Issues and challenges in defining stated-preference choice experiment quality criteria for systematic reviews of socio-economic impacts of genetically modified crops

- Initial considerations -

Jaqueline Garcia-Yi & Justus Wesseler
Technical University of Munich

Danish Choice Modelling Day
December 4th, 2012

Presentation outline

The presentation has the following parts:

I. Introduction

II. Background information

III. Objective

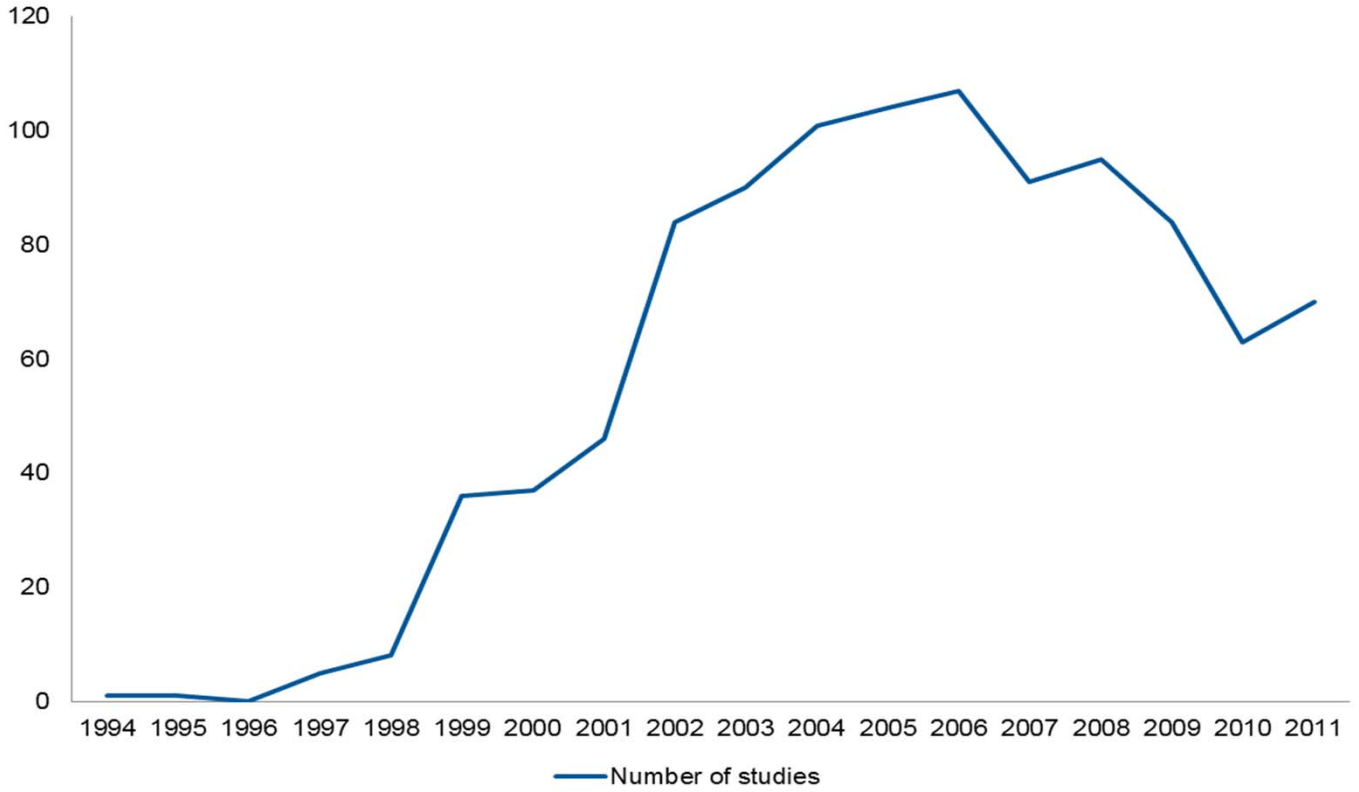
IV. Preliminary results / work in progress

V. Next steps / preliminary discussions

Introduction

GM technology socio-economic related research has received previous funding.

