Lessons from the California GM Labeling Proposition on the State of Crop Biotechnology

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1. Introduction

In the California State election on November 6th, 2012, Proposition 37 was introduced to require mandatory labeling of food sold to consumers made from plants or animals with genetic material changed in specified ways. This measure failed to pass with 51.5% of California voters opposing it and 48.5% in favor after proponents of the legislation led in the polls by a large margin in the early days of the election campaign.

Figure 1: Change in Voter Preference for the Labeling Proposition

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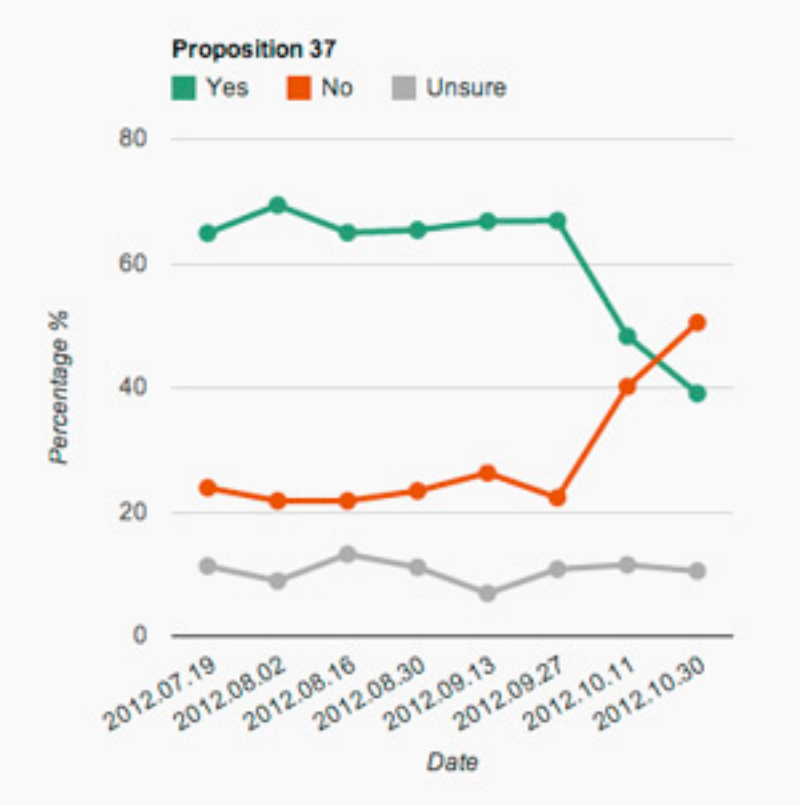

Source: Huffington Post

The campaign and the public debate surrounding genetically modified [GM] foods prior to the election was just one battle in a long struggle to shape policies that would impact the fate of crop biotechnologies in the US. The intellectual exchanges, rhetoric and tone of the campaign, as well as the result of Proposition 37 provides insight on biotechnology in the context of agriculture. This chapter analyzes some of these lessons and discuss their implications for the future of agricultural biotechnology.

2. Political Economy of and Willingness to Pay for Transgenic Technology

Agricultural biotechnology was introduced in the early 1990s, and encountered significant resistance that resulted in the imposition of strict regulation and

practical bans in Europe and Africa. Graff, Hochman, and Zilberman (2009) argue that these strict regulations are the results of political economy processes where different interest groups are using their political and/or economic capital to affect policy choices either directly by influencing policymakers or indirectly by affecting public perception to impact political choices, including voting and campaign contributions. The stakeholders involved in the political debate surrounding agricultural biotechnology include supporters such as companies that produce GM related products like Monsanto, technology startups that develop many of the innovations, scientists and universities conducting research in this area, farming sectors that use GM, and some of the public. Conversely, opponents of GM technology may come from companies without a strong GM portfolio, for example companies that sell pesticides, and environmental groups. Farmers tend to have mixed attitudes. Some farmers support GM because of its potential to alleviate pest pressure, enhance productivity and improve product quality. Other farmers oppose it, especially those that do not benefit from GM directly or because of concern about increases in supply and the resulting decline in prices. Paarlberg (2008) found that because GM technology originated in the US and benefited American companies, it has more support in the US than in Europe (this is reflected by heavy GM regulation in the EU). Moreover, countries within the US sphere of influence are more likely to adopt GM than countries that lie more in the European sphere of influence.

