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The Cost of a GMO-Free Market Basket of Food in the United States

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We examine the consumer cost consequences of choosing GMO-free food over food that contains GMOs. Using text-mining algorithms applied to detailed product descriptions contained in a proprietary database of individual GMO and GMO-free foods at the retail level, we find that, when directly compared item by item, GMO-free food costs an average of 33% more than a comparable food item that is not GMO-free. When compared on a per-ounce basis, GMO-free foods cost an average of 73% more. Generalizing to the cost of a typical market basket of food consumed by American households, GMO-free food consumption would increase the average family food budget from $9,462 to $12,181 per year.

Key words: biotechnology, consumer food choice, GMO-free, market basket.

Technological progress in the production of foods and fiber has led to unprecedented growth in the productivity of agriculture. The US Department of Agriculture (USDA) reports that total US agricultural output grew at an average annual rate of 1.49% between 1948 and 2011 while input use only grew at 0.07% per year (USDA Economic Research Service [ERS], 2015a). There are many reasons for this impressive growth, including improvements in cropping practices, input qualities, resource management, selective breeding, and other widespread innovations in production practices. One important innovation that many believe has increased productivity is the genetic modification of crops in order to achieve increased output, higher quality, or lower production costs. According to the USDA, 90% of corn, 93% of soybeans, and 90% of cotton planted in 2013 in the United States were genetically modified (USDA ERS, 2015b).

Technological improvements have increased the overall quality and variety of the US food supply while, at the same time, lowering overall food costs. The share of disposable personal income spent on food at home fell from 21.2% in 1930 to 5.7% in 2012 (USDA ERS, 2015c). However, these technological advances have not been viewed as positive by all consumers. In particular, despite scientific evidence to the contrary, skepticism and suspicion regarding the safety and quality of genetically modified organisms (GMOs) exists among many consumers, especially outside of the United States. This has led to efforts to legislate labeling of any foods containing GMOs (e.g., Proposition 37, which was defeated by California voters in 2012 and Vermont H.112, which was signed into law on May 8, 2014). To date, three state legislatures have passed mandatory GMO labeling laws and two states have passed laws against GMO labeling (Center for Food Safety, 2015). Similar labeling laws have existed in the EU for many years.

While there seems to be little lingering doubt about the yield increases brought about by GM crops with insect resistance, much less is known about the extent to which consumer concern about GMOs translates into price and food expenditure effects. A number of studies have evaluated consumers' willingness to pay for GMO-free food. Studies by Huffman (2010), Bukenya and Wright (2007), and Tegene, Huffman, Rousu, and Shogren (2003) find that US consumers are willing to pay premiums ranging from 14% to 21% for food certified to be GMO-free. Lusk, Roosen, and Fox (2003) found that US consumers were willing to pay an additional $2.83 to $3.31 per pound for beef that was not fed GMO ingredients. They also found that analogous premiums in Europe ranged from $4.86 to $11.01. Research has also documented that the information that consumers have about GMO foods heavily influences their willingness to pay. For example, Lusk et al. (2003) found that a lack of knowledge about GMOs significantly increased a consumer's stated willingness to pay for GMO-free foods. Such willingness-to-pay studies are also widely recognized to have a number of biases that can result in stated values far exceeding what consumers actually pay. The segregation and identity preservation needed to ensure food ingredients remain GMO-free from the farm gate to the retail store are also likely to be substantial. Such costs depend upon tolerance levels and the degree of regulation entailed.

Many retail outlets already offer foods that are certified to be GMO-free. The market share of GMO-free

foods is modest, but some retailers are identifying such products in their in-house brands. For example, the Whole Foods supermarket chain recently announced a commitment to complete labeling of all foods containing GMO ingredients. Fernandez-Cornejo, Wechsler, Livingston, and Mitchell (2014) report that of the 7,637 new food products introduced between February 12, 2010 and February 11, 2011, 2.6% advertised that they were GMO-free and 8% advertised that they were organic.

