$1.19	
Production process attributes	Pesticide free Minimally processed	Certified organic	No GMO	
Origin of ingredients			U.S. grown	




Question 32 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Minor National	Store brand	Major National	NONE
Price (per 4oz container)	\$0.99	\$0.79	\$0.79	
Production process attributes		Pesticide free No GMO	Certified organic Minimally processed	
Origin of ingredients	Imported			




Question 33 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Store brand	Store brand	Store brand	
Price (per 4oz container)	\$0.79	\$0.79	\$0.79	
Production process attributes	Pesticide free Minimally processed	Certified organic		NONE
Origin of ingredients	U.S. grown	U.S. grown		

Question 34 * required *****

Choose from the following 3 baby meal products:

	Option A	Option B	Option C	Option D
				
Brand	Major National	Store brand	Minor National	
Price (per 4oz container)	\$0.99	\$0.79	\$1.19	
Production process attributes	Minimally processed	Pesticide free No GMO Minimally processed	No GMO	NONE
Origin of ingredients		Imported		

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Question 35 * required *****

How often did you use the following food products in order to make food for your baby at home during the last 2 months?

1 - Every day | 2 - Two to three days per week | 3 - Once a week

4 - Once every two weeks | 5 - Less than once every two weeks | 6 - Never

	1	2	3	4	5	6
38.1 Fruit/vegetables						
38.2 Meats						
38.3 Dairy products/eggs						
38.4 Grains/pasta						

Question 36 * required *****

Regarding your purchases of the food products for your baby, how would you describe the products in each food category?

1 - Mostly organic and locally produced

2 - Mostly organic but produced outside the local area | 3 - Mostly non-organic but locally produced | 4 - Mostly other

	1	2	3	4
39.1 Fruit/vegetables				
39.2 Meats				
39.3 Dairy products/eggs				
39.4 Grains/pasta				

Question 37 * required *****

Regarding your purchases of the food products for your entire household, how would you describe the products in each food category?

1 - Mostly organic and locally produced

2 - Mostly organic but produced outside the local area | 3 - Mostly non-organic

but locally produced | 4 - Mostly other

	1	2	3	4
40.1 Fruit/vegetables				
40.2 Meats				
40.3 Dairy products/eggs				
40.4 Grains/pasta				

Question 38 * required *****

As your baby grows up, do you expect to buy more or less of the *organic* versions of the following grocery items for the household when all family members start eating the same food?

1 - Definitely less | 2 - Slightly less | 3 - About the same

4 - Slightly more | 5 - Definitely more

	1	2	3	4	5
41.1 Fruit/vegetables					
41.2 Meats					
41.3 Dairy products/eggs					
41.4 Grains/pasta					

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your.. on page 2.**

Question 39 * required *****

How many people does your typical food bill cover? Indicate the number of people—including yourself—in each of the following age group.

Note that “10” equals “Zero”.

**1 - One | 2 - Two | 3 - Three | 4 - Four | 5 - Five | 6 - Six
7 - Seven | 8 - Eight | 9 - Nine or more | 10 - Zero**

	1	2	3	4	5	6	7	8	9	10
42.1 Under 6 months of age										
42.2 Age 6-12 months										
42.3 Age 12-18 months										
42.4 Age 18-24 months										
42.5 Age 2-5 years old										
42.6 Age 6-13 years old										
42.7 Age 14-17 years old										
42.8 Age 18-24 years old										
42.9 Age 25-44 years old										
42.10 Age 45-64 years old										
42.11 Age 65 and older										

Question 40 * required *****

In which of the following regions do you currently reside?

	Pacific (Washington, Oregon, and California)
	Mountain (Colorado, Montana, Idaho, Nevada, Arizona, New Mexico, Wyoming, and Utah)
	Northern Plains (Nebraska, Kansas, South Dakota, and North Dakota)
	Southern Plains (Oklahoma and Texas)
	Corn Belt (Ohio, Illinois, Indiana, Missouri, and Iowa)
	Lake States (Minnesota, Michigan, and Wisconsin)
	Delta (Louisiana, Mississippi, and Arkansas)
	Southeast (South Carolina, Georgia, Alabama, and Florida)
	Appalachia (Tennessee, North Carolina, Kentucky, Virginia, and West Virginia)
	Northeast (Vermont, Maine, Maryland, Massachusetts, New York, Pennsylvania, District of Columbia, Delaware, Connecticut, New Hampshire, New Jersey, and Rhode Island)
	Alaska, Hawaii

Question 41 * required *****

Which of the following best describes the county of your residence?