The political economy literature suggests that the different interest groups will adjust their actions to affect policy choices according to their institutional setup in various locations. In California, the proposition mechanism can set major policy

directions, and different interest groups frequently use it to promote their own benefit. In the past, environmental and other interest groups introduced a proposition to ban pesticides (Proposition 17, "The Big Green Initiative of 1991") which failed. The labeling initiative continues along this tradition, and we expect both supporters and opponents of GM to reveal themselves through their monetary and intellectual contributions to this initiative. The ultimate fate of the proposition, however, lies in the decision-making power of the voting public and thus it is important to understand their prior beliefs and the factors that affect their voting behavior.

There is a large body of literature on the public perception of GM. Early studies (Gaskell et al. 1999) emphasized that the big difference in perception in the US versus Europe is a result of differences in the electorate's trust in the food safety regulatory system and is reflected in differences in media coverage and attitudes towards GM. Heiman, Just, and Zilberman (2000) found that gender, education and religious beliefs affect attitudes towards GM. In particular, more religious individuals tended to oppose GM, while individuals with more education were more likely to support it. Overall they identified negative prior attitudes towards GM. The negative prior preferences consumers have towards GM food were reflected in their willingness to pay a premium for the labeling of GM-free food (Lusk and Coble 2005). Studies have found that price discounts can sway consumers to choose GM products over traditional food despite negative priors (Huffman et al.2004).

Consumers are quite heterogeneous, and the amount that they are willing to discount GM food compared to conventional food varies significantly and may be

correlated to education, culture, gender, income, and the type of GM food considered. Furthermore, the discount for GM products may vary depending on the manner in which consumers' opinions are being solicited (Lusk et. al 2005) as well as the prior information provided to consumers about the impact of biotechnology in general and the products they consider. Colson, Huffman, and Rousu (2011) suggest that consumers may actually be willing to pay a positive premium for GM products that have traits that are beneficial to health. Hamilton, Sunding, and Zilberman (2003) found that the wide heterogeneity in consumer attitude is also manifested in the case of pesticides—both in terms of willingness to pay for pesticide-free food and to vote for a proposal to ban pesticides. Their findings are consistent with those of Aerni, Scholderer, and Ermen (2011) who compared voting with willingness to pay for GM-free food. They found that individuals who voted to ban the use of chemical pesticides or GMO are not necessarily the ones with highest willingness to pay to avoid GM with 'undesirable' features. This suggests that attitudes towards GM represent attitudes towards food safety and environmental sustainability, and when assessing both the environmental effects and human health risk of GMO, attitudes actually vary among the public.

Kahneman and Tversky (1984) suggested that judgments and decisions are affected by framing of different alternatives. When a technology is presented in a positive way, it will increase the likelihood of a vote in favor of it or increase people's willingness to pay for it. Heiman and Zilberman (2011) used experiments to assess willingness to purchase GM products and found that, as expected, both positive and negative framing affected likelihood of purchase at a given price (or

discount compared to non-GM), but negative framing had a stronger impact in deterring consumers. Responses were much more affected by magnitude of the discount for GM products rather than the framing, which suggests that for much of the population, costs may have a stronger impact on decisions regarding GM products than other product features. Heiman and Zilberman's (2011) work implies that negative prior perceptions about GM technology that can be amplified by negative information but can be, to some extent, reduced by positive information and price discounts. Thus new information about the impact of GM and the extent that people have to pay for the implementation of labeling, may affect their vote.

3. Conceptual Framework of Voting for Labeling

Before presenting the specific details of Proposition 37, we develop a conceptual framework that incorporates some of the major features mentioned in the literature, namely heterogeneity of the public in terms of willingness to pay (WTP) to avoid GM products (in this case, through labeling), the cost of implementation of labeling, and the possible comparison of mandatory labeling with voluntary labeling. The California proposition is an almost ideal application of the median voter model, and thus we use it for our analysis (Downs 1957). The model of course is simple and stylized, but it can provide some insight into the factors that determine the outcome and to what extent the proposition results in efficient resource allocation.