To our knowledge, no existing research has considered the cost implications of adopting a totally GMO-free diet for a typical family. We attempt to fill this void by considering the composition of the typical US household's food bill and the prominence of GMO ingredients across the diet. To this end, we utilize data from the US Department of Labor's Bureau of Labor Statistics (BLS) on the market basket weights used in calculating the consumer price index (CPI) and the composition of the average household's annual food bill that is reported in the Consumer Expenditure Survey. The CPI uses expenditure weights calculated from surveys of about 7,000 families per year and collects detailed purchase data for over 200 item categories. We use the latest market basket weights (2007-2008) and Consumer Expenditure Survey (2011) reported by the BLS.

We also consider consumption of the various food items that are likely to contain GMO ingredients, either directly or as an animal feed. This is made possible by the US Environmental Protection Agency's (EPA) Food Commodity Intake Database (FCID; US EPA, 2014), which is comprised of data taken from the National Health and Nutrition Examination Survey (NHANES) of the Centers for Disease Control (CDC) and USDA, as well as the FCID recipe database, which derives the consumption of raw crop and livestock commodities from the dietary patterns reported in the NHANES. While the principal goal of the FCID is to monitor dietary exposure to pesticides, it also provides a detailed measure of the daily consumption of the base commodities (e.g., corn, beef, etc.) that are ingredients in the US food supply.

As we have noted, a variety of empirical studies have attempted to infer the price differences of existing GM commodities and GMO-free alternatives. Nearly all of this research has been done for broad commodity categories. For example, Barrows, Sexton, and Zilberman (2014) find that the adoption of GM corn lowered corn prices by 13% while adoption of GM soybeans lowered prices by 2%-65%. It is difficult to extend these aggregate price impacts through the marketing chain to infer how the cost of the typical grocery basket was impacted by GM crops. To reinforce these aggregate estimates, we adopt a unique approach that is empirical but largely anecdotal. We use proprietary grocery item pricing for conventional and certified GMO-free food items. In particular, we utilize market research data collected by Mintel from retail outlets over the preceding 12-month period for bakery, dairy, and snack food items. The Mintel data contain unit prices and detailed product descriptions. From this extensive database, we use a text-matching algorithm to identify comparable GM-containing food items for each GMO-free certified item (Levenshtein, 1966). We utilize text-mining algorithms applied to detailed product descriptions to identify GMO-free items as well as the unit size (in ounces) of the item.

Table 1 presents detailed price comparisons for food items certified to be GMO-free and comparable food items that do not have such a certification. The price comparisons are made on a per-unit (i.e., package) basis as well as on a price per ounce of product. The product descriptions do not contain unit sizes in every case and thus the per-ounce comparisons are missing in some cases. It is important to note that although our matching algorithms derive the closest product matches possible, the products being compared may nevertheless differ in ways that we do not observe and thus that are not accounted for in the price differences. By comparing a large number of similar products, we hope to diminish any biases that would reflect product differences other than the GMO-free certification. That said, we also evaluate price differences that are based upon the relevant literature surveyed above.

Across all of the product matches, a GMO-free certification raises prices by an average of 33%. This is quite similar to the commodity price differences identified in the empirical literature. An interesting observation is that, for those products for which we are able to define unit size, GMO-free certified products seem to be packaged in smaller units. If one considers pricing on a per-ounce basis, the GMO-free certification adds 73% to price. The fact that unit sizes are absent in many cases may suggest that the 33% price difference is more reliable.

Before proceeding to an evaluation of how these price differences translate into household expenditure differences, it is interesting to consider the prevalence of GMO-containing food items in the typical consumer's diet. We utilized the EPA's FCID database to determine the typical US consumer's intake of commodities in pro-

Table 1. Price differences between comparable GMO-free certified and non-certified food products.

