COSTS OF LABELING GENETICALLY MODIFIED FOOD PRODUCTS IN THE NORTHEAST

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SUMMARY

LAW WOULD APPLY TO 40% OF FOOD AND ALCOHOL ITEMS

Proposed bill excludes restaurant foods, livestock/products fed/treated with GM products (e.g., BST milk), alcohol, organic products

TRANSLATES INTO 50% FOOD ITEMS IN SUPERMARKETS

The number of items potentially affected is so large (20,000+) it is not possible to predict exactly what processors and stores will do

3 APPROACHES TO COMPLIANCE – CALCULATE COSTS FOR EACH

Label existing products
Use non-GM ingredients
Use organic ingredients

1 LABEL: account for warehouse, store costs, labeling
Annual Family 4: $34(L) $35.50(Mid) $37(H)

2 NON-GM INGREDIENTS: higher ingredient cost, keeping inputs separate
Annual Family 4: $48(L) $232(Mid) $416(H)

3 ORGANIC INGREDIENTS: much higher ingredient costs, separation
Annual Family 4: $364(L) $960(Mid) $1,556(H)

REGULATORY AND OTHER COSTS

Regional states must implement law and monitor: $6.2m; loss farm income: $21.5m; possible lawsuit liability set at $ 20m; some environmental loss: not computed: aggregate set $1/person

CALCULATING AGGREGATES

1 MAXIMUM RANGE
Annual Family 4: $38(L) $797(Mid) $1,556(H)
High values as implies a large share of organics which are costly

2 ADJUSTED 50% labeled, 40% non-GM Ingredients, 10% organic
Annual Family 4: $73(L) $208(Mid) $342(H)

3 **CONSIDERING MIDPOINTS: Annual Family 4: $500 annually best estimate with full labeled/unlabeled product range. 2.5% food budget; $7.9 billion annually for Northeast**
If some product variants are eventually discontinued then costs and consumer choice will decline over time. Consumer surveys and experiences in Europe suggest the products most likely to be

dropped are the labeled ones resulting in a system, compared to present, with higher costs (due to more costly non-GM ingredients) and different but no real increase in consumer choice.

EXECUTIVE SUMMARY

Current U.S. food labeling policy does not require the labeling of genetically modified (GM) foods. Voluntary labeling is an option, in which case the costs are borne by the sellers and largely passed on to consumers seeking those products. State mandatory labeling laws, such as recently enacted in Vermont and proposed in N.Y. State, among other states, would shift those costs largely to all consumers. The objective of this report is an assessment of what those costs are likely to be for the Northeast, the 11 state plus the District of Colombia region, food consumers with the purpose of providing more information for legislators and consumers. There is no intent here to take a position, pro or con, on the labeling decision, nor are the possible benefits of the proposed law evaluated.

The initial stage of the analysis is to determine the proportion of foods which would be required to be labeled under the proposed legislation, which specifically excludes restaurant and other food items for immediate consumption along with other classes of foods. In total it is calculated that between 60 and 66 percent of foods sold in N.Y. State would be exempted; the study adopts the 60 percent level as it is based on more specific supermarket food categories used by the industry. Costs though are incurred on a per item not aggregate value basis. The 40 percent of mandated-labeled foods transcribes into 21,000 – 25,000 separate labeled items, or 50-58 percent of items available in supermarkets.

Firms can comply with the proposed labeling requirements by either labeling or by using ingredients below the specified GM threshold level of .9 percent. Labeling costs involve, in addition to the labeling function itself, the annual costs of warehousing more items as well as the charges leveled for stocking 'new' items by supermarkets. As estimated here those costs for a family of four in the Northeast are in the mid-$ 30 range.

The second approach to compliance is using non-GM ingredients, which may be either produced not using GM seeds, or organic. Those ingredients though are more costly, particularly organically grown ones. Additionally, the GM and non-GM products must be kept separate ('Identity Preservation') which involves both handling and record keeping costs. For the non-GM option estimated costs, again for a family of four, range from a low of $48 to a high of $416, with a midpoint of $232. The costs for using organic ingredients are respectively $364 to $1,556 with the midpoint at $960. Additional costs to the region include the potential loss of net farmer income from producing GM corn and soybeans, which while very real for regional farmers is minor compared to direct consumer costs. There are additionally regulatory costs which are borne by the State. Adding one dollar per capita for all those costs brings the maximum range of cost, for the four person household, to $38 to $1,556 with a midpoint of $797 (Table 10).

Such a large range though is difficult to comprehend as it assumes one of the four options (labeled, non-labeled non-GM, and non-labeled organic) will be adopted exclusively. That seems unlikely as consumers are more apt to spread their purchases across the three categories with organics potentially growing somewhat while some of the majority will accept (as now) the GM product, but reduced due to the new label. Assuming that the labeled product will command half the market and organic 10 percent, the weighted results are $73 (L) to $342 (H) with a midpoint of $ 208. These values correspond to a midpoint cost for Northeasterners of $3.3 billion with a range from $ 1.1 to $ 5.4 billion (Table 11). Taking the midpoint of the two available estimates, $ 208 and $ 797, gives a figure of just over $ 500 for the four person regional family. This is the best estimate currently available until more is known about which products, labeled or unlabeled, will survive in the long term.

Yet in many dimensions these estimates represent a low bound value. For one, additional costs associated with frozen and fresh foods are not considered due to data limitations. Second, no explicit value is placed on legal liability for regional residents in the case of a law suit over a mandatory labeling policy. Vermont legislators estimate costs to their state to be in the $8 million range while for the region, a value of $ 20 million is used. And finally there are environmental benefits from GM crops, benefits from reduced pesticide use and a more benign herbicide to enhanced soil retention and carbon sequestration for the far higher portion of GM crop producers who use conservation tillage ('no till'). Those benefits were not possible to monitorize at the regional level.

The cost estimates do assume that all cost increases will be passed along to food consumers, as opposed to being absorbed by processors or supermarkets. Given the characteristics of the food sector that seems a good approximation, but it can also be noted that costs absorbed are costs nonetheless, and if the firms operate in the Northeast, they are regional costs. Another kind of cost which is not reflected here is the option (known as diverting) to purchase bulk items from out of the region for discount sales there. If products must be labeled specifically for N.Y. sales, or even a small group of states, then product flow will be restricted and access to discounts limited.