We assume society contains a large number of voters, each of them having a different WTP for labeling of GM products in food. This WTP is the additional

amount consumers are ready to pay annually in terms of higher prices of food, inconvenience, etc. Let WTP be denoted by W, which is distributed from $0\ to\ \overline{W}$. Let $F(W)$ be the cumulative distribution of the WTP for labeling among a heterogeneous population. Specifically, if the population is ordered according to WTP, the fraction of the population that is willing to pay an amount equal to or greater than a specific W is $F(W)$. Note that $F(\overline{W}) = 1$, at the highest level of WTP the cumulative distribution is equal to1. If α is a fraction between 0 and 1, then we will define W_α as the maximum amount that α fraction of the population is willing to pay for labeling. If, for example, $W_{0.5} = \$100$, then half the population with a lower WTP for labeling would pay $100 for labeling. The fraction of the population with WTP above a certain value W is thus $1 - F(W)$.

First suppose that mandatory labeling will increase the price of food by ΔP_M, and suppose that the public is facing a proposition to introduce mandatory labeling of GM food products. Let's assume that individuals will vote in support of the proposition if their WTP is greater than the increases in the price of food due to labeling. Thus the support for the proposition is $1 - F(\Delta P_M)$ and the proposition will pass if $1 - F(\Delta P_M) \geq .5$ or if $F(\Delta P_M) < .5$, namely, $\Delta P_M < W_{.5}$, the median voter has WTP that is smaller than ΔP_M.

Thus if voters' WTP were fixed, campaigning would serve no purpose. Voters seemed uncertain about both their WTP and the cost of mandatory labeling. Let $F^0(W)$ be the initial distribution of WTP, and ΔP_M^0 the initial estimate of the per capita cost of mandatory labeling. Campaign efforts from both sides aimed to modify

the distribution of the WTP and the estimate of ΔP_M. The supporters of the proposition aim to convince the voter to reduce their perceived ΔP_M and increase their WTP. Let $F^1(W)$ be the cumulative distribution of the WTP , and ΔP_M^1 is the estimate per capita cost of the mandatory labeling after the campaign. The proposition has a lower probability of passing if $\Delta P_M^1 > \Delta P_M^0$, namely if the *perceived* cost to the consumer because of the proposition per capita *increased* due to campaign efforts. Another reason for the reduced probability of the proposition passing is that campaign efforts modified the distribution of WTP, in particular, $W_{.5}^0 > W_{.5}^1$, the median voter's WTP for labeling was reduced due to the campaign. A campaign may change the outcome of a vote from support to rejection of the proposition if $W_{.5}^0 - \Delta P_M^0 > 0$ but $W_{.5}^1 - \Delta P_M^1 < 0$.

If the proposition had failed, the consumer could obtain information on GM food through voluntary labeling. In this scenario, the people who do not care much about GM food do not need to pay for the labeling, but the people who want to avoid GM food have the option to do so by paying extra price ΔP_V. It is plausible that $\Delta P_V > \Delta P_M$ because the cost of mandatory labeling is distributed among more people. If the voters are aware of the option of voluntary labeling, as long as $\Delta P_M < \Delta P_V$, individuals with $W > \Delta P_M$ will vote in favor of the mandatory labeling, but this option is not likely to affect the outcome.[6]

One might ask whether the result of the voting procedure efficient in an economic sense? We attempt to answer this question partially. First, consider

[6] If for some reason some individuals assume that the cost of mandatory labeling is greater than that of voluntary labeling, they may vote against mandatory labeling.

whether the passing of the proposition will improve the welfare of the voters (it is a partial measure of the efficiency effect). Assume that in the initial scenario (benchmark scenario), there is **no mandatory or voluntary labeling,** and the initial voter surplus is zero. The result of the voting is improved efficiency in the narrow sense if it improves the surplus of the voting population. If the proposition passes (Yes), the change in the average voter surplus is:

$$\Delta VS_Y = \int_0^{\bar{W}} (W - \Delta P_M)\, dF(W)$$ [7]