Non-GMO certified product	Comparable product without non-GMO certification	Non-GMO unit price	Comparable unit price	Non-GMO price/oz	Comparable price/oz	% unit price difference*	% $/oz difference
Sugar cookie mix	Sugar cookie mix	3.99	1.89	0.27	0.01	75%	320%
Chocolate chip cookie mix	Chocolate chip cookie mix	2.99	3.49	0.16	0.18	-15%	-15%
All-purpose flour	All-purpose flour	3.99	1.49	0.25	0.05	99%	168%
Peanut butter cookies	Peanut butter cookies	6.99	2.79	0.58	0.17	92%	121%
Lemon cookies	Lemon cookies	6.99	1.99	0.58	0.15	126%	134%
Vanilla animal cookies	Vanilla animal cookies	2.49	3.49	0.42	0.39	-34%	7%
Oatmeal animal cookies	Oatmeal animal cookies	2.49	4.49	0.42	0.06	-59%	194%
Blueberry pastry crisps	Blueberry pastry crisps	1.99	1.99	0.05	0.00	0%	248%
Buttermilk biscuits	Buttermilk biscuits	1.98	2.79	0.12	0.11	-34%	10%
Cinnamon rolls with icing	Cinnamon rolls with icing	3.98	2.19	0.02	0.02	60%	25%
Chocolate chip cookies	Chocolate chip cookies	4.99	3.29	0.08	0.00	42%	283%
Blueberry waffles	Blueberry waffles	2.69	2.54	0.03	0.02	6%	43%
Half & half	Half & half	3.99	2.48	---	---	48%	---
Eggnog	Eggnog	2.69	2.59	---	---	4%	---
Whole milk	Whole milk	2.69	3.56	---	---	-28%	---
Fat-free milk	Fat-free milk	2.69	1.99	---	---	30%	---
Vanilla almond milk	Vanilla almond milk	3.00	2.99	---	---	0%	---
Organic whole milk	Organic whole milk	6.99	3.59	---	---	67%	---
Non-fat yogurt with blueberry on the bottom	Non-fat yogurt with blueberry on the bottom	1.00	1.79	0.02	0.03	-58%	-58%
Double Gloucester cheese	Double Gloucester cheese	8.99	7.99	---	1.14	12%	---
Plain soymilk	Plain soymilk	2.00	2.69	---	---	-30%	---
Whole milk	Whole milk	4.99	3.56	---	---	34%	---
Vanilla almond drink	Vanilla almond drink	6.49	3.39	---	---	65%	---
Chocolate peanut butter protein bar	Chocolate peanut butter protein bar	15.19	11.99	0.13	---	24%	---
Raz-mataz berry fruit chews	Raz-mataz berry fruit chews	2.98	1.00	0.01	0.01	109%	-52%
Oats & honey crunchy granola bars	Oats & honey crunchy granola bars	2.94	2.24	0.04	0.03	27%	50%
Original almond milk	Original almond milk	2.59	2.99	---	---	-14%	---
Low-fat milk	Low-fat milk	1.69	1.00	---	---	52%	---
Original almond milk	Original almond milk	3.00	2.99	---	---	0%	---
Nonfat yogurt with superfruits on the bottom	Nonfat yogurt with superfruits on the bottom	1.00	1.79	0.02	0.03	-58%	-58%
Non-fat yogurt with blueberry on the bottom	Non-fat yogurt with blueberry on the bottom	1.39	1.79	0.03	0.03	-25%	-25%
Chocolate brownies	Chocolate brownies	7.99	7.99	0.67	0.67	0%	0%
Panettone cake	Panettone cake	5.99	9.99	---	0.06	-51%	.
Provolone cheese slices	Provolone cheese	3.99	4.99	0.67	0.62	-22%	6%
Low-fat vanilla yogurt	Low-fat vanilla yogurt	4.49	1.99	0.14	0.40	81%	-104%
Peanut butter and chocolate chip bars	Peanut butter and chocolate chip bars	5.00	17.99	0.63	0.14	-128%	152%

Table 1. Price differences between comparable GMO-free certified and non-certified food products.