Finally it should be emphasized that the figures presented here are estimates as no one knows how consumers, and the food industry, will react if labeling is mandated. The volume of products affected in the food system is so large there is not space within the system to add a labeled version of all products now sold unlabeled. Consumer studies along with experiences from Europe tell us that many shoppers will avoid/pay less for labeled GM foods, in which case many of those over time will disappear, reducing choice and raising food costs due to the higher ingredient costs of non-GM inputs. Alternatively distributors or supermarkets may choose to exclude some product versions. That though risks alienating shoppers accustomed to seeing variety available in stores. Some may even seek to shop out of the region. So the long term equilibrium under a labeling regime is unknown at this time and so the associated costs cannot be

predicted with surety. What is certain is that there will be notable costs, and most of those costs will be reflected in higher food costs in the Northeast.

I. INTRODUCTION AND OBJECTIVES

HIGHLIGHTS: The objective of this report is to estimate the costs to Northeast food consumers if the labeling of selected genetically modified foods is mandated. The study region incorporates 11 states plus Washington, D.C. with a total 2013 population of 63.5 million. The proposed labeling legislation in New York State is used as a basis for the analysis, noting its language closely parallels that of adopted legislation in Vermont, Maine and Connecticut. No position is taken on whether or not to label those foods. Rather the intent is to provide additional information so that any discussion over a mandatory labeling law can function in a more fully informed environment. However it is important to note that the consequences of a labeling law will be so significant in terms of the number of food items affected and the presentation of additional choices to consumers no one at this point can be certain of the eventual outcome beyond that fact there will be costs which will largely be passed on to consumers.

The United States took and maintained a lead in both the science and commercialization of biotechnology, with particular applications to plants and food. The pioneering science of Cohen and Boyer in the early 1970s ultimately made possible the release of the first genetically modified (GM) food worldwide in the mid-1990s. By 2012, some 90 percent of the domestic soybean, corn, sugar beet and cotton crops incorporated genetic modification.[1]

In part the establishment and maintenance of the scientific and commercial lead by the United States in this technology is attributable to Federal regulatory policy dating to 1986, a policy based on scientific principles that have consistently been confirmed by the National Academies of Science. At that time the government determined the genetic modification of plants was but a particular means to an outcome which was conceptually no different than other approaches applied since humankind took up settled agriculture over ten thousand years ago. Selecting the best individual plants, whether done by observation by early farmers or more systematically through 'scientific' breeding over the past century, has the effect of changing the genetic structure of crops just as does their direct genetic modification. What is important under that regulatory approach is the outcome, the product itself, not the process by which it is achieved. That is, the U.S. regulates the *product not the process* of genetic modification of plants.[2]

As a direct consequence of that product-not-process approach, the labeling of genetically modified (GM) foods is not required in this country.[3] And so genetically modified foods have not been routinely labeled under Federal policy, but states are presently focusing attention on their own labeling policies. In 2012 and 2013 respectively California and Washington State introduced ballot initiatives for mandatory labeling requirements for certain genetically modified foods, both of which failed to achieve majority support. However in 2013-14 Connecticut and Maine both passed legislatively mandatory labeling requirements for genetically modified foods. Those laws though do not go into effect until contiguous states with a total of at least 20 million inhabitants pass similar legislation.[4] Most recently, Vermont adopted a mandatory labeling law[5] to go into effect July 2016.[6] Additional states, including New York and Massachusetts, are

presently considering adopting through the legislative process a related mandatory labeling law for specified GM foods.[7]

A. Objective

With Vermont recently having adopted a mandatory GM food labeling bill for specific products with a 2016 effective date, Maine and Connecticut a similar one with no as yet specific effective date, and the New York legislature presently considering a closely related variant for its citizens, the impetus for labeling GM foods has shifted to the Northeast. Labeling though has real costs attributable to more expensive ingredients and the process of maintaining product identity and the labeling process itself, among others. Those costs are not insignificant – the median estimates annually are $ 348 - 401 in California[8] and $ 360 - 490 in Washington State for a family of four[9] – and will be paid for largely by food consumers in the mandatory labeling states. The objective of this report is then to provide an estimate of the costs to North East food consumers of the adoption of mandatory labeling legislation. No attempt is made here to identify or quantify the benefits of GM labeling or to take a position on the net benefits of labeling or not labeling GM foods.[10]

For the purposes of this analysis the Northeast is defined as the 12 state/area region including New York, Pennsylvania, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, Delaware and Washington, D.C.. As of 2014 that region has a combined population of 63.5 million.[11] The proposed New York legislation[12] is used as a basis for the analysis because as noted it is very similar in wording to the laws already adopted within the 12 area region.

That midpoint annual estimate is $ 800 for a family of four, or $ 12.7 billion region wide. That estimate though represents a broad range allowing for consumers to select among current products that have been labeled, unlabeled products using non-GM ingredients, and exclusively organic ingredients. An alternative approach is to use surveys to indicate how consumers indicate they will respond to the new alternatives, recognizing that many consumers have indicated an unwillingness to consume genetically modified foods labeled as such. Computed in that way, midpoint annual household expenditure increases aggregate to $ 224, or $ 1.1 billion region wide. The range of the estimate reflects current uncertainties in costs and interpretations, such as the number of other states which may or may not adopt related legislation and, particularly, how producers, store operators and consumers will respond to the myriad of 'new' products which will be called for. It is nonetheless hoped that this cost estimate will allow Northeast residents and their elected representatives to make a more informed choice when deciding whether or not to adopt this significant legislation.

B. Structure of this report

The first step in analyzing the cost to Northeast residents of labeling selected GM foods is the determination of the proportion of food stuffs which are covered by the legislation. That is done in Section II below.

For the identified foods, compliance with the law can be accomplished either by (a) labeling as containing genetically modified ingredients, or (b) using food ingredients which have a genetically modified content below the 0.9 percent (by weight) cutoff of the legislation.[13] The costs associated with labeling are analyzed in Section III while those associated with the no-labeling requirement are presented in Section IV. Section V includes additional, general costs such as losses to Northeastern farmers and food processors as well as costs associated with potential liability at the processor, food store and state levels. Finally, Section VI summarizes the analysis with an estimate of the likely range of overall costs associated with the proposed labeling legislation.

II. NORTHEAST FOODS AFFECTED BY THE PROPOSED LABELING BILL

HIGHLIGHTS: Under the definitions of the proposed legislation and considering the available GM foods, only an estimated 40 percent of food purchases by value must be labeled under the current legislation.

Within the food industry product handling costs are calculated on a per-item or SKU (stock-keeping unit) basis, not value. For the purposes of this report the number of mandatorily labeled SKUs is estimated to be 50 – 58 percent of average supermarket SKU numbers, or between 21,000 and 25,000 SKUs. This number represents such a large proportion of food store items it is not clear how store operators will respond as there is insufficient shelf space to stock all the items in a labeled and unlabeled form. Store managers, along with processors and distributors, will likely discontinue some of the potential items while seeking a best balance between providing variety to consumers, costs, and space availability.

