



# Agricultural and Resource Economics ARE UPDATE

Giannini Foundation of Agricultural Economics, University of California

Vol. 23, No. 2 Nov/Dec 2019

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## Preferences for GMOs: Do Purchasing Patterns Differ from Voting Behavior?

Scott Kaplan, Gina Waterfield, and David Zilberman

**In 2012, California voted “no” on Proposition 37, which would have required special labeling on all foods containing genetically-modified (GM) ingredients. We examine the relationship between willingness to pay for products that avoid GM ingredients, and willingness to vote in favor of regulation for these products.**

Many consumer goods are produced using controversial technologies that receive mixed acceptance from the general public due to perceived negative consequences or risks. These technologies are particularly prevalent in the food industry, with examples including the application of pesticides, irradiation, and the use of antibiotics and artificial growth hormones in dairy production.

One such technology is genetic modification, which has been a complex issue in the case of food production. Studies have shown that genetic modification has increased yields by 5–30%, reduced toxic pesticide use between 10–70%, and reduced commodity prices by 5–35% for several staple crops. At the

same time, mixed messaging about perceived health and environmental risks has been widespread, including comparisons to “Frankenfood” and uncertainty over potential environmental consequences (e.g., crop disease resistance).

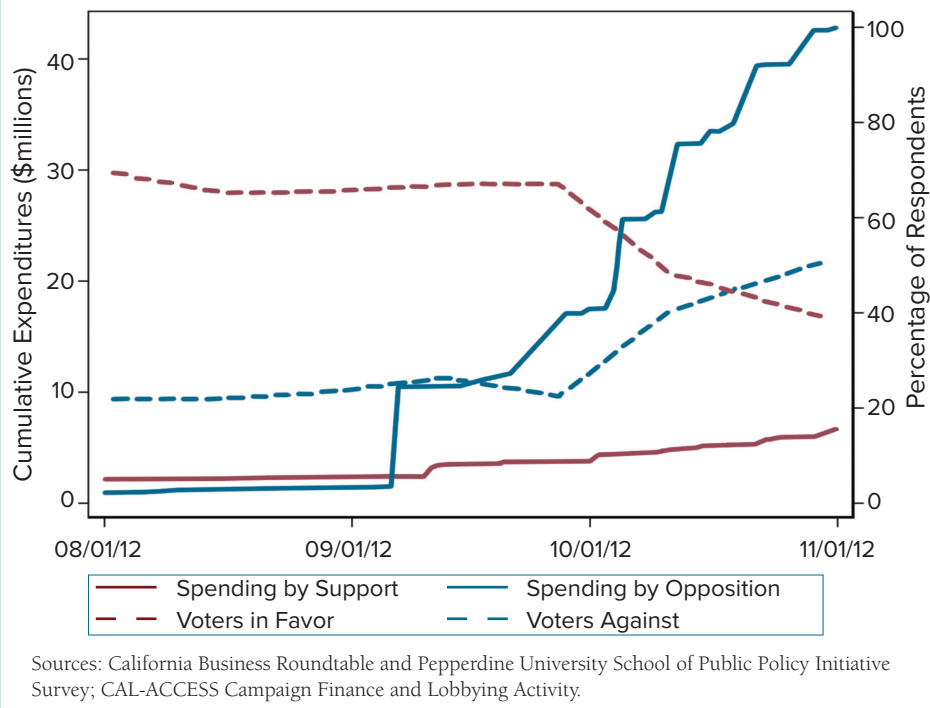
In many instances, individuals are able to express preferences for or against controversial technologies both through purchasing behavior as well as voting decisions on referendums. This has been the case with foods containing genetically modified (GM) ingredients, wherein the consumer setting, individuals can pay a premium for GM-free food. In the referendum setting, voters can choose to support more stringent regulation of GM technology.

We examine a real referendum—Proposition 37—that was voted on in California in November 2012 and would have required mandatory labeling on all foods containing GM ingredients. Our study used an online survey tool to poll over 700 California residents in the weeks leading up to the 2012 election. We use the responses to compare the impact of income, perceived private health risk, and perceived environmental risk on individual willingness

to pay (WTP) for GM-free food as well as on willingness to support different types of regulation on food containing GM ingredients. While our sample is close to representative of the California voting population by the pool of potential respondents was limited. Thus, our survey sample represented slightly more educated, wealthier, and less racially diverse individuals than the California population as a whole. However, there was enough variation in these characteristics to account for their impact on our analysis.