Non-fat yogurt with caramel on the bottom	Non-fat yogurt	1.00	1.00	0.02	0.02	0%	-19%
Crescent rolls	Crescent roll dough	2.98	3.48	0.37	0.22	-16%	54%
Non-fat yogurt with pineapple on the bottom	Non-fat yogurt	1.39	1.00	0.03	0.02	33%	14%
Plain non-fat yogurt	Peach non-fat yogurt	1.39	0.80	0.03	0.13	55%	-163%
Non-fat yogurt with strawberry on the bottom	Non-fat yogurt	1.39	1.00	0.03	0.02	33%	14%
Peanut butter chocolate chip real whole food bar	Peanut butter & chocolate chip	3.29	17.99	1.10	0.14	-170%	209%
Reduced-fat milk	2% reduced-fat milk	4.99	1.99	---	---	92%	---
Reduced-fat milk	2% reduced-fat milk	3.58	1.99	---	---	59%	---
Peanut butter chocolate chip protein pleasure bar	Peanut butter & chocolate chip	2.99	17.99	0.12	0.14	-179%	-13%
Peanut butter cookie bar	Peanut bar	2.99	0.68	0.19	0.00	148%	366%
Peanut butter cookie bar	Peanut bar	22.95	0.68	0.08	0.00	352%	280%
MMM...chocolate chip cookie mix	Mint chocolate chip cookie mix	5.69	1.89	0.04	0.14	110%	-119%
Non-fat yogurt with black cherry on the bottom	Non-fat yogurt	1.39	1.00	0.03	0.02	33%	14%
Peanut butter cookie bars	Peanut buter cookie bars	5.00	0.68	0.06	0.00	200%	251%
Chocolate peanut butter blast nutrition bars	Chocolate peanut butter bars	23.31	6.98	0.11	0.08	121%	29%
Non-fat yogurt with salted caramel on the bottom	Non-fat yogurt	1.39	1.00	0.03	0.02	33%	14%
Peanut sea salt bar	Peanut bar	2.49	0.68	0.17	0.00	130%	355%
Peanut butter animal cookies	Peanut butter animal cookies	2.49	2.18	0.42	0.02	13%	287%
0% fat plain Greek yogurt	Non-fat plain Greek yogurt	3.99	3.72	---	0.16	7%	---
Organic buttery spread	Original buttery spread	2.99	2.98	0.23	0.20	0%	15%
Mint chocolate chip protein bar	Mint chocolate 20g protein bar	21.50	2.99	0.07	0.01	197%	175%
Organic white corn tortilla chips	Organic blue corn tortilla chips	3.99	2.99	0.05	0.25	29%	-154%
Choco moko cookies	Chocolate cookies	8.99	2.88	0.82	0.29	114%	104%
Non-fat yogurt with chocolate fudge sauce on the bottom	Non-fat yogurt	3.50	1.00	0.08	0.02	125%	125%
Vanilla pure almond milk	Vanilla almond milk	3.39	2.99	---	---	13%	---
White tortilla chips	White corn tortilla chips	5.19	2.99	0.32	0.23	55%	34%
Yellow tortilla chips	Yellow corn tortilla chips	5.19	2.29	0.32	0.18	82%	61%
Pumpkin tortilla chips	Pumpkin seed tortilla chips	3.69	2.50	0.62	0.42	39%	39%
American flavor rice vegan slices	American flavor slices	3.18	3.27	0.05	0.04	-3%	6%
Cheddar flavor rice vegan slices	Cheddar flavor slices	3.18	3.99	0.05	0.05	-23%	-14%
					Average:	**33%**	**73%**

** Percentage differences given by ln(Non-GMO Price/Comparable Price)*

Table 2. Average and median daily intake (grams) for selected food commodities (based upon the Food Commodity Intake Database, the NHANES/What We Eat in America Survey Data, and the US EPA Office of Pesticide Programs).