A. Foods excluded from labeling requirement by value

Any law must be specific so as to be clear about what lies within and outside its scope. In the current labeling context, a significant factor is distinguishing between those foods which will have to be labeled and those which are exempt. The scope of the law has clear implications for the extent, and thus costs, of labeling, and so is explored here. The current New York bill, the model for this analysis, reads as follows in describing which foods are *exempted* from the labeling requirement:[14]

Food derived from animals not themselves genetically engineered regardless of whether the animal has been fed with any food produced with genetic engineering or treated with a drug or vaccine that has been produced through genetic engineering

This clause excludes for example beef and dairy products, including those from cows which are treated with genetically modified Bovine Somatotropin (rBST).

Any processed food that would be subject to this section solely because one or more processing aids or enzymes were produced or derived with genetic engineering.

Excluded here is cheese produced using a genetically modified chymosin as a substitute for rennet produced from calves and other sources.

Any alcoholic beverage that is subject to regulation by the alcoholic beverage control law.

Food that has been lawfully certified to be labeled, marketed, and offered for sale as "organic".

Food that is not packaged for retail sale and that either: (1) is a processed food prepared and intended for immediate human consumption, or (2) is served, sold, or otherwise provided in any restaurant or other food service establishment that is primarily engaged in the sale of food prepared and intended for immediate human consumption.

Presently approaching half of food expenditures (but not food volume) are made for food not prepared at home (further details below).

Medical food.

This is a smaller specialized food group to be administered or consumed "under the supervision of a physician" in terms of expenditures and volume which will not be considered in detail here.

B. Composition and expenditures on mandatorily labeled foods

The first step in determining the costs of labeling GM food products is calculating the expenditure shares on food products which must be labeled under the definitions above (Section II.A). According to data collected by the government Bureau of Labor Statistics (BLS) for the Northeast (NE) for 2012 (the most recent available), 12.5 percent of total household expenditures are for food and alcoholic beverages, and of that 61 percent is for food and alcoholic beverage for consumption at home.[15] The share of all food expenditures by major food groups is presented in Table 1.

Table 1: Share of food at home expenditures by major food groups in the NE, 2012, BLS data

Cereal and baked products:	*7.8 %*
Meat, poultry, fish, eggs	12.0
Dairy	6.0
Fruits & vegetables	*10.6*
Other	*17.7*
Alcoholic beverage	7.1

Source: BLS Reports, "Consumption Expenditures in 2012". Report 1046, March 2014, Table 11. Available at http://www.bls.gov/cex/csxann12.pdf

Among these expenditure groups, only cereal and baked products, fruits and vegetables and other will be required to be labeled, according to the legislative definitions above (Section II.A). They sum to a total of 36.1 percent of total expenditures for at home food and alcoholic beverage consumption. This means nearly two thirds (64%) of food consumed will not be required to be labeled, a percentage in line with the proposed legislation in California and Washington, and the legislation adopted in Connecticut and Maine.[16] But even this percentage overstates the proportion of food stuffs which must be labeled under the proposed legislation. Labeled organic foods by regulation are not to contain GM components and represented four percent of food and beverage sales in 2010.[17] That brings the proportion of GM foods to be labeled in NE down to 32 percent using the BLS data.

Additional exclusions can be made by examining the subcategories of the food groups identified by the BLS (CIP-U).[18] According to those data, only up to 37 percent of the fruits and vegetables (identified as other fresh vegetables and other fresh fruits) would need to be labeled at this time (only some sweet corn and one brand of papaya are GM). Similarly, coffee and tea can be excluded, accounting for 22 percent of nonalcoholic beverages. With those adjustments, just over one fourth of all food and alcoholic beverages consumed in the NE will need to be labeled under the proposed law. And that too is an outside estimate as, for example, only a portion of 'cereals and baked products' will contain GM corn, soybean and sugar beet products. For example, there is no genetically modified wheat on the market.

A second data source for food sales is from the Food Marketing Institute, the major trade association, which reported supermarket sales by department for 2011. Their reported figures by department are shown in Table 2.

Table 2: Food Marketing Institute supermarket sales by department, 2011

Dry Grocery (Food)	25.30 %
Produce	10.84
Baked Goods (inc. in-store bakery)	5.17
Frozen Foods	6.50

Source: Food Marketing Institute, "Supermarket Sales by Department – Percent of Total Supermarket sales". Available at https://www.fmi.org/docs/facts-figures/grocerydept.pdf?sfvrsn=2.

These total 48 percent, but that also is an overstatement of foods potentially requiring labeling under a NE law. Again we can subtract the four percent of organic foods. And among grocery products currently on the market only some sweet corn and one brand of papaya are genetically engineered. Papaya sales are tiny by comparison while sweet corn sales for the fresh produce market totaled at the farm level in N.Y. in 2012 $ 882 million.[19] Allowing for a 100 percent markup at retail sweet corn produce sales that year amounted to nearly $ 2 billion, or 4.3 percent of store sales. Making those adjustments, the share of food subject to the proposed labeling law is 40 percent.

As the FMI categories fit the product categories in the proposed legislation better than the BLS ones do, the FMI figures are used in this analysis. That is, the figure of 40 percent of food expenditures covered by the proposed labeling legislation is used here. That is, under NE regional labeling legislation, at least 60 percent of food expenditures are exempted from labeling.

C. Food items required to be labeled by number of products

While the share of affected products (above) is calculated on a sales dollar basis, handling costs are computed on a per item basis. In the supermarket business, items are referred to as SKUs for Stock-Keeping Units. An individual SKU would then refer to a product like Jiffy Extra Crunchy Peanut Butter. Jiffy's smooth peanut butter or another brand's crunchy would have separate SKUs. The number of SKUs for individual products can be large: 121 SKUs for spaghetti/marinara sauce, 43 for barbecue sauce[20] and 57 for coffee.[21]

The average supermarket in 2012 carried 42,686 SKUs.[22] According to the Department of Agriculture, supermarkets in 2011 accounted for 91 percent of food store sales, which means that focusing on that outlet alone represents the great majority of domestic sales.[23] There are no published figures on SKU numbers by department. It was though possible to acquire the figures for one Midwestern chain store for 2014. The store had above average sales volume but with

30,086 SKUs had a somewhat below average product count. The SKU numbers by department are listed in Table 3.

Table 3: SKU numbers by department for one large Midwest supermarket, 2014

Dry Grocery:	14,124
Produce	1,236
Baked Goods	443
Frozen Foods	1,765
TOTAL	17,568

Source: Private communication

Dividing that figure by the total number of SKUs (30,086) gives a value of 58 percent, the proportion of in-store items which potentially must be labeled under a regional labeling. Adjusting that proportion for the average store SKU value of 42,686 gives a value (rounded) of 25,000. That can be considered for purposes here an upper bound. The lower bound is set at 50 percent of SKUs, or 21,000 (again rounded) to reflect that not all items in a department would be required to be labeled. It should be noted that because there are costs associated with each SKU, the higher the number of SKUs the higher will be the estimated costs of labeling.