	Counties in metro areas of 1 million population or more
	Counties in metro areas of 250,000 to 1 million population
	Counties in metro areas of fewer than 250,000 population
	Urban population of 20,000 or more, adjacent to a metro area
	Urban population of 20,000 or more, not adjacent to a metro area
	Urban population of 2,500 to 19,999, adjacent to a metro area
	Urban population of 2,500 to 19,999, not adjacent to a metro area
	Completely rural or less than 2,500 urban population, adjacent to a metro area
	Completely rural or less than 2,500 urban population, not adjacent to a metro area

Question 42 * required *****

Description of your gender:

<input type="checkbox"/>	Male
<input type="checkbox"/>	Female

Question 43 * required *****

Your age (choose one):

<input type="checkbox"/>	under 24
<input type="checkbox"/>	24-34
<input type="checkbox"/>	35-44
<input type="checkbox"/>	45-54
<input type="checkbox"/>	55-64
<input type="checkbox"/>	65 and older

Question 44 * required *****

Your race (choose all that apply):

<input type="checkbox"/>	White
<input type="checkbox"/>	Black/ African American
<input type="checkbox"/>	Hispanic
<input type="checkbox"/>	American Indian/Alaskan Native
<input type="checkbox"/>	Asian
<input type="checkbox"/>	Native Hawaiian/ Pacific Islander

Other:

Question 45 * required *****

The highest degree or level of school that you have completed (choose one):

<input type="checkbox"/>	8th grade or under
<input type="checkbox"/>	9th through 12th, no diploma
<input type="checkbox"/>	High school diploma or equivalent
<input type="checkbox"/>	Some college work or Associate Degree
<input type="checkbox"/>	Bachelor's Degree
<input type="checkbox"/>	Master's, Doctorate, or Professional Degree

Question 46 * required *****

Your annual household income before tax (choose one):

<input type="checkbox"/>	Less than \$10,000
<input type="checkbox"/>	\$10,000 - \$24,999
<input type="checkbox"/>	\$25,000 - \$49,999
<input type="checkbox"/>	\$50,000 - \$74,999
<input type="checkbox"/>	\$75,000 - \$99,999
<input type="checkbox"/>	\$100,000 - \$199,000
<input type="checkbox"/>	More than \$200, 000

Fill out this page only if you answered:

- *About half of it* OR *All or most of it* on question **2. How much shopping for your..** on **page 2**.

Question 50

Please use the space below if you have any comments, opinions, or questions about baby food or organic baby food.

Thank you for completing the survey. Please follow the link below to receive your credit. <http://dkr1.ssisurveys.com/projects/end?rst=1>

Characters

500

Remaining:

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Appendix B - LIMDEP codes for all models

Multinomial logit:

```
nlogit;Lhs=choice;choices=1,2,3,4;Rhs=store,minnat,price,org,nochem,nogmo,chemgmo,minip,imp,usa;print VCV;$
```

Mixed logit with demographic variables:

```
nlogit;Lhs=choice;choices=1,2,3,4;Rhs=store,minnat,price,org,nochem,nogmo,chemgmo,minip,imp,usa;print VCV;
```

```
RPL=edu,inc,central,southe,northe;  
FCN=store(n),minnat(n),org(n),nochem(n),nogmo(n),chemgmo(n),minip(n),imp(n),  
usa(n);Halton;PTS=100$
```

Alternative code:

```
CALC ; Ran(12345) $  
RPLOGIT; Lhs = choice  
; Choices = 1, 2, 3, 4  
; Model:U(1,2,3,4) = b1*price +b2*org +b3*nogmo +b4*nochem  
+b5*chemgmo +b6*minip  
+b7*usa +b8*imp +b9*store +b10*minnat/  
; RPL = inc, edu, central, southe, northe  
; Fcn = b2(n|#11111), b3(n|#11111), b4(n|#11111), b5(n|#11111),  
b6(n|#11111), b7(n|#11111), b8(n|#11111),  
b9(n|#11111), b10(n|#11111)  
; Parameters  
; WTP = b2/b1, b3/b1  
; Halton  
; Pts = 100 $
```