Product category	Products	Average daily intake (g)	Median daily intake (g)
Field corn products	Field corn flour, field corn flour-baby food, field corn meal, field corn meal-baby food, field corn bran, field corn starch, field corn starch-baby food, field corn syrup, field corn syrup-baby food, field corn oil, field corn oil-baby food	76.5	52.0
Soybean products	Soybean seed, soybean soy milk, soybean soy milk-baby food, infant formula, soybean oil, soybean oil-baby foods, soybean vegetable or soybean flour, soybean flour-baby food	30.4	21.2
Cotton products	Cottonseed oil or cottonseed oil-baby food	1.5	1.1
Canola products	Rapeseed oil or rapeseed oil-baby food	1.6	0.6
Sugar beets	Beet sugar, beet sugar-baby food, beet sugar-molasses, beet sugar-molasses-baby food	15.0	10.34
Beef products	Beef meat or beef meat-baby food, beef meat dried, beef meat byproducts, beef meat byproducts-baby food, beef fat or beef fat-baby food, beef, kidney or beef, liver or beef, liver-baby food	48.1	12.4
Poultry products	Chicken meat or chicken meat-baby food, chicken liver, chicken meat byproducts or chicken meat byproducts-baby food, chicken fat or chicken fat-baby food, chicken skin or chicken skin-baby food, turkey meat or turkey meat-baby food, turkey liver or turkey liver-baby food, turkey meat byproducts or turkey meat byproducts-baby food, turkey fat or turkey fat-baby food, turkey skin or turkey skin-baby food, poultry other meat, poultry other liver, poultry other meat byproducts, poultry other fat, poultry other skin, egg whole or egg whole-baby food, egg white or egg white (solids)-baby food, egg yolk or egg yolk-baby food	71.8	47.8
Pork products	Pork, meat or pork, meat-baby food or pork, skin or pork, meat byproducts or pork, meat byproducts-baby food or pork, fat or pork, fat-baby food or pork, kidney or pork, liver	24.6	3.0

cessed and prepared food items. Table 2 contains the results of this survey of consumption patterns.

We report both mean and median daily intakes, since it is not uncommon for certain segments of the population to avoid a specific commodity altogether (e.g., vegetarians will have no meat consumption). In the case of field corn, which is overwhelmingly comprised of GM corn, the typical individual consumes 76.5 grams of corn across a wide range of processed commodities. These commodities include ingredients such as corn flour, corn meal, corn syrup, and so forth. In the case of soybean products—a commodity that is nearly entirely GM—the average consumer has a daily intake of about 30.4 grams. The gram intake totals are of interest, but perhaps more enlightening is the broad range of food ingredients that contain the relevant agricultural commodities. In the case of meats, which use GM products as feed inputs, poultry is consumed the most, followed by beef products, and finally by pork. The median consumption of pork is quite low, reflecting the fact that a significant share of the US population does not consume pork products.

Though the quantitative measures of daily consumption of raw commodities is difficult to interpret in terms of the costs of a typical food basket, the FCID data do provide a detailed illustration of exactly how GM commodities are used in the US food supply. The breadth of food ingredients that contain GM commodities is impressive and serves to highlight the significant dietary changes that would be necessary to avoid consumption of GM commodities in the US diet.

Table 3 presents the latest average annual expenditures on food by US households. This is based on the 2011 Consumer Expenditure Survey of the BLS (US Department of Labor, 2014). The data are comprised of a survey of the population of 60.14 million US households. The average household consisted of 3.2 persons, 0.9 children, and had an annual gross income of $86,700. Total annual expenditures averaged $63,972, of which $8,315 went toward food. Of that amount, $4,944 was spent on food at home and $3,370 was spent on food away from home. Spending on broad categories of food items is included in Table 3.

In order to decompose the total expenditures of $63,972 into specific food categories, we applied the

Table 3. Expenditures on broad food categories for average household in 2011 (taken from the 2011 Consumer Expenditure Survey).

