The role of risk aversion and knowledge in shaping consumers' preferences towards GMO labelling policies

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Introduction

- Limited research of subjects' actual national policy preferences (ex. Loureiro & Hine 2004)
- Measurement of consumer evaluation of GMO products usually includes:
  - Auctions of food products to evaluate price mark-ups, WTP/WTA
  - Concepts such as acceptance, perceptions, attitudes
- Assume: attitude or approval closely related to economic measures of preferences (Kahneman et al. 1993, Hess et al. 2016)
- Risk and benefit perceptions, trust, and knowledge determined as crucial factors influencing consumers' evaluation of GMO (ex. Caswell et al. 1994, Loureiro & McCluskey 2000, Costa-Font et al. 2008)

Introduction

Goal

- Estimate preferences towards GMO labelling policy
- Improve understanding of the role of cognitive and behavioural factors that are part of a complex decision-making process with regard to GMO

New

- Design to measure labelling policy preferences
- Variables controlled: risk-aversion (risk taking probability) as a personal characteristic, measures of knowledge, communicated social trust

Why ask consumers?

Pure Himalayan Fine Grind Salt Pink, 5 Pounds Pure Himalayan Salt

478 customer reviews | 27 answered questions

About the product

- Completely chemical and pesticide free
- No bleach, no anti caking agents, non-gmo
- Un-irradiated and un-fumigated
- Kosher
- Fine Grind (.5mm)

Price: $15.95 ($3.19 / pound) & **FREE Shipping**

In Stock. Ships from and sold by TigerDive.

3 Sizes: 5 Pounds

1 Pound	2 Pounds	5 Pounds
$7.49	$8.25 ($4.13 / pound)	$15.95 ($3.19 / pound)

Get it as soon as May 12 - 17 when you choose **Expedited** at checkout.

Ship to: Select a shipping address:

Qty: 1

Turn on 1-click ordering

Add to Cart

The award-winning African Sunset petunia turns out to be the product of genetic engineering, and doesn't have a permit to be sold in the United States.

F.D. Richards/Flickr (**CC BY SA 2.0**)

U.S. flower sellers rush to destroy illegal GE petunias

Conceptual framework
(Costa-Font et al. 2008)

- three main groups regarding attitudes toward GM food:
  - anti-GM food or pessimistic,
  - information searchers
  - GM-accepters or optimistic
- different compositions of such groups in a specific society
- in countries with limited knowledge of GMO…
  - Poland & EU generally not well informed (Centrum Nauki Kopernik 2014, Twardowski 2008)
- one would expect to find information searchers with very negative (positive) information conveyed with pessimistic (optimistic) attitudes

Conceptual framework
(Costa-Font et al. 2008)

Knowledge

- singular human attribute that noticeably enhances the likelihood of GM food acceptance, especially when objective rather than perceived knowledge is examined
- consumers, who reveal either rejection or acceptance of GM food, seem to be strongly influenced by individual values and hence by subjective knowledge
- significant differences in conclusions about the impact of knowledge on GMO evaluation
  - partly due to parallel use of subjective/objective measures (House et al. 2005); knowledge is a multidimensional construct
  - mixed results for studies using only subjective (objective) knowledge measures (Boccaletti & Moro 2000, McCluskey et al. 2003, James et al. 2011, and more)
  - poor measures of objective knowledge used & necessity to use new constructs

Conceptual framework

Risk

- often: measures based on perception of risk
- risk perception -> mandatory labelling (Harrison & Mclennon 2004)
- most reluctant consumers are typically those relatively more risk conscious/oriented (Costa-Font et al. 2008)
- group of „Safety Seekers" – seek to avoid GMO (Baker & Burnham 2001)

Social trust

- GMO perceived hugely by risk perceptions in EU (Hess et al. 2016)
- trust plays important roles in individual's decision making in situations involving risk and uncertainty (Lewis & Weigert 1985)
- respondents who are generally trusting less averse to GM food (Ding et al. 2012)