This analysis is important in developing a clear empirical understanding of how individuals act as consumers versus voters, and how these actions may differ from what to expect from a rational individual. In a policy setting, this can help inform the way we frame propositions surrounding controversial technologies and the impacts of such referendums on purchasing decisions depending on consumer demographics and beliefs. Importantly, in the case of poorer individuals, referendums may be the only feasible way to express aversion towards controversial technologies that may be cheaper.

**Figure 1. Proposition 37 Cumulative Campaign Spending and Pre-Election Poll Results**

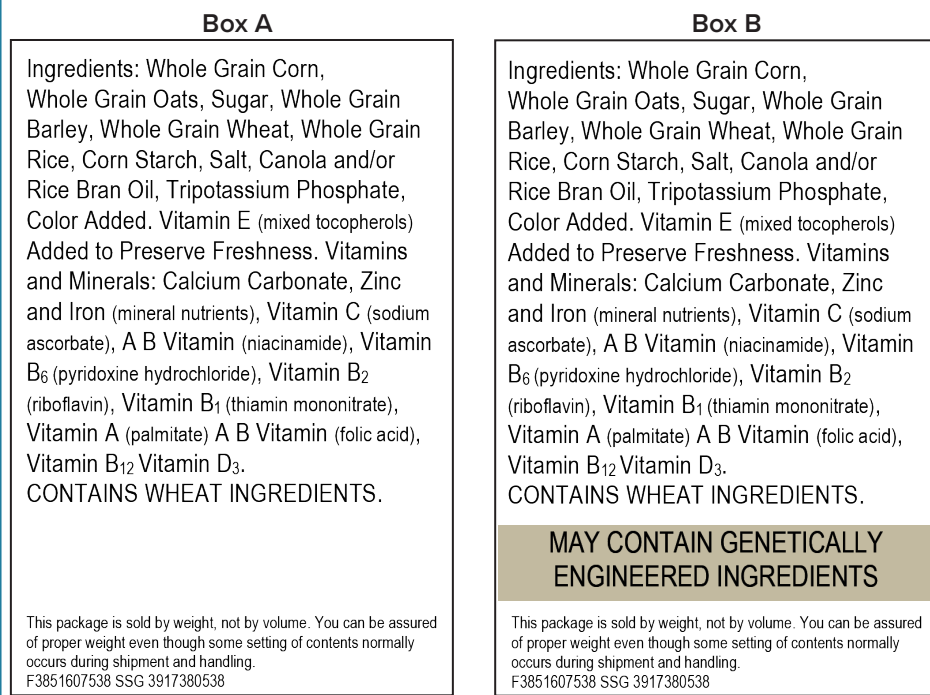


## Purchasing versus Voting Behavior

While purchasing GM-free foods and voting for more stringent regulation on labeling foods containing GM ingredients are both indicative of aversion to this technology, the inherent decision-making process by individuals is

substantially different. A consumer’s purchasing decision primarily affects their individual well-being and has little impact on market-wide use of a technology. On the other hand, a vote for more stringent regulation is intended to have market-wide effects, even though an individual vote is likely to have little impact.

**Figure 2. Label for GM-Free versus GM Cereal: Framing for Survey Question Asking about Purchasing and Voting Behavior**



Additionally, individuals face very different constraints as consumers than as voters. It may be that poorer consumers cannot afford to state their aversion to GM foods through purchasing decisions. On the other hand, they may vote without monetary constraints, and can express their aversion to this technology at the ballot box.

In order to capture differences in these decisions and elicit WTP for a GM-free product under a mandatory labeling scenario, we presented survey respondents with the image shown in Figure 2. There are no differences between these two product labels for a popular breakfast cereal, with the exception that one contains the phrase “MAY CONTAIN GENETICALLY ENGINEERED INGREDIENTS.” Respondents were asked to provide their maximum WTP for the GM-free product in addition to the \$1.99 shelf price.

After the WTP question, we asked individuals how they planned to vote on Proposition 37, which would require mandatory labeling of GM foods similar to the format seen in Figure 2. We also provided them with a description of the actual proposition appearing on the ballot. Our survey timing was advantageous since we distributed it only a couple of weeks before the election, and thus the actual impact of the referendum was salient. Finally, we asked a more hypothetical question on whether individuals would be supportive of an outright ban on food products containing GM ingredients. This provided a more extreme viewpoint on GM products as a whole.