Average annual $ expenditures (2011 CES)	63,972
Food	8,315
Food at home	4,944
Cereals and bakery products	687
Cereals and cereal products	225
Bakery products	462
Meats, poultry, fish, and eggs	1,084
Beef	298
Pork	209
Other meats	166
Poultry	197
Fish and seafood	153
Eggs	62
Dairy products	533
Fresh milk and cream	194
Other dairy products	339
Fruits and vegetables	926
Fresh fruits	325
Fresh vegetables	294
Processed fruits	144
Processed vegetables	164
Other food at home	1,714
Sugar and other sweets	188
Fats and oils	142
Miscellaneous foods	866
Nonalcoholic beverages	445
Food prepared by consumer unit on out-of-town trips	72
Food away from home	3,370
Alcoholic beverages	515

2007/08 CPI market basket weights to the total expenditures.[1] Table 4 presents the detailed CPI weights and total expenditures on specific food categories. We have also included (where possible) the farm-to-retail value proportions. These are not used directly in our calculations but they do allow informal inferences regarding the degree to which farm price shocks might be reflected in retail prices. These data were collected from unpublished USDA sources (USDA ERS, 2014). We identify each food item category that is likely to have GMO ingredients. This includes cereal and bakery products, meat and poultry, dairy, beverages, prepared foods, and food away from home.

Of the total expenditures of $9,462 on food and beverages, $8,239 is spent on food items likely to contain GMO ingredients. We consider the impacts on the typical family's food budget of a GMO-free diet. First, we consider the 33% price premium implied by our comparison of specific GMO-free certified food products and comparable conventional foods. In that case, the typical family's food budget would increase from $9,462 to $12,181 each year. Of course, depending on household composition and consumption patterns, the price impacts could differ widely across households. We next consider the impacts of a modest 10% price premium for GMO-free food items. In that case, total expenditures would rise to $10,286 per year. In the case of a 20% price premium, which is the midpoint of the estimates reviewed by Barrows et al. (2014), total food expenditures would increase to $11,110. A 40% price premium would increase food expenditures to $12,758. Finally, if we apply the 73% price premium implied by our $/ounce price comparisons, total food expenditures would rise to $15,806.

Overall, our calculations suggest that the cost of a typical US family's market basket of food would rise from 8% to 50% annually, depending on the impacts on retail prices from going to a GMO-free diet. To put this in perspective, consider a comparison of food spending in developed countries that regulate GMO ingredients to that of the United States. According to calculations presented by *Civil Eats*, the typical US family spends approximately 6.9% of its household budget on food at home as compared to 13.9% in France and 11.1% in Germany (Jones, 2011). Dietary differences beyond GMO regulation are likely reflected in these statistics, but it is likely that at least part of the budget differences reflect the higher costs associated with GMO-free foods.

In short, the budgetary implications of a GMO-free diet are substantial. GMO-free food items are shown to be more expensive than conventional alternatives. GMO ingredients play an important and ubiquitous role in the US food supply. Even small increases in the costs of these ingredients translate into significant impacts on the typical US household. Increased food costs would not only impact food consumption patterns but would

1. *Note that modest differences in expenditures in broad categories arise from applying the CPI weights to the 2011 expenditures. For example, the weights imply total food expenditures of $8,791 as compared to the CES total of $8,315. We utilize the CPI weights because of the significantly greater detail that they provide.*

Table 4. Simulated impacts of a 33% price increase in foods containing GMOs on average household expenditures (based on the 2011 Consumer Expenditure Survey).