Total number of socio-economic studies related to GMOs



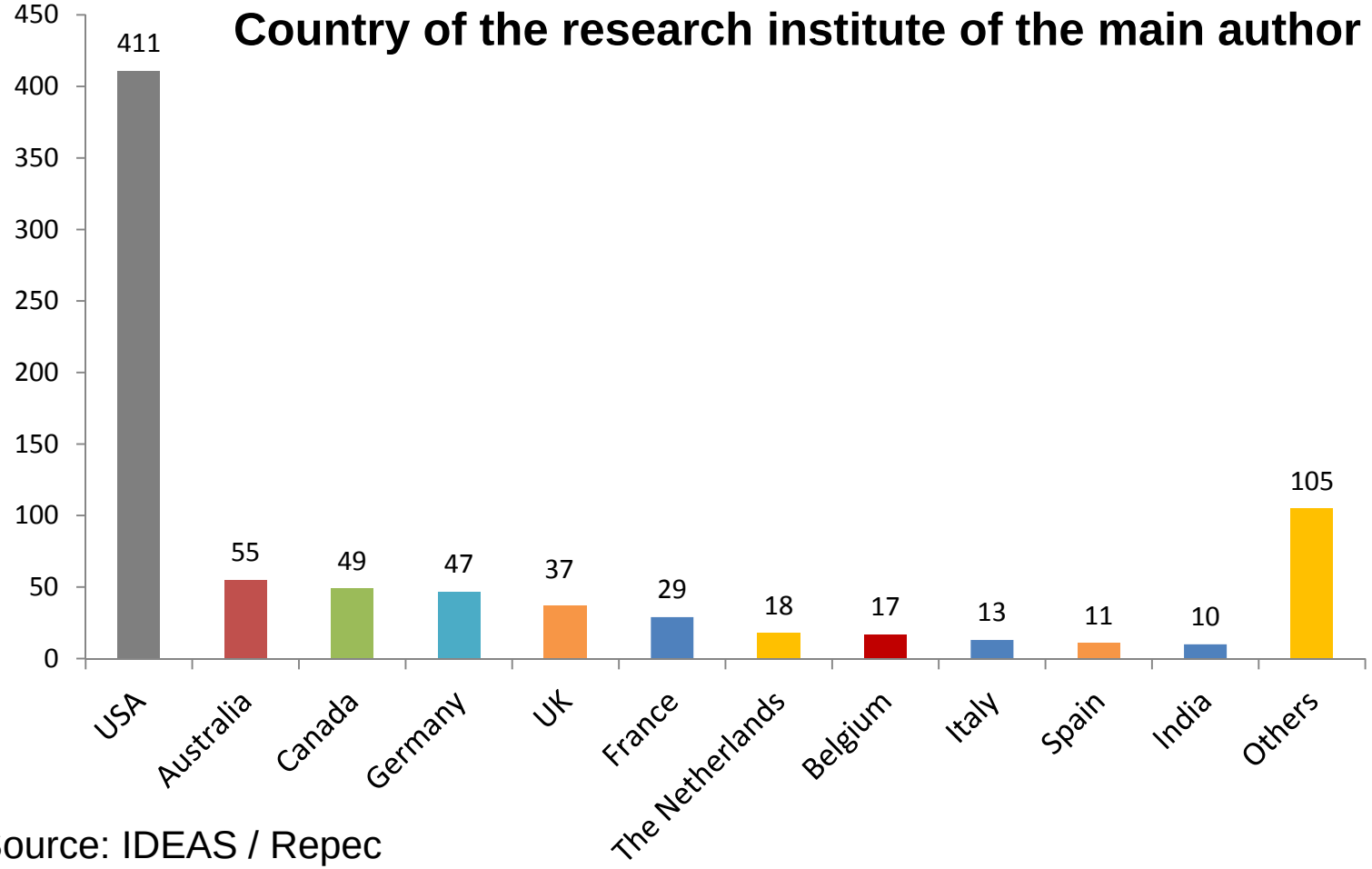
IDEAS / Repec is the largest bibliographic database dedicated to economics.