The 20,000+ estimate of affected items is very large indeed and will likely prove impractically so at the store level as well as for food processors and distributors. Some portion of that number then likely will not be made available in both labeled and unlabeled form, not to mention organic, but just what portion that will be is not known at this time. Food sector members will need to observe how consumers react so as not to restrict customer food variety choice unduly while remaining conscious of costs.

III. COSTS ASSOCIATED WITH LABELED PROCESSED FOODS

HIGHLIGHTS: Under the proposed labeling law, non-exempted foods with a GM content exceeding .9 percent must be labeled. Labeling costs include the physical act of labeling as well as costs of warehousing additional items in addition to any costs supermarkets incur for stocking and tracking, and may impose on those 'new' products. For a family of four those costs are estimated to amount annually to a midpoint value of $ 35.50, or $ 561 million for the Northeast region.

For labeled products, there is no necessity to change the ingredients or processing activities. Processors will need physically to develop and apply labels, a non-trivial activity, as well as create separate warehouse and store spaces or 'slots' to accommodate the labeled as well as the non-labeled, non-GM product variants of the same products. The processors will need the dual

labeled and non-labeled lines for states with and without labeling legislation. Store operators for their part will wish to have available both the labeled and non-labeled variants so as to provide customers with choice. With space on supermarket shelves at a premium, adding newly designated products will be a costly undertaking, even assuming the space is available. Fresh produce is excluded from this analysis because the number of GM produce products involved is very limited while any locally-sourced products can be labeled as needed with a simple shelf label.

A. Warehousing costs

A typical food product is warehoused in at least two locations, initially with the manufacturer/processor and second with a distributor prior to being assembled into loads for store delivery. Large supermarket chains typically own their own warehouses and buy in bulk directly from manufacturers. Smaller operations utilize independent distributors who serve a similar function. For efficiency large volume items like many food products (tomato sauce) are handled in SKU pallet loads at the processor and warehouse levels – one SKU per item per pallet load. Pallet loads are subsequently broken open when individual cartons are 'picked' when assembling loads for store delivery.

Major warehouse-level costs include in-and-out charges plus monthly storage charges. Simple arithmetic then suggests the gross number of additional pallets spaces required *per wareh*ouse for the to-be-labeled products is equivalent to the number of new SKUs, 21,000 – 25,000 (see Section II.C above) plus associated handling costs. Labeled products though should be considered somewhat differently for while the labeling creates two SKUs where one existed previously – one for the labeled and one for the unlabeled version – the total amount of the product sold will not necessarily change. Thus the in-and-out costs will remain constant but with new warehousing 'slots' required, storage costs will increase.

Independent food warehouses charge a minimum of $ 5.00 per pallet per month storage, or $ 60 annually.[24] Retailer-owned warehouses do not post rates but because the functions are highly similar across the two types of warehouses the costs for supermarket-owned warehousing is assumed to be similar as well. For the addition of 21,000 and 25,000 SKUs (see Section II.C) the storage cost amounts to $ 1.3 to 1.5 million annually (rounded) *per warehouse*. This is a low estimate as it ignores the far higher cost of frozen food storage, which accounts for about six percent of the SKUs. Fresh produce occupies a middle cost ground, but accounts for a small portion of GM products. The dollar estimate though assumes that all the 'new' food items created by the proposed labeling law will indeed be made available in both labeled and unlabeled forms. Given space constraints that seems unpractical, but just what accommodations will be made is unknown at this time. So, considering the full range of possible products, how many warehouses though are needed to fill Northeast food customer demand?

That number, food warehouses serving Northeastern consumers, is difficult to discern as they are located both within and outside the region with warehouses serving multiple states. At one extreme is one large N.Y.-based chain, Wegmans, with two warehouse complexes, one located in N.Y the other in Pennsylvania, serving its 80 superstores located in N.Y., Pennsylvania, N.J., Virginia, Maryland and Massachusetts.[25] At the other extreme is Krasdale Foods[26] which provides warehousing for thousands of small stores from its single facility. It assumed here that one warehouse is required to support the producer and distributor needs of 500 food stores.

To calculate the number of food stores in the Northeast region it is assumed that the number of stores is directly proportional to the percent of the national population (20%). Using as a base the 178,779 retail food stores nationally 2014[27], that translates into about 35,756 food stores, or 72 warehouses. At $1.3 – 1.5 million per warehouse per year the costs come to between $93.6 and $108 million annually.

This computed number of regional stores and, from that, warehouses is likely at the low end because the more metropolitan areas prominent throughout the Northeast (New York, D.C., Boston, etc.) tend to have more stores per capita than less densely populated areas. Using N.Y. State as an example, the number of stores based on the population proportion (6%) is 10,727 compared to the actual reported number of 14,322[28], 25 percent lower. For purposes here, the 35,756 food stores, or 72 warehouses, given above is the low value. The high figure is 25 percent higher, or 44,695 stores corresponding to 90 warehouses. Using the same $1.3 – 1.5 million per warehouse per year the costs comes to between $117 and $135 million annually, for a maximum range of $93.6 to $135 million.

B. Supermarket-level costs

With some 100,000 new supermarket products introduced every year of which 70 percent fail to catch hold, stores experience real costs when evaluating and introducing new items. To offset some of those costs many chains have adopted a system known as a ‘slotting allowance’ of charging manufactures to allocate shelf space to new items. The ‘introduction’ of potentially 21,000 – 25,000 newly labeled items (see Section II.C above) under the proposed law could trigger similar costs for stores, including the likelihood that some of those products will be discontinued over time. The costs incurred are not slotting allowance charges specifically, but do represent similar costs. The amount of those costs is estimated here.