DCE on GMO

- Changes in national policy for GMO labelling and availability on the market
- Realism:
  - consequential (informing authorities to design proper regulations)
  - provision of objective information (as before referendum)

- Representative sample of 6,600 citizens of Poland
- March to June 2016
  - Measures of behavioural variables
    - Risk-aversion
      - Holt and Laury lottery (economic)
      - Domain-specific risk-taking scale (psychology)
  - Measures of cognitive variables
    - Knowledge
      - Subjective (self-assessment)
      - Objective (quiz x2)
      - in 5 domains: risks, benefits, regulations, health and environment impacts
    - Risk and benefit perceptions
  - Information treatments with communicated social trust

Attributes and levels used in the DCE

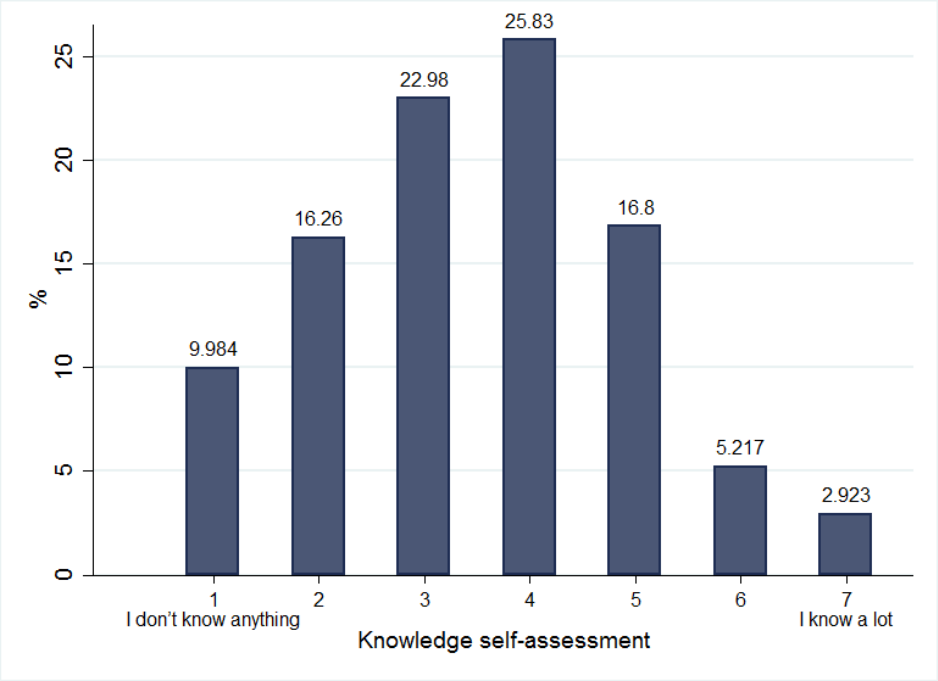
Attribute	Description	Levels
Food for direct consumption	such as grains, fruits and vegetables and foods that consist, contain or are made from GMOs	1. labeling ban (no labels) 2. voluntary labeling 3. obligatory labeling 4. banning GMO from the market Reference levels (status quo): obligatory labeling – food voluntary labeling – processed food, commercial and pharmaceutical products
Processed foods not directly consumed by humans	not directly consumed by humans, but instead are processed in ways that remove DNA and its immediate products (proteins), so considered foods made "with the help of GMOs„	
Commercial products	derived from GMO, which are not used for food and feed purposes.	
Pharmaceutical products	GMO used to produce proteins used as medicines; source of human therapeutics	
Cost	annual cost for respondent's household	10, 20 50, 100 zł [0 zł for SQ]