In addition to individual purchasing and voting responses, we collected a rich set of demographic data, as well as prior knowledge and beliefs about GM foods, including perceived health and environmental impacts. Specifically, we asked individuals to self-report how much they knew about the use of GM ingredients in production processes on a scale of 1 (no knowledge) to 5 (very well-informed). More objectively,

what percentage of packaged grocery store food they thought contained GM ingredients. We also asked them to rate how safe they perceived GM food to be for individual health, which was a proxy for the individual consumption benefits (or costs), and for the environment, which was a proxy for public benefits (or costs).

Our findings suggest that there is a wide distribution of WTP for GM-free food. Among the respondents, 55% reported zero additional WTP. On the other hand, 20% of respondents were willing to pay more than a \$0.50 premium on top of the base price of \$1.99. These are likely individuals who choose instead to purchase organic products, which are required to be GM-free. The mean WTP was \$0.35, or 18% of the base price, which falls slightly towards the conservative end of the wide range of estimates found in the literature.

There was also significant variation in beliefs over both the individual health impacts (33% believe GM foods to be fairly unsafe or unsafe for consumption, while 45% believe them to be fairly safe or safe) and environmental impacts (43% believed them to be unsafe, while 36% believed them to be safe). Table 1 provides a detailed breakdown of characteristics of individuals by voting preferences and WTP grouping (low, moderate, and high). We identify one notable descriptive statistic from this table in the group of respondents that would be in favor of both a “Label and Ban” – of the 268 applicable respondents, 97 were not willing to pay any additional premium for GM-free food. This suggests that there is a substantial number of individuals exhibiting extremely strong preferences against food containing GM ingredients with their voting behavior, but none whatsoever as consumers.

In addition, we observe that 68% of respondents believed that the percentage of non-organic, packaged food at

**Table 1.** Mean Respondent Characteristics, by Voting Choices and WTP

WTP	N	Age (Years)	Education (Yrs)	Income (\$1,000)	Passed Test (%)	Safe to Consume (Belief Scale 1 to 5)	Safe for Environment
<b>No Label or Ban</b>							
Low	213	54	16	53	28	4.3	4.2
Mid	24	53	16	48	21	3.8	3.5
High	8	51	17	43	13	4.3	4.0
All	245	54	16	52	27	4.3	4.1
<b>Label Only</b>							
Low	69	48	16	45	32	3.9	3.6
Mid	29	48	16	55	41	3.4	3.1
High	27	42	16	50	30	3.3	2.7
All	125	47	16	48	34	3.6	3.3
<b>Ban Only</b>							
Low	17	51	15	43	18	2.6	3.3
Mid	2	55	15	44	50	4.0	3.0
High	5	40	15	51	0	2.0	1.7
All	24	49	15	45	17	2.6	2.9
<b>Label and Ban</b>							
Low	97	50	15	43	38	2.2	1.9
Mid	84	44	15	37	30	2.5	1.9
High	87	42	16	43	44	2.2	1.8
All	268	46	15	41	37	2.3	1.9
Opted Out of WTP	53	48	16	53	36	2.1	1.9
All	715	49	16	47	32	3.2	2.9

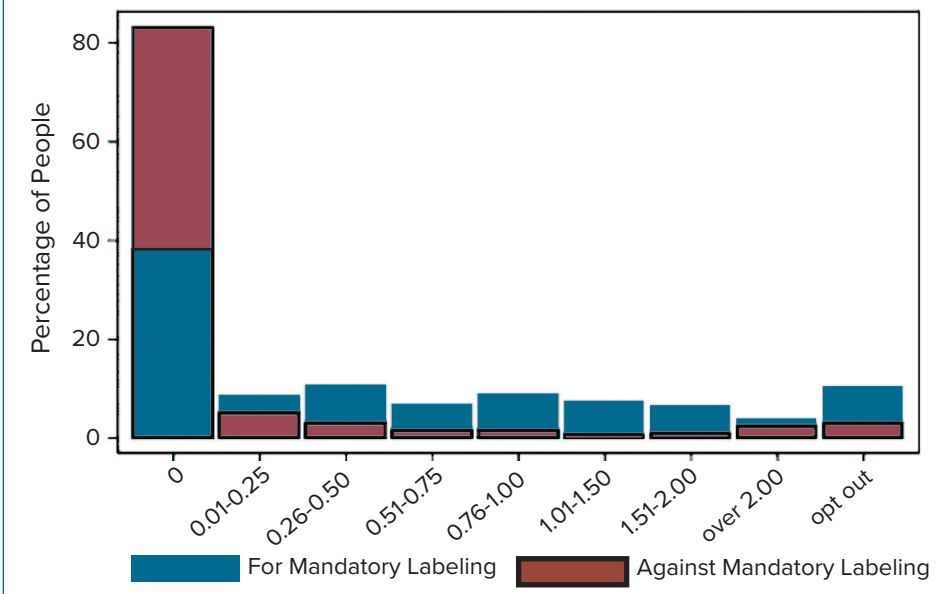
Note: “Passed Test %” is the percentage of respondents who correctly believed that over 60 percent of packaged non-organic food sold in grocery stores contained any GM ingredients; “Safe to Consume” is the mean value respondents gave for how safe they believe GM food is for human health (1 for “very unsafe” to 5 for “very safe”). “Safe for Environment” is the mean value respondents gave for how safe they believe GM food is for the environment (1 for “very unsafe” to 5 for “very safe”).