Data on the prevalence and amount of slotting allowance costs are drawn from a 2003 study by the Federal Trade Commission (FTC).[29] That study involved detailed data from seven retailers, four of which reported for multiple geographical divisions. Data were collected for five food categories: bread, hot dogs, ice cream, pasta and salad dressing. Of those, only bread, pasta and salad dressing are not specifically excluded from labeling under the proposed labeling legislation (see Section II.A above). The number of new products charged allowances varied by chain and product category, from a combined low of six to a maximum of 65 percent. Individual product

categories among bread, pasta and salad dressing ranged from a low of 0 (bread) to a high of 121 percent (pasta). All stores did charge allowances for salad dressing.[30] Participating chains on average charged an allowance of $ 9,000 per item in 2000 dollars, which corresponds to $ 12,000 in 2014 dollars.[31]

The issues with charging slotting-like charges for re-labeled existing products are though different from those applying to new items. Notable many of the re-labeled products are private/store brands for which allowances are not applied. Grocery private label market share registers 22 percent of unit sales and 18 percent of dollar sales.[32] The failure rate will also be lower as many of the re-labeled products are already established. And stores will need to satisfy customer expectations by stocking many of the items available prior to the adoption of any labeling legislation. Exactly how individual stores/chains will respond cannot be known at this time so some assumptions must be made. First, based on the practices reported in the FTC study, it is assumed that charges will be applied only in the dry grocery and frozen foods categories, which correspond to 90 percent of potentially affected SKUs (see Section II.C above). Second, it is anticipated that charges will be applied to only 25 percent of items.

The one-time cost per chain then comes to $ 75 million (42,886 SKUs x 58% to be labeled x $12,000/SKU targeted x 25% charged = $ 75 m). There are some 45 food store chains operating in the Northeast with at least 20 stores[33] so the total onetime cost comes to $ 3.4 billion. This up-front charge must be annualized over a number of years, here selected to be 10 years at an annual interest rate of five percent. The annualized cost then comes to $ 440 million. Costs for the large number of smaller (non-supermarket) stores are not included.

C. Labeling costs

While affected food products with unchanged ingredients will require no reformulation, they must be relabeled in some form to indicate the GM contents. That requirement represents an ongoing cost, in part an (assumed small) initial design cost plus annual costs for labeling the 'new' products. As part of a new requirement to label meat products by country of origin the Department of Agriculture estimated annual labeling costs as between $17 and 47.3 million for 121,350 unique labels.[34] The estimated food SKUs which must be re-labeled (21,000 – 25,000, see Section II.C) then represent respectively 17 and 21 percent of the annual labeling and related costs. That computes to a range of $ 2.9 – 9.9 million, with a midpoint value of $ 6.3 million.[35]

Under the proposed legislation, fresh produce can be identified with a simple carton or display label.[36] Only two products would need labels at present, a papaya brand and sweet corn, and so the additional labeling costs are considered minimal at this time and are not evaluated.

D. Aggregate annual estimated costs for labeling affected food products in the Northeast

There are three components associated with the labeling of existing products affected by the proposed labeling law: warehousing additional products, shelf space charges for additional

products, and labeling costs. The estimated aggregate annual costs for each component are evaluated in Table 4.

Table 4: Aggregate annual estimated costs for labeling affected food products in the Northeast, 2014

		$ Million		
CATEGORY		LOW	MIDPOINT	HIGH
Warehousing additional products		93.6	114.3	135.0
Shelf space charges for additional products		440	440	440
Labeling costs		2.9	6.3	9.9
TOTAL		536.5	561	585
PER CAPITA[37]	($, rounded nearest $.50)	8.50	9.00	9.20
FAMILY 4	($, rounded nearest $.50)	34	35.50	37

Sources: See text

IV. COSTS ASSOCIATED WITH UNLABELED PRODUCTS

HIGHLIGHTS: Under the proposed law non-exempt food products may remain unlabeled if the GM content remains below .9 percent. That criterion may be met by using either non-GM ingredients or organic products (which are non-GM). Those inputs though are more costly, to which must be added the cost of preventing intermingling with GM ingredients (known as Identity Preservation). Identity Preservation is estimated to cost annually for a family of four a midpoint value of $20 for non-GM ingredients and $86 for the organic option. The additional ingredient cost is notably higher, with four person family annual midpoint costs of $52 and $215 for the non-GM and organic ingredients options respectively.

Processors and retailers wishing to avoid the proposed GM labeling mandate must ensure the GM content is below the cutoff level of .9 percent (by weight).[38] There are two principal options for meeting that requirement, (a) using non-GM ingredients or (b) using ingredients meeting the criteria of 'organic', which by regulation must not be produced using GM seed.[39] Both options will be assessed here, although the notably higher cost of organic ingredients means the non-GM option is the more likely choice for avoiding mandatory labeling in the Northeast under the likely legislation language. Organic products of course can be labeled as such, which most consumers who search out that product line would know to be GM-free in any case. A reason processors might though use organic ingredients in products not specifically labeled 'organic' is to be able to utilize the regular transport and storage system for major ingredients like soybeans and corn. Even when well cleaned, facilities regularly used for GM products may contain a residue of GM

products which could be detected in a labeled organic product, potentially making it difficult to sell as such.

The 'model' legislation used here sets the maximum bar for GM ingredients at .9 percent (by weight),[40] which would generally be sufficient for accidental mixing in dual GM/non-GM food facilities.[41] For purposes here then no increase in handling costs of non-GM products is expected beyond a tracking cost for maintaining identity from the farm to the processor and cleaning costs when switching from a GM to a non-GM product using the same facilities/equipment. We begin by considering the added costs of using non-GM ingredients, followed by using organic ingredients. Finally, the costs of identity preservation are evaluated.

A. Costs of using non-GM ingredients

While some 90 percent of U.S. corn, soybeans and sugar beets are genetically modified,[42] that figure means 10 percent of the crop is produced not using GM seed. Much of that product is intended for export to countries which have limits on GM content, at least for food uses. Prices paid for those GM- free products do provide a source for estimating any added costs of the GM-free product. Typically the difference is a premium to compensate farmers and handlers for the higher costs of producing and maintaining separation between the GM and non-GM crops at the first-buyer level.[43]

A common practice for agricultural commodities is to set future prices as differentials from those quoted by the Chicago Board of Trade. Alternatively, buyers quote prices at harvest time for immediate delivery. At the same time, the Department of Agriculture reports actual prices paid at location specific markets (grain elevators).[44] For purposes here we use five quotes of price differentials (premiums) for corn and soybeans provided by several sources (Table 5). There are no indications of price premiums for non-GM sugar beets, very likely because cane sugar, a very close substitute, is all non-GM. Hence only corn and soybean non-GM options are considered here.

Table 5: Farm level non-GM premiums paid for corn and soybeans, 2008-13

COMMODITY	LOCATION	DATE	NON-GM PREMIUM $/bu
Corn	US	10/08	0.38 – 61.2[45]
	US	11/12	.40 - .50[46]
Soybeans	Iowa	12/13	2.25 – 2.50[47]
	US	10/08	1.07 – 1.39[48]
	US	11/12	1.00 – 4.00[49]

Sources: As shown

From these ranges of prices, the ones used for this analysis were selected to be $.50 per bushel of corn and $ 3.00 for a soybean bushel, respectively, which translates respectively into a12 and 24 percent premiums over quoted cash prices. The computed percentage differential is affected by the year of the analysis – using 2012 as a base with a smaller (and higher priced) crop the differentials respectively were seven and 20 percent.[50] For the computations below the range of increase is then 7 – 12 percent for corn and 20 – 24 percent for soybeans, for a maximum range of seven to 24 percent.