Choice card - example

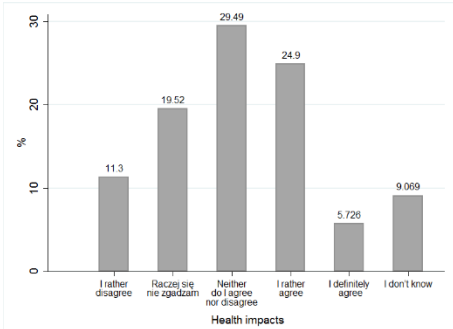
Your choice:	☐	☐	☐
	Option 1	Option 2	Status quo
Food 	voluntary labeling 	obligatory labeling 	obligatory labeling 
Processed foods 	labeling ban (no labels) 	obligatory labeling 	voluntary labeling 
Pharmaceutical product 	obligatory labeling 	labeling ban (no labels) 	voluntary labeling 
Commercial products 	banning from the market 	voluntary labeling 	voluntary labeling 
Yearly cost to your household:	50 zł	10 zł	0 Zł

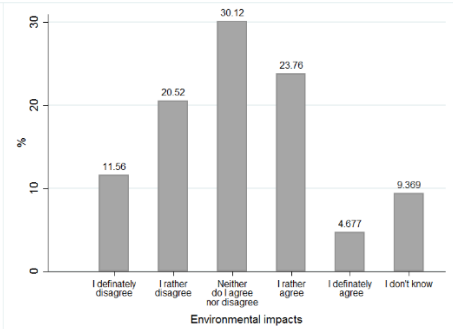
Knowledge self-assessment

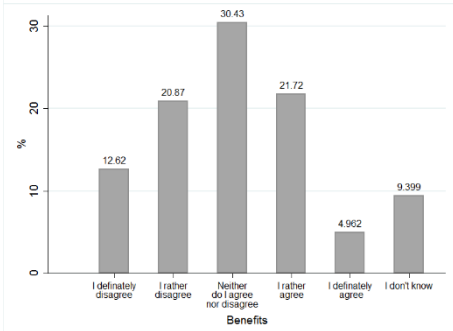
How much do you know about GMO (genetically modified organisms)?