Broad search strategy = “genetically modified” or “transgenic”

Total number of studies = 1147 (Date: October 26, 2012)

Introduction

GM crop socio-economic topics have been researched worldwide.



Source: IDEAS / Repec

Total number of valid studies = 927 (without duplicated or non – related to socio-economics)

Total number of countries = 47 Data non available = 125

About genetically modified (GM) crop research

- Outcomes seem not to be generally considered in decision making. Potential reasons for that are: (a) studies are not readily available, (b) differ on their quality, or (c) conclusions are not easily understood.
- Also available research may have not addressed the information needs of the widen public and policy-maker communities yet.
- Opposed groups of both experts and stakeholders characteristically advocate conflicting opinions.
- Facilitation of a reliable synthesis could promote dialogue and stimulate the sustainable use of GM crop technology by diverse involved parties.

About EU GRACE Project

EU GRACE Project (2012-2015) aims to elaborate and implement a transparent framework for the review of studies related to genetically modified (GM) crops (food and feed) effects on the environment, socio-economics and human health:

- It aims to create **high quality** reviewing processes for impact assessment of GM crop in different fields.

- It aims to provide **valuable, transparent, well-documented, and sustainable (able to be up-dated) synthesis studies** (systematic reviews of all the relevant information available) to decision-makers and stakeholders.

Source: Annex I “Description of work” (GRACE Project, 2012).

Definition of Systematic Review (SR)

SR are used to “provide overviews of existing evidence pertinent to clearly formulated *specific questions*, using **pre-specified and standardised methods** to identify and critically appraise relevant research, and to collect, report and analyse data from the studies that are included in the reviews”. (EFSA, 2010)

Formal SR have been hardly used in socio-economics impact evaluations and the existing SR methods available from other disciplines (e.g. health) may not be readily applicable to this field.

Background information

General steps for SR implementation (adapted from ODI, 2012):

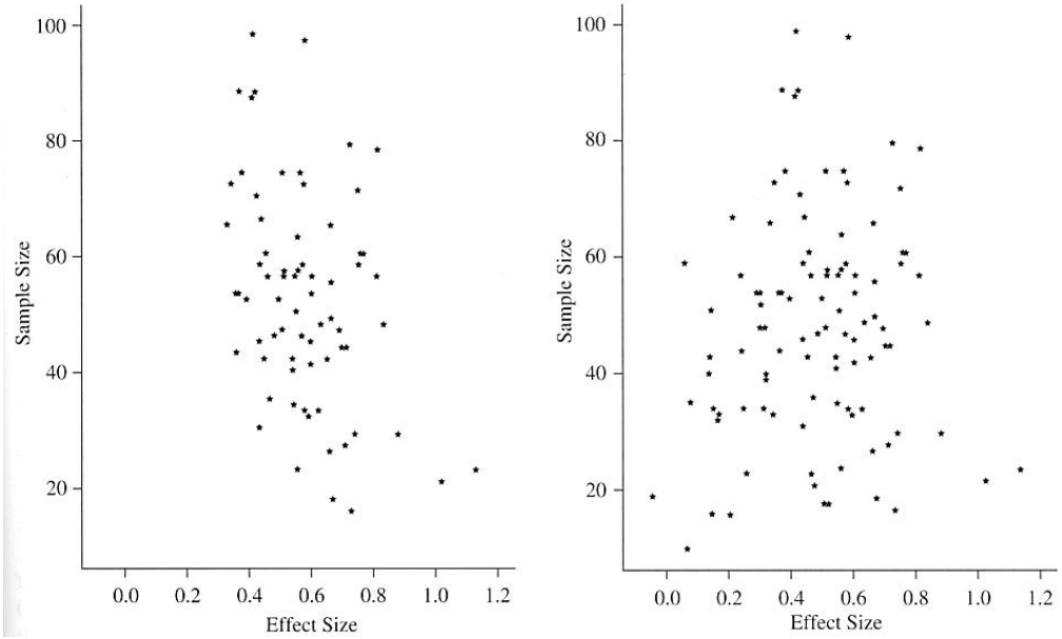
1) **Deconstruct the research question** by population (P), intervention (I), outcome (O) and comparator (C).
2) **Produce a protocol** describing definitions, search strings, search strategy, inclusion/exclusion criteria, and each of the methods to be applied in the SR.
3) **Pilot the protocol** and, if necessary, revise it.
4) **Conduct systematic searching** (study retrieval) of academic databases and perform hand-searching of different websites (e.g. institutions, journals, etc.).
5) **Screen and select relevant studies**, using pre-defined inclusion and exclusion criteria**.**
6) **Assessing risk of bias** in selected studies (quality assessment!).
7) **Extract quantitative and qualitative data**, synthesize evidence and address potential bias, and, if possible, perform meta-analysis regressions.
8) **Interpret results and draw conclusions**.