The second component of the assessment is considering the share of grain and oil products in retail food products. According to the Department of Agriculture the figures (farm share) for cereal and baked goods is seven percent, fats and oils 20 percent.[51] Finally, one needs per capita average annual food and alcohol expenditures. For 2012 (the most recent year available) those are $ 4,906.[52] And using the share of food sales affected by the proposed legislation of 40 percent (Section II.C) the per capita costs can be computed as per capita expenditures ($4,906) times share (.4) times increase attributable to using non-GM crops. Results are shown in Table 6.

Table 6: Costs of substituting non-GM crops for GM crops

Per capita food $	Share food affected	Inc. %	Farm share %	Per Capita Inc. $Exp. 2012
4,906	.4	7 (L)	7 (L)	$ 10 (.2%)
			20 (H)	27 (.6%)
4,906	.4	24 (H)	7 (L)	$ 33 (.7%)
			20 (H)	94 (2 %)

Sources: In text

That is, using non-GM foods will increase the per capita food bill from between $ 10 and 94, or .2 to 2 per cent, with a midpoint of $ 52 (1 %). For all Northeasteners in 2012 the midpoint cost increase would be $3.3 billion, with a range of $635 million to $6.0 billion.[53]

B. Cost of using organic ingredients

Per bushel organic corn and soybean prices for food quality product for April 2014 are reported respectively to be in the $ 12.00 – 12.25 and $ 27.50 – 30.37 range nationally. Those compare with GM product prices in the $ 5.00 – 5.25 and $ 14.50 – 14.85 range for corn and soybeans respectively.[54] Much of the GM crop is used for livestock feed and so may not be food quality, but no food quality corn and soybean prices are quoted. To be conservative, for comparison purposes the feed quality organic corn and soybean prices are used rather than the food quality prices. Those are for corn, $9.50 – 12.50 and soybeans $ 23.87 – 26.50.[55] These figures give a maximum range of $ 9.50 – 26.50, or 75 - 90 percent above the non-GM crop prices, here extended to a range of 60 – 90 percent to be conservative. Using the same approach as in Table 6 above, the effect of substituting organic crops for GM ones is shown in Table 7.

Table 7: Costs of substituting organic crops for GM crops

Per capita food $	Share food affected	Inc. %	Farm share %	Per Capita Inc. $Exp. 2012 $
4,906	.4	60 (L)	7 (L)	$ 82 (1.5 %)
			20 (H)	235 (5 %)
4,906	.4	90 (H)	7 (L)	$ 124 (2.5 %)
			20 (H)	353 (7 %)

Sources in text

That is, using organic foods will increase the per capita food bill from between $82 and $353, or 1.5 to 7 per cent, with a midpoint increase of $ 215. For all Northeasterners in 2012 the midpoint cost increase would be $13.8 billion, with a range of $5.2 to $22.4 billion. These are large numbers indeed, representing at midpoint a 4.4 percent increase in food and alcohol expenditures, and even they are computed conservatively.

C. Costs of identity preservation

The costs estimated in Tables 6 and 7 above consider non-GM product costs only up to the first-handler level, typically a grain buyer (referred to as a grain elevator). From that point through processing to the product labeling stage the GM and non-GM products must be kept separate lest the one contaminate the other. This is known as identity preservation (IP) which requires both cleaning facilities (elevators, trucks, processing equipment) as well as separate record keeping

for the two streams of product. The task is complicated because the two forms of the products, GM and non-GM, are identical in appearance and can be distinguished only through testing.

The costs tabulated in Table 8 reflect a series of estimates from studies over the 1998 - 2001 period, the most recent available. Once processed, the non-GM product of course involves no additional labeling costs as the labels do not need to change from their present form where no mention is made of GM ingredients. Firms may choose to add wording like 'doesn't contain genetically modified ingredients' but that would be a voluntary choice so that any associated costs are not considered here.

Table 8: Estimates of identity preservation costs

Crop	Year	cents/bu	%	Notes
Soy[56]	1997		.6 – 3.1	food & feed use; food use far higher
Soy	1997		6 – 9	
Corn[57]	1997		16	
Corn & Soy[58]	2000	16-27	3.3-14.7	inc. coord, segregation, opportunity
Corn[59]	2000	22	11.9	
Soy	2000	54	11.4	
Soy	2001	15-42	3.3-9.5	
Soy	2000	63-72	13.3-15.2	industry estimate
Soy[60]	2000	12	2.5	export costs so less handling required than for processing

Sources: as identified

The estimated costs clearly range broadly, affected by different methods of estimation and time periods. Cost change percentages are also affected by the underlying crop prices. Indeed the available estimates indicate the identity preservation costs for corn are lower than for soybeans, but corn is much lower in price than are soybeans so the percent cost is closer. From these data the approximate median identity preservation costs range from 15 to 40 cents per bushel for corn and soybeans respectively. That translates, approximately, to a 10 percent input cost increase for identity preservation over farm level (farm gate) prices. Calculated in this way, the estimate assumes that crop and identity preservation costs rise at the same rate over time.

The effect of identity preservation costs on retail food costs for the Northeast is presented in Table 9. The cost increase in percentage terms is treated as the same for non-GM foods and organic products, which means the dollar costs are higher for the organic products due to their higher farm level price. That higher cost is justifiable by noting that the non-GM product permits a .9 percent mixture with the GM product while organic foods due to market preferences for non-GM content often result in a near zero tolerance.[61] Zero contamination is nearly

unattainable when the same logistic system is used for GM and non-GM grains so that organics essentially require the use of an entirely separate logistics system in order to address market preferences, which is clearly very costly.

Table 9: Effects of identity preservation costs on per capita food costs for non-GM and organic products

Per capita food $	Share food	Inc. prod. %	Farm share %	Cost IP %	PC inc. $Exp.
Non-GM*					
4,906	.4	7 (L) 20 (H)	7 (L) 20 (H)	10	$ 1 3
4,906	.4	24 (H)	7 (L) 20 (H)	10	$ 3 9
Organic**					
4,906	.4	60 (L)	7 (L) 20 (H)	10	$ 8 26
4,906	.4	90 (H)	7 (L) 20 (H)	10	$ 12 35

*Source: Table 6
**Source: Table 7

That is, identity preservation costs add 10 percent above the costs of the substitute non-GM ingredients. For the non-GM option this amounts to a per capita $ 1 – 9 annually, midpoint $5, or $317.5 million for all Northeast residents. Comparable figures for the organic option is $8 – 35 annually, a $21.50 midpoint, or $1.4 billion annually for the region. While these amounts are not a great as for the substitute ingredients they are notable in themselves, and moreover are in addition to the ingredient costs.