Category	Food items	2007/08 CPI weights	2011 CES expenditures	Farm value as % of retail	Contains GMO ingredients	Expenditures with no GMOs
Total expenditures from CES			63,972.00			
Food & beverages		14.792	9,462.74			
Food		13.742	8,791.03			
Food at home		7.816	5,000.05			
Cereals & cereal products	Flour & prepared flour mixes	0.039	24.95	7%	*	33.18
	Breakfast cereal	0.194	124.11		*	165.06
	Rice, pasta, cornmeal	0.118	75.49		*	100.40
Bakery products	Bread	0.212	135.62		*	180.38
	Fresh biscuits, rolls, muffins	0.109	69.73		*	92.74
	Cakes, cupcakes, cookies	0.197	126.02		*	167.61
	Other bakery products	0.220	140.74		*	187.18
Beef & veal	Uncooked ground beef	0.202	129.22	56%	#	171.87
	Uncooked beef roasts	0.081	51.82		#	68.92
	Uncooked beef steaks	0.173	110.67		#	147.19
	Uncooked other beef & veal	0.047	30.07		#	39.99
Pork	Bacon, breakfast sausage, & related products	0.124	79.33	38%	#	105.50
	Ham	0.071	45.42		#	60.41
	Pork chops	0.066	42.22		#	56.15
	Other pork including roasts & picnics	0.080	51.18		#	68.07
Other meats		0.236	150.97		#	200.80
Poultry	Chicken	0.269	172.08	38%	#	228.87
	Other poultry including turkey	0.067	42.86		#	57.01
Fish & seafood	Fresh fish & seafood	0.159	101.72			101.72
	Processed fish & seafood	0.138	88.28			88.28
Eggs		0.099	63.33		#	84.23
Dairy & related products	Milk	0.281	179.76	31%	#	239.08
	Cheese & related products	0.269	172.08		#	228.87
	Ice cream & related products	0.130	83.16		#	110.61
	Other dairy & related products	0.159	101.72		#	135.28
Fresh fruits	Apples	0.071	45.42	33%		45.42
	Bananas	0.066	42.22			42.22
	Citrus fruits	0.084	53.74			53.74
	Other fresh fruits	0.228	145.86			145.86
Fresh vegetables	Potatoes	0.070	44.78	23%		44.78
	Lettuce	0.057	36.46			36.46
	Tomatoes	0.076	48.62			48.62
	Other fresh vegetables	0.233	149.05			149.05
Processed fruits & vegetables	Canned fruits & vegetables	0.138	88.28			88.28
	Frozen fruits & vegetables	0.081	51.82			51.82
	Other processed fruits & vegetables including dried	0.048	30.71			30.71

Table 4. Simulated impacts of a 33% price increase in foods containing GMOs on average household expenditures (based on the 2011 Consumer Expenditure Survey).

Juices & nonalcoholic drinks	Carbonated drinks	0.285	182.32	*	242.49
	Frozen noncarbonated juices & drinks	0.013	8.32	*	11.06
	Non-frozen noncarbonated juices & drinks	0.397	253.97	*	337.78
	Coffee	0.112	71.65		71.65
	Other beverage materials including tea	0.119	76.13		76.13
Other food at home	Sugar & artificial sweeteners	0.055	35.18	*	46.80
	Candy & chewing gum	0.188	120.27	*	159.96
	Other sweets	0.054	34.54	*	45.94
	Butter & margarine	0.067	42.86	*	57.01
	Salad dressing	0.063	40.30	*	53.60
	Other fats & oils including peanut butter	0.102	65.25	*	86.78
	Soups	0.090	57.57	*	76.57
	Frozen & freeze dried prepared foods	0.301	192.56	*	256.10
	Snacks	0.314	200.87	*	267.16
	Spices, seasonings, condiments, sauces	0.250	159.93	*	212.71
	Baby food	0.079	50.54	*	67.22
	Other miscellaneous foods	0.432	276.36	*	367.56
Food away from home	Full service meals & snacks	2.870	1,836.00	*	2,441.88
	Limited service meals & snacks	2.347	1,501.42	*	1,996.89
	Food at employee sites & schools	0.269	172.08	*	228.87
	Food from vending machines & mobile vendors	0.112	71.65	*	95.29
	Other food away from home	0.329	210.47	*	279.92
	Beer, ale, & other malt beverages at home	0.303	193.84	*	257.80
	Distilled spirits at home	0.079	50.54	*	67.22
	Wine at home	0.232	148.42		148.42
Alcoholic beverages away from home		0.437	279.56	*	371.81
Total (at +33% price impact)		14.79	9,462.10		12,180.95
Alternative price impacts:					
+10%			10,285.99		
+13% (Average of studies surveyed by Sexton & Zilberman, 2014)			10,533.99		
+20%			11,109.89		
+40%			12,757.68		
+73% ($/oz. change from Mintel)			15,476.53		

** indicates the commodities contain GMO ingredients*

 # indicates that GMO feed is used in production

We assume a baseline 34% price increase in all goods for which GMOs are used as direct ingredients or feedstuffs.

also affect all classes of expenditures as limited income is redistributed across alternative consumption items.

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Authors' Notes

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