Steps 4-7 are first piloted and then monitored to ensure each researcher searches, screens, assess, and extracts consistently, according to the protocol.

Background information

Publication bias

A SR contemplates a broad searching strategy, including non-peer review documents to avoid publication bias.



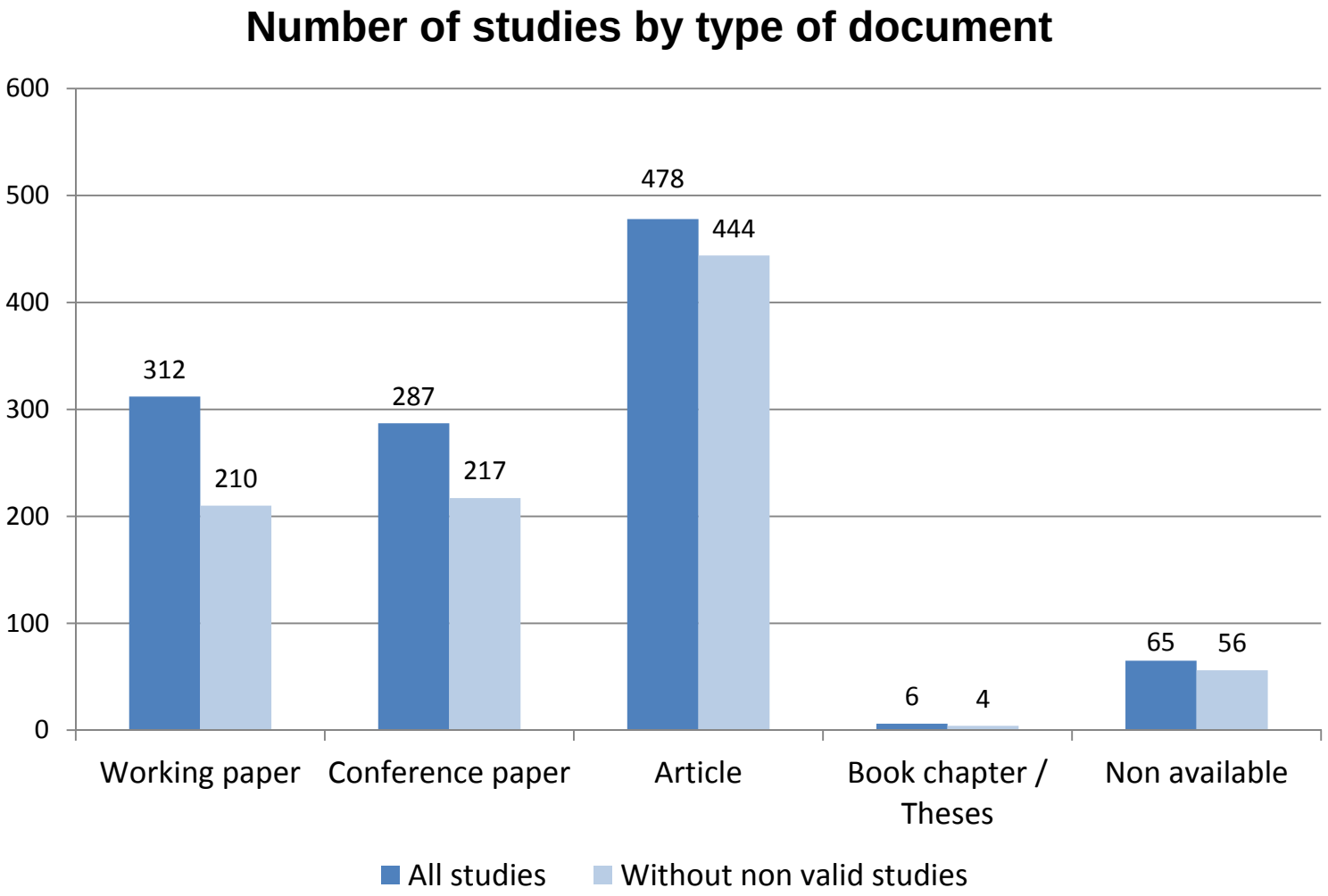
Funnel plot 1 (to the left): Presence of publication bias due to studies with non statistically significant results tend not to be published in peer-review journals.