V. OTHER COSTS FOR THE NORTHEAST

HIGHLIGHTS: GM crops provide net benefits to Northeastern farmers, estimated here to amount to $21.5 million annually. GM crops have distinct public environmental benefits, reduced plowing (which means less erosion and better retention of soil carbon), reduced pesticide use and a more benign herbicide, but those benefits were not monitorized specifically for the region. Some value should be placed on the legal liability states face should a labeling law be adopted. The estimate used by Vermont of $8 million is the best available; scaled up for the region the figure of $20 million is used. And finally, regional implementation costs in aggregate for all state agencies are estimated at $6.2 million annually.

The preceding Sections II – IV detail the estimated costs of the proposed GM food labeling bill which are directly associated with food for in home consumption in the 12 state/rea Northeast region. That is, they are costs which can be expected largely to be passed on to the region's food consumers. The labeling law though, if adopted, will have additional costs which will not necessarily be passed on in the form of higher food prices, but which are costs to area residents nonetheless. The intent of this section is to identify and, when possible, estimate the extent of those costs. Those costs consist of lower farm income associated with reduced production of GM crops (which are profitable for many farmers), reduced environmental benefits associated with reduced production of GM crops, and the liability faced by the region in the likely event of a lawsuit challenging the form and/or legality of a labeling law. Such lawsuits are commonplace following major regulatory changes and, being costly to defend, represent a potential liability for the region's taxpayers. And finally there are the implementation costs for the region, including annual expenses for monitoring and checking compliance.

A. Reduced environmental benefits associated with reductions in GM crops

While the proposed labeling legislation does identify as part of the justification potential environmental problems with GM crops, no mention is made of potential benefits.[62] Yet those benefits do exist and are identified here. Quantification estimates at the national or international level have been made and are referenced here, but it exceeds the scope of this analysis to quantify the extent and costs for the Northeast region in particular.

Environmental benefits associated with herbicide tolerant (HT) (also known as RoundUp Ready) corn and soybeans include the use of a more benign herbicide as well reduced plowing requirements (which is a weed control mechanism). Reductions in plowing mean less carbon is released from the soil as well as reductions in fuel used in the plowing operations. There is a 40 - 50 percentage point difference (i.e., 36% v. 86%) difference in the use of no till by non-HT and HT users respectively.[63] Insect resistant corn primarily reduces the requirement to use sprayed pesticides as well as reducing the environmental impacts of the insecticides themselves.

Worldwide for all crops in 2004 reduced carbon emissions associated with declines in fuel usage amounted to an estimated 1 billion kilograms (the equivalent of 480,000 cars annually) while 9.4 billion kilograms of carbon dioxide remained in sequestration due to reductions in plowing (the equivalent of 4.7 million cars). Herbicide tolerant soybeans in the U.S. represent almost 40 percent of that amount.[64] As use of GM crops has increased worldwide since 2004 current values would be higher than those reflected here. Regarding GM corn, the principal financial benefit is yield increases, with benefits also associated with insecticide reduction and reductions in mycotoxin, a carcinogen in humans and the source of several diseases among horses, pigs and

other domestic livestock fed corn.[65] Yield benefits of HT soybeans are negligible according to multiple studies, but farmers historically do benefit from modest reductions in herbicide use.[66]

B. Lower farm income associated with reduced production of GM crops

Wu estimates the net additional value of GM corn to farmers as $ 17.52 per acre. With the 2013 corn acreage in the Northeast at 3.7 m[67] and assuming Northeast farmers are at the national average of 90 percent (see endnote 1) GM corn, the additional value to regional farmers of growing GM corn is $57.2 million.[68] However as only some 10 percent of corn is used for food – the major uses are livestock feed, ethanol production and export – the potential loss of income resulting from a GM labeling requirement would be about $6 million annually.[69] That figure assumes the uses of corn grown in the Northeast follow national trends and represents a maximal value if all GM corn for food use is discontinued.

Benefit estimates of HT soybeans are more mixed, from very limited to $ 43/acre[70], according to a 2000 report. With Northeast soybean acreage of 1.6 m in 2013[71], net gross benefits (again assuming a 90% adoption level) then range from $62 m to a limited amount. About two thirds of soybeans by weight – the meal – is used for livestock feed, but the oil is a food product meaning a decline in demand for GM soybeans for food use would affect nearly the entire crop.[72] To be conservative a maximal value of $15.5 m (25%) is used here for the region, bringing the total annual value of GM crops to Northeastern farmers to $21.5 million, or $0.34 per capita. While the effect of a labeling requirement on the farm sector is small compared to the estimated impacts on food costs, the amount is nonetheless relevant to the traditionally low margin sector that describes farming.

C. Potential liability of law suits

With any major piece of legislation like the proposed GM labeling law there is always the possibility of legal action whether it be from the industry or from an NGO or a group of individuals. Particularly notable is the question if a state has the legal right to require GM food labeling when it is not mandated under Federal law. The point here is not to debate the legality issue but rather to note that the potential of a lawsuit which must be defended by a state is very present. Indeed, the State of Vermont is sufficiently concerned about the possible costs that they have identified a potential legal defense cost of $ 8 million.[73] While it is easy to imagine that there will be at least a single, and costly, legal challenge to labeling laws throughout the Northeast region – indeed the Vermont legislature is expecting one – the likelihood of multiple court challenges in different states using similar legal language is more difficult to anticipate. It does seem likely, given the amount of money at stake and differences in legal philosophies in state and Federal courts across the region that more than a single case will be brought (assuming

the laws are not struck down). Here it is assumed that total legal costs to the region's government's will be $20 million, although the actual amount could easily be less, or more.

Others in the food system are potentially open to law suits, particularly if there is an issue such as a mis-labeled product. The 'model' law does remove some of the direct liability under the law from the sector participants by allowing them to rely on a written statement from suppliers that the products were grown/produced "without the knowing or intentional use" of genetically engineered inputs.[74] Predicting how those statements were be interpreted in legal proceedings is beyond the scope of this analysis. In any case legal costs would not be ongoing.