grocery stores was between 0–60%, when in fact the true percentage is over 70%, suggesting that a sizable majority of individuals may underestimate their true consumption of food containing GM ingredients. However, it is not clear in which direction this might bias WTP—once informed, individuals may express higher WTP for GM-free products if they have firm beliefs about perceived negative consequences of foods with GM ingredients. They may exhibit lower WTP if they’ve been eating these foods all along and have not experienced negative health impacts.

Figure 3 above illustrates the WTP patterns by those who would have voted for mandatory labeling versus those voting against this regulation. One can see that over 80% of individuals voting against mandatory labeling had zero WTP for the GM-free product, while only about 40% of individuals voting for mandatory labeling had zero WTP. Thus, among individuals with positive WTP for the GM-free product, substantially more of them would also vote for mandatory labeling.

Our results also uncover some interesting relationships between consumer

**Figure 3.** Willingness-to-Pay by Willingness to Vote in Favor of Mandatory Labeling



and voter decisions. Notably, we find that consumers with low WTP for GM-free food have a substantially higher probability of voting in favor of mandatory labeling (almost 60% larger) than high WTP consumers, suggesting that low-income voters may choose to represent their dislike for GM ingredients through voting behavior.

Additionally, only consumers with “moderate” WTP appear to care about perceived private health benefits of GM-free foods in their decision to vote for mandatory labeling. Among low and high WTP groups, perceived private health benefits do not impact their voting behavior, but for very different reasons. Low WTP individuals should not be concerned about the perceived private health benefits of GM-free food since they will not purchase these products, while high WTP individuals favor the regulation regardless of their other characteristics.

## Conclusions

In cases of products using controversial technologies, individuals in referendum states often have the ability to make both purchasing and voting decisions. Genetically modified ingredients in food is one such technology, and

individuals in California are able to express preferences both as consumers (by purchasing GM-free foods) and as voters at the ballot box. For example, in November 2012, there was a vote on Proposition 37 to require labels on all foods containing GM ingredients, which did not pass.

Our findings suggest that there is a positive relationship between WTP to avoid food containing GM ingredients and voting for mandatory labeling of these foods. This effect is driven by many factors across different sub-groups of consumers based on their WTP, including income, perceived private health benefits, and perceived environmental benefits associated with GM-free food. In particular, individuals who are uncertain or ambivalent about the environmental safety of food containing GM ingredients will express greater aversion to these foods as voters than as consumers.

We also find that low-income individuals are more likely to vote in favor of labeling regulation relative to their WTP, while high-income individuals with low WTP are unlikely to support regulation. These results suggest incredible heterogeneity among individuals, which supports the case for differentiated products in the market

with the reasonably displayed information. Consumers have a right to know what is in their food, and a label that provides information about GM ingredients, while at the same time not standing out in a meaningful or negatively framed manner (i.e., as seen in Figure 2), may improve welfare.

This study is an important step in understanding how individuals respond to controversial technologies as both voters and consumers. It may be important to consider how referendums and propositions are framed, especially in the context of controversial technologies that exist for purchase. It also supports the importance of having referendums so individuals who are unable to express avoidance behavior through purchase decisions can do so at the ballot box. We should also encourage nutrition education that informs consumers about potential health, environmental, and economic gains from GM products.

### Suggested Citation:

Kaplan, Scott, Gina Waterfield, and David Zilberman. “Preferences for GMOs: Do Purchasing Patterns Differ from Voting Behavior?” *ARE Update* 23(2) (2019): 1–4. University of California Giannini Foundation of Agricultural Economics.

### Authors’ Bios

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### Further Reading

Carter, C.A., et al. 2012. “California’s Proposition 37: Effects of Mandatory Labeling of GM Food.” *ARE Update* 15(6): 3–8. University of California Giannini Foundation of Agricultural Economics.