This surplus change is the difference between the willingness to pay of each individual minus the extra costs multiplied by the measure of the relative size of the population with a given willingness to pay W (by $dF(W)$, which is the differential of the cumulative distribution at W). This change can be decomposed to:

$$(1)\ \Delta VS_Y = \int_0^{\Delta P_M} (W - \Delta P_M)\, dF(W) + \int_{\Delta P_M}^{\bar{W}} (W - \Delta P_M)\, dF(W)$$

The first element is the surplus of the people that oppose the proposition (their willingness to pay is below ΔP_M, and this term is negative) while the second element is the surplus of the people who support the proposition (their willingness to pay is above ΔP_M). If the sum is positive, the proposition will increase the welfare of the voters. Note that the proposition will pass if:

$$(2)\ \Delta SY = \int_{\Delta P_M}^{\bar{W}} dF(W) - \int_0^{\Delta P_M} dF(W) > 0$$

[7] This is an average because we weigh the welfare change for each WTP group the probability weight of this group.

Where ΔSY is the difference between the fraction of those who support the proposition and those who oppose it. Note that the proposition may fail because more people will oppose it, yet it may improve the welfare of the voting public if it passes (namely $\Delta SY < 0$ and $\Delta VS_Y > 0$), if the average gain from the people that support the proposition is sufficiently larger than the average loss of the people who oppose it. Under such a hypothetical situation, failure of the proposition is not improving welfare.

Suppose the proposition fails but increases awareness, leading to a voluntary market. Then the welfare effect on the voting public is:

$$(3)\ VS_N^{VM} = \int_{\Delta P_V}^{\bar{W}} (W - \Delta P_V)\, dF(W)$$

Compared to the current situation, the people who have high WTP ($W > \Delta P_V$) gain from the voluntary market, but the rest of the population is unaffected. So obviously a voluntary market is an improvement relative to no labeling whatsoever. The passing of the proposition is superior from a welfare perspective to having a voluntary market if:

$$\Delta VS_Y - VS_N^{VM} =$$

$$(4)\ \underbrace{\int_0^{\Delta P_M} (W - \Delta P_M)\, dF(W)}_{(a)} + \underbrace{\int_{\Delta P_M}^{\Delta P_V} (W - \Delta P_V)\, dF(W)}_{(b)} + \underbrace{\int_{\Delta P_V}^{\bar{W}} (\Delta P_V - \Delta P_M)\, dF(W)}_{(c)} > 0$$

Equation (4) presents the change in the welfare of the voting public from the passing of the proposition **relative to voluntary labeling**. It is the sum of the loss of individuals with low willingness to pay for labeling (group a in 4), the gain of people with modest WTP for labeling (group b, with $\Delta P_M \le W \le \Delta P_V$), and the gain of the

group of people with relatively high WTP for labeling (group c). This last group gains less from the passing of the proposition compared to voluntary labeling versus non-labeling because their gain is only the reduction in the per unit cost of labeling as you switch from voluntary to mandatory labeling. Comparing equations (1) and (4) suggests that the existence of feasible voluntary labeling can affect the intensity of support for mandatory labeling.

The complete impact on social welfare should also consider the impact on groups outside of the voting public, but this analysis is beyond the scope of this framework. The debate about the proposition does recognize the existence of these external effects, as we will show below.

4. Background on Proposition 37 to Introduce Mandatory Labeling in California

California's Proposition 37 required the labeling of certain plant and animal foods containing GM ingredients or processed using GM technology. While the proposition was designed to apply to most types of food , there were several significant exceptions. Generally, raw or processed food made from genetically modified plants or animals requires a label. Meats produced from animals fed GM feed or injected with GM materials, medicines produced using GM technology, foods sold in restaurants for consumption in-house, alcoholic beverages, and raw foods unintentionally produced with GM materials (seeds) were to be exempt from the proposition. These exemptions reflect the reality that most grain-fed meat products are produced from GM feed. Thus the proposition does not label existing traits that

are mostly used for animal feed, but erects barriers for possible GM traits in crops for human consumption. The proposition also prohibits labeling GM products as 'natural', and thus is consistent with the exclusion of GM as organic.