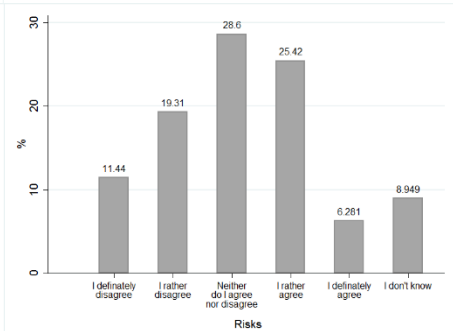


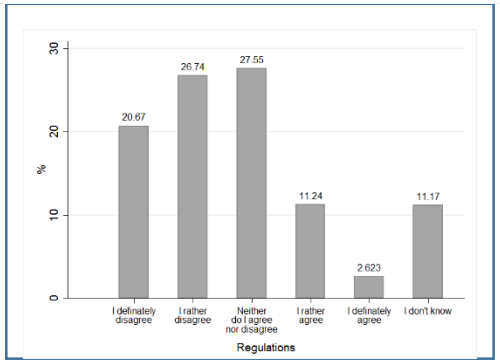
I know a lot about…







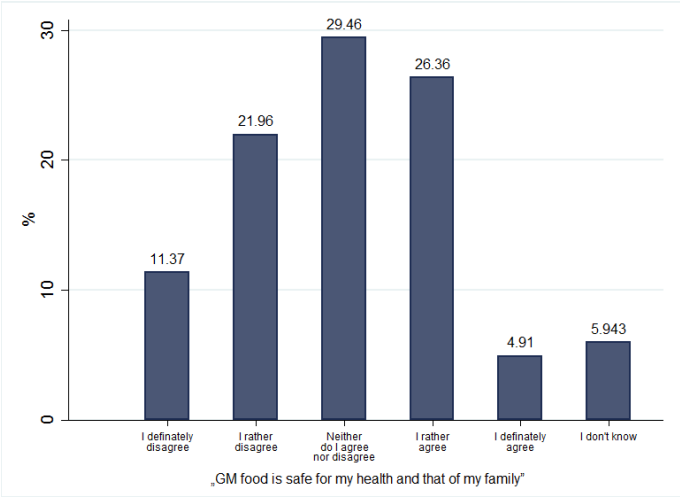


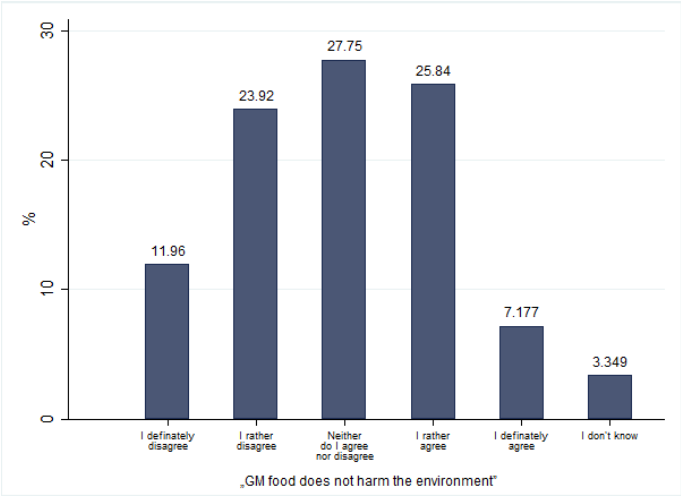


QUIZ

	T	F	%
Genetically modified food can be transferred into genes of humans who eat them.		X	51
Based on currently available research results, it can be stated that GM food poses no greater risk to human health than conventional food	X		39
Transfer of genes between species cannot occur in nature.		X	38
It is impossible to transfer genes between animals and plants.		X	28
Genes of traditionally bred plants have not changed for thousands of years.		X	58
Genetically modified plants can have greater resistance to pests, diseases and environmental conditions.	X		75
Genetically modified plants can have improved nutrition content or contain less of hazardous substances.	X		48
Genetically modified crops allow for reduction of chemical fertilizers use.	X		58
Use of genetically modified plants reduces farmland biodiversity.	X		38
Firms, that engineered genetically modified crops, are owners of GM seeds and farmers are obliged to pay for use these crops.	X		29
Products produced with the help of GMO are available on the Polish market.	X		68
In Poland GM food and GMO used for fodder are subject to mandatory labelling.	X		58
In Poland food and fodder produced with the help of GMO, but not containing any modified genes, are subject to mandatory labelling.		X	14
In Poland pharmaceuticals and commercial products produced with the help of GMO are subject to mandatory labelling.		X	12
GM foods must undergo a health safety assessment prior to being awarded certification for distribution to the market.	X		69

Knowledge and attitudes





Spearman's rank correlation coefficient

	GM food safe for my health	GM food safe for the environment
Self-assessment of general knowledge	-0.0146	-0.0265
Self-assessment of knowledge about envir/health impacts	0.0084	-0.0296
Quiz result	0.1682***	0.0913***

Results – MXL with interactions

	Mean	Standard deviation	Subjective knowledge index (normalized)	Objective a priori knowledge index (normalized)	Risk aversion index (normalized)
Status quo	0.60***	2.68***	-0.21***	0.40***	0.15***
GM Food - voluntary label	-1.15***	1.16***	-0.04	-0.21***	-0.09***
GM Food - no label	-1.63***	1.41***	-0.05	-0.28***	-0.13***
GM Food - ban	-0.30***	1.36***	0.14***	-0.35***	0.03
GM Food processing - obligatory label	0.30***	0.53***	-0.02	0.02	0.01
GM Food processing - no label	-0.30***	0.39***	-0.06**	-0.02	-0.04
GM Food processing - ban	-0.05	0.85***	0.02	-0.21***	0.03
GM Pharmaceuticals - obligatory label	0.29***	0.52***	-0.04	0.05**	0.08***
GM Pharmaceuticals - no label	-0.29***	0.37***	-0.03	-0.05*	-0.01
GM Pharmaceuticals - ban	-0.16***	0.89***	-0.02	-0.20***	0.03
GM Commertial products - obligatory label	0.03	0.52***	0.02	-0.02	0.01
GM Commertial products - no label	-0.04	0.50***	0.00	0.00	-0.02
GM Commertial products - ban	-0.33**	0.78***	0.03	-0.24***	-0.01
- Cost (100 PLN)	1.63***	2.37***	-0.18***	0.30***	0.18***