D. Region implementation costs

Under any law, state agencies will be responsible on a state by state basis for developing the implementing regulations and enforcement system. Those are startup costs. Annual responsibilities will involve testing and conducting audits. For Washington State the estimates of those costs under the proposed Initiative 522 summed to $ 3,368,000 over the initial six years, of which about three fourths represented annual costs.[75] Costs for Oregon's Measure 27 (which was voted down in 2002) are notably higher, but do contain a large allocation for sampling in restaurants, which would not be required under the 'model' legislation.[76] The Washington State sum comes to $675,000 annually. The startup costs are not annualized, but they are largely consistent over the six year estimate period. The Northeast though has 9.2 times the population of Washington so the costs need to be adjusted to account for the larger number of samples and audits which must be taken in the region. Adjusting the annualized costs by 9.2 (the development costs are assumed conservatively to be population-neutral) gives an annualized value of $6.2 million.

E. Aggregate other costs

The aggregate of other costs is entered as one dollar per capita annually.

VI. AGGREGATE COST ESTIMATIONS

HIGHLIGHTS: Calculating the annual midpoint family of four cost across the three labeling compliance options comes to $800, with a very large range, $38 – 1,556. That high range implies that many Northeasteners will choose the organic option which, due to its high cost, seems unlikely. Alternatively, surveys results can be used to distribute the sales across the options. That approach yields a midpoint value of $208 for the four person family, or $3.3 billion annually for all Northeasteners. Actual costs will depend on how consumers respond to the labels – whether consumption of labeled products declines or prices must be lowered as is predicted by studies and surveys – and the decisions of distributors and supermarket managers to discontinue some products. The labeling change if evoked will be so large as to cause food

system changes which cannot be fully predicted at this time but surveys and experiences from Europe suggest that labeled GM products are more likely to disappear over time.

Tables 4 – 9 preceding provide estimates of additional costs to Northeastern food consumers under the proposed labeling law using different scenarios. The purpose of this section then is to provide an aggregate estimate of cost increases for State residents. That estimate though cannot consist simply of an aggregation of the tabulated costs for they represent alternatives so that a simple summation would constitute double counting. That is, since the law can be satisfied either by labeling (with its associated costs) or by substituting non-GM components so that labeling is not required, adding the two would result in a meaningless figure. The initial approach to computing an aggregate cost then consists of selecting a midpoint of the several estimates and using that as a representative cost, along with the associated cost range. Those figures are presented in Table 10.

Table 10: Aggregate midpoint and cost range for costs associated with a Northeast regional GM labeling law

METHOD	Annual cost inc. per capita $ L	MIDPOINT	H
Labeled*	8.50	9.00	9.20
Substitute non-GM ingredients inc. IP costs**	11	57	103
Substitute organic ingredients inc. IP costs***	90	239	388
Other, including all state regulatory costs****	1.00	1.00	1.00
AGGREGATE per capita (include regulatory costs) $	9.50	200	389
AGGREAGRTE family 4 (include regulatory costs) $	38	797	1,556
AGGREGATE region $	603m	12.7b	24.7b

Sources: * Table 4 and Section V.B.
** Tables 6 & 9 and Section V.B.
*** Tables 7 & 9 and Section V.B.
**** Section 5.D

These data though would be difficult to interpret on an operational basis – what portion of a post-law foods will be labeled as containing GM ingredients, what portion will remain unlabeled with non-GM ingredients, and what portion will use organic ingredients? That is, we are asking if there is additional information indicating how future customers in a GM product labeled world might distribute their purchases among the three available options, labeled, substitute non-GM

ingredients and substitute organic ingredients. For organic foods, currently about four percent of sales, purchases are projected not to exceed 10 percent. The post-labeling shares of labeled and non-GM product are more difficult to project. There is though some survey information which provides a guide.

Across multiple surveys across time responses indicate that around 50 percent (range 49 – 57%) of food buyers would be 'less likely' to purchase labeled GM foods. Those survey results are consistent with multiple studies which have found that when given a choice between conventional and GM foods, consumers have a strong preference for the conventional variety.[77] Considered from another perspective and using a different methodology, studies indicate consumers are willing to pay 14 percent less for the same products once labeled. That would result in a loss of 14 percent of the revenue from labeled products,[78] which would greatly reduce their viability in the competitive food industry.

From the perspective of the analysis here, the survey data are more applicable than the reduced value of labeled foods. Using those survey figures, and anticipating 10 percent of consumers would switch to organic foods, then 40 percent of shoppers would be expected to purchase unlabeled foods, which is to say foods produced with non-GM ingredients. These figures allow a 'weighting' of the cost estimates presented above (Table 10):

- 10 percent organic
- 40 percent non-GM ingredients, and
- 50 percent labeled using GM ingredients

The resulting calculation presented in Table 11 shows midpoint annual aggregate costs for Northeast residents of $3.3 billion, with a range of $1.1 to $5.4 billion. Per capita costs are near $50 with per family costs in the $70 – 340 range.

Table 11: Weighted aggregate labeling legislation costs for Northeast food consumers

METHOD	WEIGHT %	Weighted Annual cost inc. per capita $ L	MIDPOINT	H
Labeled	50	4.25	4.25	4.50
Substitute non-GM ingredients inc. IP costs	40	4	23	41
Substitute organic ingredients inc. IP costs	10	9	24	39
Other, including State regulatory costs		1.00	1.00	1.00
AGGREGATE per capita $		18.25	52	85.50
AGGREAGRTE family 4 $		73	208	342
AGGREGATE region $		1.1b	3.3b	5.4b

Sources: Table 10; see text for weights

These costs reflect the addition of consumer choice through the availability of both labeled and unlabeled (non-GM) food products. It is possible that over time consumers and/or the food industry will decide some options are not viable and they will disappear from food stores. That will reduce system costs at the expense of consumer choice. If the discontinued items are from the to-be-labeled group (that is, contain GM ingredients over the allotted amount) then there will be limited system savings on warehousing, etc. (see Table 10 first line) but overall higher costs due to the more costly non-GM ingredients. If the discontinued items are from the unlabeled, non-GM group then ongoing costs to Northeasterners of a labeling law will be relatively modest. However experiences from Europe suggest that once GM products are labeled they are not selected and disappear from the marketplace, resulting in higher costs with no net enhancement in consumer choice.[79]

Given the information available now on product availability, the range of estimates computed as midpoints for a family of four is still large, from $ 208 up to $ 797. The midpoint of that range is just over $ 500 for that four person family in the region. That is the best current estimate until more is known about which products will and will not survive in the market, for many seem likely to disappear. The more of the survivors are labeled the costs will be lower compared to the case where they are unlabeled non-GM containing products.

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[7] State of New York, 3525—B, Jan. 28, 2013.

[8] Northbridge Environmental Management Consultants, "The Genetically Engineered Foods Mandatory Labeling Initiative". July 25, 2012.

[9] Northbridge Environmental Management Consultants, "Washington State Initiative No. 522". Sept. 16, 2013.

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