Proposition 37 also states that there will be increased costs incurred by the state in monitoring and enforcing this new mandatory labeling system. According to the proposition itself, "increased annual state costs ranging from a few hundred thousand dollars to over $1 million" will be required in order to "regulate the labeling of genetically engineered foods" (California Voter Guide 2012). These regulations range from those on GM research facilities and farm-level monitoring of crop treatment, all the way to processors of food and manufacturers of labels. While these direct costs are significant, indirect costs associated with yield decreases as a result of reduced GM technology used in production may result in additional costs to the government and to the consumer.

Enforcement of the proposition would take place at the county level, with the California Department of Health and Safety bearing the responsibility. The enforcement standards for food labeled under Proposition 37 are actually much stricter than the USDA organic standards. According to Colin Carter (2012) under the mandatory GM labeling requirement conventional foods would be subject to testing at certain processing levels to check for 'accidental GM' ingredients all the while foods labeled 'organic' are subject only to testing at the farm level, bypassing additional testing thereafter. In addition, the onus of enforcement is largely on the consumer, which may give way for citizens suing 'on behalf of the general public', where companies responsible for the violation would not be given any advanced

notice about the allegations nor the opportunity to address the issue before penalties (Cross 2012). Fines would amount to $1,000 per day for companies found to be violating the labeling system (Hiltachk 2012). The legal implications of this are extremely significant. Much of the involvement of the legal system will not come through lawsuits against labeled GM foods, but rather against conventional food that is not labeled but contains some GM ingredients, even if by accident through processing (Hiltachk 2012).

Proposition 37 had numerous supporters, headed by the 850,000 member Organic Consumer Association, which was the largest support donor with over $1.3 million spent. Other notable donors include Nature's Path (a non-GMO packaged food maker which raised over $650,000), Chipotle Mexican Grill, Whole Foods Markets, and the California Democratic Party. Overall, the supporters of Proposition 37 raised $8.7 million dollars. While the supporters were ahead in the polls for much of the debate over the proposition, the ability of the opposition to counter with much larger donations had a significant effect on the final outcome. Monsanto provided the largest donation—its outlays of over $8.1 million nearly matched the entire Yes side. Several other food companies donated, including Kraft Foods Global, Hershey Company, Pepsico Inc., General Mills, and the Kellogg Company. Several biotechnology companies, including DOW Agrosciences, Bayer Cropscience, BASF Plant Science, each donated $2 million. Both sides were vying for the support of the media; major newspapers such as the Los Angeles Times, the San Francisco Chronicle, and the Sacramento Bee opposed the proposition for various reasons. Michael Pollen and several other leading food activists were very visible supporters

of the proposition.

It was clear that given the early lead of those supporting labels in the polls the opponents had a chance only if they were able to make a large investment. Indeed they did so; the 'no; side spent $45.6 million versus the $8.7 million on the 'yes' side. The final outcome, however, depended on the evolution of the arguments of the two parties, as presented below.

5. Evolution of the Public Debate

As the political economic literature suggests, the introduction of a new proposition starts a public debate where two camps gradually introduce arguments that aim to enhance the likelihood that their argument will win. The two camps usually introduce their own arguments to the public arena, respond to their opponent's arguments and assess their impacts via polling. Thus there is an ongoing process of mutually learning that is based on feedback and the ability to come up with new arguments that may sway voters. Our perspective on the evolution of the debate surrounding Proposition 37 is based on observing and participating in it and interacting with key players in the campaign.[8] The debate concerning Proposition 37 had three phases.

Proponents of the proposition supported their stance via three main arguments. First they drew on the basic American principle of freedom of information. They noted that over 40 other countries require labeling for GM foods so their citizens can make informed decisions. This was argued to be especially

[8] Kathy Fairbanks, No on 37 and Stacy Malkin, yes on 37.

important as GM food may pose some risk and people have the right to protect themselves. The second line of argumentation aimed to highlight the broadly-held perspective that GMOs do not provide real benefit and simply introduced new or enhanced existing risks. Key points included that GM traits are primarily in crops that are not consumed directly by humans, they do not increase yields or replace pesticides and may be dangerous for the environment and humans. The conclusion was we need more experience to assess their true risks.[9] In addition, the rights to these technologies are held by large agri-businesses and corporations like Monsanto, who capture most of the economic benefits of the technologies and reduce both the freedom to operate and the economic wellbeing of the small farmer.