Results – MXL with interactions

	Mean	Standard deviation	Subjective knowledge index (normalized)	Objective ex post knowledge index (normalized)	Risk aversion index (normalized)
Status quo	0.60***	2.63***	-0.22***	0.53***	0.13***
GM Food - voluntary label	-1.14***	1.10***	-0.02	-0.37***	-0.07***
GM Food - no label	-1.62***	1.34***	-0.03	-0.49***	-0.10***
GM Food - ban	-0.30***	1.39***	0.10***	-0.17***	0.04
GM Food processing - obligatory label	0.29***	0.50***	-0.03	0.06**	0.01
GM Food processing - no label	-0.30***	0.33***	-0.05*	-0.06**	-0.03
GM Food processing - ban	-0.06	0.86***	0.01	-0.18***	0.04
GM Pharmaceuticals - obligatory label	0.30***	0.54***	-0.05*	0.11***	0.07***
GM Pharmaceuticals - no label	-0.28***	0.45***	-0.03	-0.07**	-0.01
GM Pharmaceuticals - ban	-0.16***	0.92***	-0.03	-0.17***	0.04
GM Commertial products - obligatory label	0.03	0.52***	0.02	-0.05**	0.01
GM Commertial products - no label	-0.05	0.50***	0.00	0.00	-0.02
GM Commertial products - ban	-0.32***	0.80***	0.03	-0.23***	0.00
- Cost (100 PLN)	1.62***	2.37***	-0.19***	0.45***	0.16***

Information treatments

- Treatments:
  - Vary levels of communicated social trust in GMO safety for heath/environment

    „GM food is safe for my health and that of my family."

    „GM food does not harm the environment."

    „*y*% of citizens agreed with this statement" varying *y* across treatments
  - Vary the social norm in terms of how local it is: Poland vs. EU
  - Levels: 5/25/50/75% for environment, 5/20/35/60% for health

Results – MXL and social trust

	Mean	Standard deviation	Communicated agreement
Status quo	1.09***	3.78***	0.16***
GM Food - voluntary label	-1.03***	0.7***	-0.05
GM Food - no label	-1.35***	0.88***	-0.11**
GM Food - ban	-0.13*	1.38***	-0.02
GM Food processing - obligatory label	0.35***	0.34***	0.03
GM Food processing - no label	-0.21***	0.55***	-0.04
GM Food processing - ban	0.21***	0.63***	0.03
GM Pharmaceuticals - obligatory label	0.24***	0.41***	0.06**
GM Pharmaceuticals - no label	-0.27***	0.51***	0
GM Pharmaceuticals - ban	-0.04	0.62***	0.04
GM Commertial products - obligatory label	-0.04	0.35***	0.06*
GM Commertial products - no label	-0.03	0.27***	-0.02
GM Commertial products - ban	-0.16***	0.57***	0.01
- Cost (PLN)	-0.07	0.69***	-0.04***

Results

- Preliminary
- Preference of more information (obligatory labelling preferred to voluntary)
- Sceptic towards GMO

Knowledge

- Subjective – negative impact
- Objective a priori – positive (support for current policy, not banning)
- Objective ex post – mixed effects (support for current, but also more obligatory labelling)
  - Negative searchers?
- How people perceive, learn and process information in the context of new technology developments? – to be investigated

Results

Risk-aversion

- Psychological measure – small negative effect (preference for labelling)

Social trust

- Behaviour largely driven by existing threats concerns
  - Information about higher level of social trust for bioengineering leads to stronger preferences for increasing labelling requirements
    - Banning considered infeasible?
- Not always straightforward in interpretation

Thank you!

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