Funnel plot 2 (to the right): Absence of publication bias.

Source: Greenhouse & Iyengar (2009)

Meta-analysis of GM food valuation studies: Lusk *et al.* (2005) and Dannenberg (2009). They included the type of valuation method (e.g. CE, auction) and others as variables in the regressions. No quality assessment of studies *per se*.

Background information



Total number of studies = 1147.
Total number without non valid studies (duplicated or non related to socio-economics) = 927.

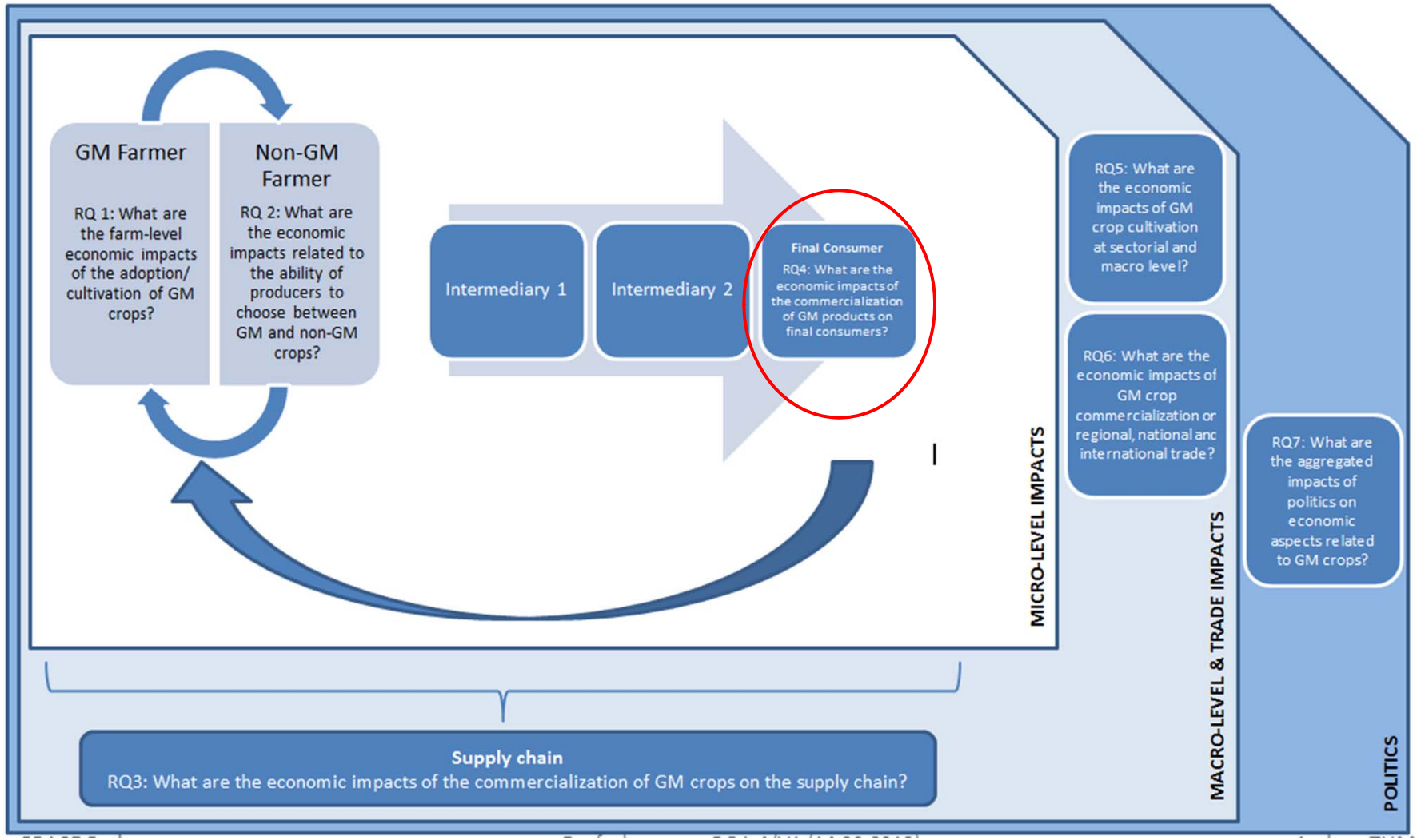
Objective

Evaluate the possibility of the identification of a pre-defined set of criteria for a structured quality assessment of stated-preference choice experiment studies.

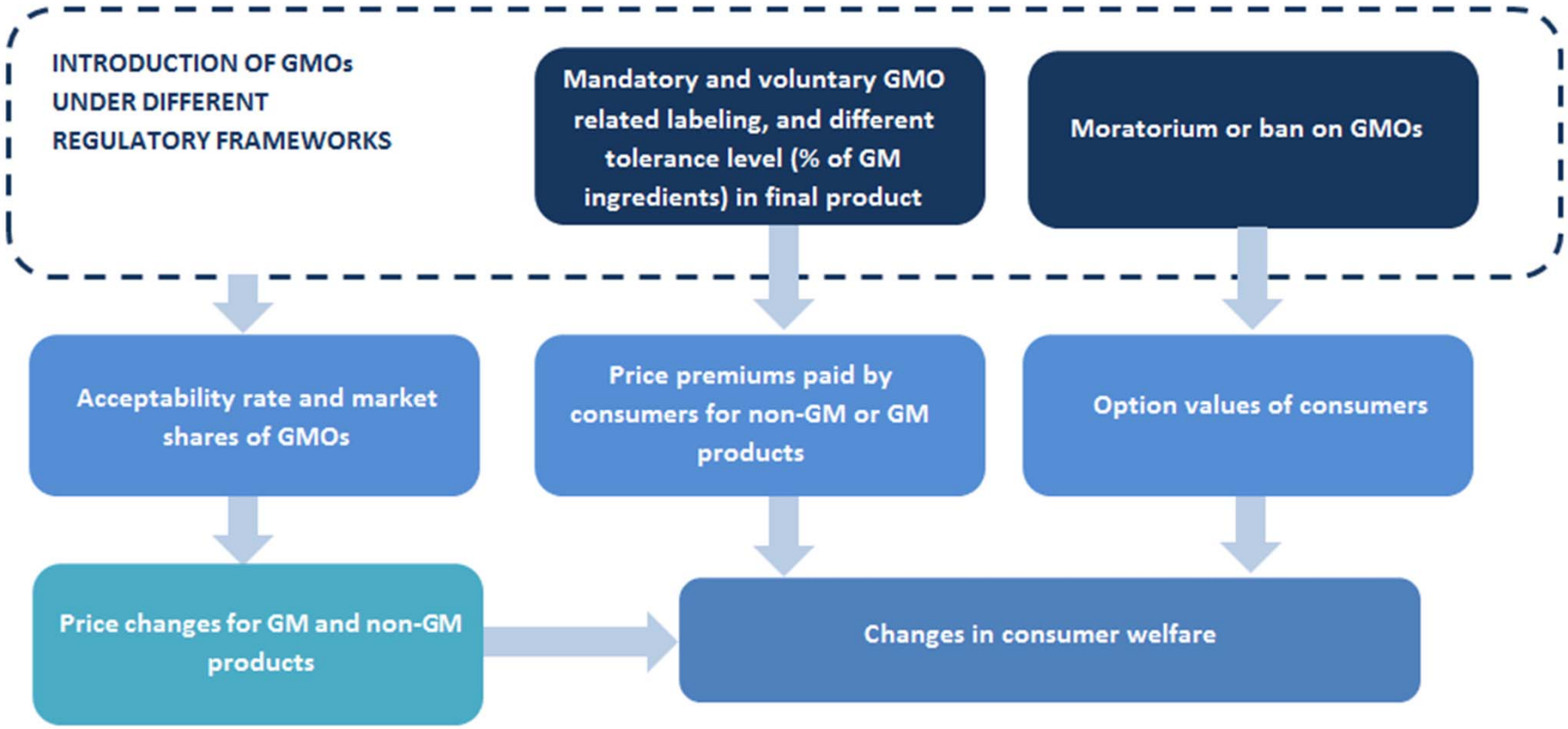
This will help to fully contemplate the more important sources of bias, and if possible, to correct for them during the systematic review implementations.