Opponents of the proposition focused on addressing each of the proponent's claims. First, they disagreed that the proposition addressed the issue of freedom of information; they tried to recast the debate into whether labeling should be mandatory or voluntary. If there is market demand to avoid GM food, then the supplier will provide it and a certification mechanism will be established to label it. They pointed to other examples of voluntary labeling to accommodate consumer preferences, including fair trade coffee, halal, and kosher foods, and even organic foods do not include GM and are certified by the government. The true issue to the 'no side was what would be the benchmark: would it be non-GM, or GM? Opponents of Proposition 37 suggest that including GM as part of the mainstream food is preferable because of its important contribution to the food system.[10]

The opponents also disputed the assertion that GM provides negligible

[9] http://www.carighttoknow.org/facts
[10] Zilberman (2012); http://www.noprop37.com/facts; Alston and Sumner (2012)

benefits, citing studies documenting GM's contribution to increasing food availability without jeopardizing food safety. In particular, they argue that GM provides an alternative means to address pest problems by replacing existing chemical pesticides that pose health risks or to address problems that have are not otherwise managed. Ultimately, GM traits increased output. In developing countries the impact of GM on yields are especially pronounced. In particular there are several studies that show that GM cotton yields are more than 50% higher than conventional crops, corn yields may increase by 20% and soybean yields rise by 30%. A key feature is that GM varieties enabled the expansion of acreage by double cropping (Qaim and DeJanvry 2003, Qaim and Matuschke 2005, Qaim and Zilberman 2003). Furthermore, this supply-enhancing effect of GM caused the reduction in the price of major food commodities of 15-30% and if the Europeans removed the de facto ban on GM some of the recent food price inflations may have been avoided. Thus, the main beneficiaries of GM are poor consumers globally.

Opponents of the proposition cited reports from leading research academies that suggest that GM foods were as safe as conventional foods, both in terms of human health and environmental effects. Furthermore, they argued that one of the main reasons that farmers adopt GM is that it reduces their exposure to toxic pesticides. In response to the allegations that GM primarily benefited big agribusinesses, opponents of Proposition 37 cited results of quantitative studies that reported the benefit of GM foods to be in the billions of dollars, shared among consumers, farmers, suppliers, and industry (Alston and Sumner 2012). They also noted studies that suggested that the excessive regulation of GM actually

contributed to the concentration of the industry and prevented the introduction of new traits with even more appealing properties, including varieties that are more drought tolerant varieties and offer enhanced nutritional content, especially in specialty crops. They noted that the industry was supporting new clearinghouse arrangements to assist small farmers to access GM varieties.

The public discourse about Proposition 37 engaged many media outlets, including print, television, social media, and editorial blogging. Each side provided new information to strengthen their argument. For example, the proponents circulated the results of a French study that found tumors in rats fed on GM corn. But the opponents were swift in their response, publicizing the responses of several academies of science including the National Academy of Sciences, American Council on Science and Health, the World Health Organization, and European Food Safety Authority. The opponents benefited from another fortuitous study from Stanford University that found that organic food has no more nutritional value than conventional food.[11]

[11] http://med.stanford.edu/ism/2012/september/organic.html

Table 1: Proposition 37 polling data

Date of Poll	In favor	Opposed	Undecided
September 17-23, 2012	61%	25%	14%
October 7-9, 2012	39%	30%	31%
October 7-10, 2012	48.3%	40.2%	11.5%
October 21-28, 2012	39.1%	50.5%	10.5%

*[12]

As Table 1 suggests, proponents of Proposition 37 benefited initially from widespread support, with 65% in favor, 25% opposed and 14% undecided; the first phase of the campaign between mid September and early October actually reduced the support for the proposition to 39%, with many voters reporting they are undecided. The fact that people for the first time heard about some of the benefits of GM and, more importantly, that they were presented with arguments that there is no evidence for its negative effects (and actually no evidence that organic is better) may have caused people to rethink their stance.