Preliminary results

Overall conceptual framework of socio-economics of GM crops



Conceptual framework for consumer studies



Specific review question identification for consumer studies

Review questions	Population (P)	Intervention (I)	Control (C)	Outcome (O)
1) How the availability of GM food (I) affect consumers (P) food choices (O) in relation to the situation before this availability (C)?	Consumers located in: a) Europe b) North America (excluding Mexico) c) Latin America & the Caribbean d) Asia e) Africa f) Australia & Oceania With different individual characteristics, such as a) concern for health and environment b) ethics and moral values c) degree of risk aversion d) perceptions of risk and benefits related to GM products, based on different levels of subjective (personal) knowledge about GMOs e) trust on Government and regulations and different sources of information (e.g. NGOs) f) socio-cultural context (customs, traditions, prior belief, and social norms) g) others	Commercialization of labeled GM products to consumers, including: a) mandatory labeling b) voluntary labeling (e.g. GM free certification) c) different tolerance levels or percentage of GM ingredients in the final product Under different information scenarios (which consider different level of uncertainty about the particular information): a) no information b) negative information c) neutral information d) positive information (e.g. reduction of pesticides, lower concentration of mycotoxins) Produced by different type of industries under: a) different brands (reliable, no reliable, etc.) b) scale of production (local, transnational) c) others With different product-related characteristics, such as: a) proximity of the genetic modification to the final product b) quality of the product, including flavor c) others	Consumer choices before the availability of GM food, such as: a) first generation of GM products b) second generation of GM products c) third generation of GM products	Consumer choices after the availability of GM food, in particular adoption or acceptability rates
2) What are the effects of the introduction and commercialization of labeled GM products (I) on the price premiums (O) paid by consumers (P) for GM or non-GM products in comparison with the GM or non-GM counterpart (C)?			Price paid by consumers for the GM or non-GM counterpart, including: a) first generation of GM products b) second generation of GM products c) third generation of GM products	Positive or negative price premiums paid by consumers for the GM or non-GM counterpart, including: a) conventional non-GM products b) organic products c) products labeled as GM free.
3) What are the welfare effects (O) of the introduction and commercialization of labeled GM products (I) on consumers (P) in comparison with the situation before the introduction and commercialization (C)?			Consumer welfare before the introduction and commercialization of GM products, including: a) first generation of GM products b) second generation of GM products (e.g. crops with beneficial health effects) c) third generation of GM products	Changes in consumer welfare after the introduction and commercialization of GM products
4) How the moratorium or ban of GM products (I) affect the option values (O) from consumers (P) in comparison with the previous situation (C)?		Moratorium (delay in the approval) or ban (prohibition of commercialization) of GM products	Option values of consumers before the moratorium or ban	Changes in option values of consumers after the moratorium or ban
5) What are the welfare effects (O) of the moratorium or ban of GM products (I) on consumers (P) in comparison with the previous situation (C)?			Consumer welfare before the moratorium or ban	Changes in consumer welfare after the moratorium or ban

Preliminary Results: Data availability

	Number of studies	% of total
Valid studies	**798**	**70**
1) Farm-level studies	162	14
2) Co-existence studies	46	4
3) Supply chain studies	56	5
4) Consumer studies	227	20
5) Sectorial and macro level studies	85	7
6) Trade–related studies	113	10
7) Political economy studies	103	9
8) Mixed topic studies	6	1
Non-valid studies	**220**	**19**
1) Repeated studies	134	12
2) Non-related to economics & others	86	7
Non-classified studies	**129**	**11**
1) Non-available	92	8
2) In other language	37	3
TOTAL	**1147**	**100**

Threats to validity of results of choice experiments

- **Internal validity**

whether the choice experiment is actually measuring an observed outcome (e.g. responses are consistent).

- **External validity**

whether the results can be generalized to a other realizations of interest

- **Statistical conclusion validity**

validity of the statistical inferences from the choice experiment

Be clear and transparent about the current state of knowledge.

Main aspects to be considered for CE quality assessment

Nature and extend of **hypothetical bias** *might* be reduced by:

- Presence and content of “cheap-talk” or scripted presentations
- Presence of opt-out or null alternative (however, Boyle & Ozdemir, 2009 did not find any effect of including or not the opt-out alternative).
- Inclusion of supplementary questions to assess the confidence with which an individual would hypothetically purchase the good.
- Identification of constraints that impact on actual choices, ignored in the CE (e.g. protest responses).

Selected sources (slides 16 and 17): Akter *et al.* (2009), Alberini *et al.* (1997), Boyle & Ozdemir (2009), Brown *et al.* (2003), Carlsson & Martisson (2003 & 2008), Carlsson *et al.* (2005), Champ & Bishop (2001), Hanemann (1991), Hanley *et al.* (2225), Hensher *et al.* (2001), Hensher (2010).

Main aspects to be considered for CE quality assessment

Other important related aspects:

- Experimental design of the choice set.
- WTP/WTA disparity.
- Embedding phenomenon / “warm glow” effect / part-whole biases / scoping.
- Number of alternatives in the choice set / number of choice sets.
- Attribute ignorance.
- Context dependence / sequencing and ordering effects.
- Learning effects.
- Choice of attribute levels in the cost attribute.
- Lack of information / no reporting by authors.
- Other sample and survey design and conduction generalities (e.g. online or in person interviews, etc.).

Next steps for quality assessment

Ex – ante quality assessment:

Would it be possible to evaluate *a priori* the quality of available CE studies?

- Set minimum standards based on literature review (conduct a SR for quality assessment of CE?).
- Search for agreement among experts (on-line questionnaire).

Limitation:

- Time and budget constraints.

Ex- post quality assessment:

- Select potential influential factors and include them in the meta-analysis regression of consumer– related CE.

Limitation:

- Increasing degrees of freedom in the regressions.

Acknowledgements:

GRACE project (GMO Risk Assessment & Communication of Evidence) (2012-2015) is funded by the EU.

Thank you…!!!