[12] Poll conducted by the LA Times. http://articles.latimes.com/2012/sep/27/business/la-fi-prop37-times-poll-20120927

The second phase of the public debate began in October 2012. It was clear from the advertisement blitz that the opponents were better financed as their ads were more frequent and were presented through better outlets. In the second phase much of the arguments became 'personal'. The proponents of Proposition 37 emphasized that this was a case where big businesses were attempting to buy the election. The public was asked, 'who do you trust? Monsanto, Pepsi, or the Consumers Union?'[13] Furthermore, it was insinuated that scientists who opposed Proposition 37 were in the pockets of big business.[14] At the same time, the opponents suggested that the proposition was written by lawyers interested in profiting from litigation arising out of violations of Proposition 37 and that these professionals were simply seeking to erect obstacles to the functioning of markets for personal gain.[15]

From our discussion with the individuals behind 'No on 37', it seems that none of the parties benefited from this particular phase of the debate. Nevertheless, one sub-argument promoted by the opponents gained some traction--namely, that the proposition did not arise out of objective concerns about current products (because 70% of GM foods are exempt from this legislation), rather from a desire to slow the biotechnology sector. The opponents of Proposition 37 stressed that GM varieties may help to address climate change and may be economically valuable for California, which tends to be a leader in provision of technology.

The third phase of the debate emphasized the immediate impact of

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[13] http://www.carighttoknow.org/
[14] http://blogs.berkeley.edu/2012/06/06/why-labeling-of-gmos-is-actually-bad-for-people-and-the-environment/#comments
[15] http://www.noprop37.com/facts/

Proposition 37 on Californians. Alston and Sumner (2012), a study by Northbridge Environmental Consulting and Carter et. al., (2012) all presented findings that suggested that Proposition 37 could cause economic hardship. The logic was that its implementation would require the separation of different types of products based on whether or not they contain GM, which would require investment in costly monitoring throughout the supply chain, which may lead some food retailers to limit their product choices in order to avoid the extra cost of compliance. Thus, it was estimated that the extra food cost per family of four would be $400/year. Proponents of Proposition 37 had first introduced the cost argument, arguing that voluntary labeling was unfair because it raises prices of non-GM foods and makes it less affordable for the poor. The opponents used these studies to turned the argument around, reframing the discussion into whether people that are indifferent about GM should pay extra for information that they don't value? When Proposition 37 failed at the ballot box, commentators suggested that this final cost argument played a prominent role in its defeat,[16] which supports our conceptual model which states that if the majority of population does not value the labeling more than the extra cost that it imposes, then it will fail.

6. Conclusion

Proposition 37 originated from an attempt to stall the advances of GM and biotechnology in the California, seeking to drawing on the perception that there is significant public suspicion against the technology and rising awareness and concern about food safety. The initial survey of the public mood presented in this

[16] http://science.time.com/2012/11/06/prop-37-why-californias-ballot-initiative-on-gm-food-is-about-politics-more-than-science/

study suggests that there was a potential for the proponents of the proposition to succeed. Furthermore, there is a large body of literature in economics and other fields that suggests that some consumers may be willing to pay significant premiums for non-GM food. However, in the end the proposition failed. Two main arguments seemed to carry the outcome of the vote: first, flaws in the writing of the proposition created suspicion of its intent; and perhaps more importantly, the claim that implementation would raise food prices for Californians by $400/year per household caught people's attention. To some extent, this was a real experiment on WTP to avoid GM. This experiment showed that among the majority of the populace the WTP was low, suggesting that while some of the perceived objections are widely held, they do not run deeply. Once the public realized the cost of restricting GM, they lost enthusiasm, which suggests that increased education on the benefits of GM and, more importantly, the cost of blocking its use, might bear fruit and help to relax the policies that regulate and restrict GM in other markets.

It seems that if the public faces a serious tradeoff and is exposed to sound argumentation as to why a regulatory requirement is excessive, people will vote against restrictions. This bodes well for the future of GM if its proponents can make a strong case for it, given that California has tended to support environmental causes—California is one of few states that has implemented climate change policies. Another lesson might be simply that money talks and large contributions to political causes can may sway the public, possibly even against sound policy. But the elections in 2012 demonstrated that large spending does not always guarantee a win.

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