

# Full Information Product Pricing: Simulating the Role of Non-price Information in Market and Policy Choices

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# Commodity Markets

- Neoclassical microeconomic **commodity market** models are an example of **perfect competition**
  - Make the **assumption of perfect information** (Rational Choice Theory)
- Perfect information implies that **consumers know everything about every product at every point in time**
- If agents are rational and possess perfect information
  - They will **select the best products**
  - The market will **reward those who have produced** the best products

# Role of Information in Markets

- Information has **economic value** because it enables consumers to **make choices that yield greater expected value or utility** than could be made without information.
- Information economics is concerned with the "variations created by the **presence, absence, extent and distribution of information in economic structures.**"

(Norton, 2001)

# Lack of Information

- **Information asymmetry** is present in transactions where one party has access to better or more information than another
- The result is an **imbalance in power** which can yield **sub-optimal market outcomes**
- Information is the "**negative measure of uncertainty**" (Arrow, 1984)
- Information asymmetry can be **reduced through the Internet and Information Technology** (Levitt & Dubner, 2005)

# Information in Commodity Markets

- In **commodity markets** there is a **lack of non-price information**
  - **Wages** paid to producers
  - Working **conditions**
  - Access to **healthcare**
  - **Pollution** from production process
  - Other **social impacts**
- This **constitutes information asymmetry** and can yield **sub-optimal market choices**

# Motivations for Study

- We intend to use the Internet, information technologies and information policies to **inject information back into market transactions** and thereby reduce information asymmetries and **improve market outcomes**
- We refer to this process as “**Full Information Product Pricing (FIPP)**”
- We expect that FIPP **will benefit “green”, organic and fair trade** industries

# FIPP in NAFTA

- Most products consumed within the **NAFTA** trading zone are **produced and distributed through cost-minimizing distribution networks**
- Consumers and producers are increasingly paying attention to **information about where, when, how, and by whom** our goods are produced
- Some elements of **non-price information** is transmitted through relationship-based networks or under **certifiable labels** (e.g., “organic” or “Fair Trade.”)
- We are calling such networks of **relationships among consumers, producers, retailers, and distributors** “Full Information Product Pricing (FIPP) Networks”.

# Importance of FIPP Networks

- Potential to **promote national exports, small and medium enterprise formation (SMEs) and regional development.**
- Offer a production alternative to support **fair wage** and **environmentally friendly** trade
- **Trade agreements** end-up trying to **enforce standards** (such as environmental or labor standards), and **FIPP** practice can **create the positive reaction to the agreements**, creating policy alternatives to standard enforcement policies

# Who is working on this?

- North American Digital Government Working Group
  - A trans-national digital government working group to explore new models of collaboration
    - Eleven different institutions
    - Canada, Mexico, and the United States
    - Project is hosted by the Center for Technology in Government, University at Albany
    - Interdisciplinary team
    - Complementary research methods and theoretical approaches
    - Strong existing collaborative linkages
    - Supported by the National Science Foundation digital Government Research and the National Council for Science and Technology (CONACYT-Mexico)

# Overall FIPP Research Focuses

- How to use information and communication technology **(ICT) to support FIPP** distribution networks?
- What **product labeling** and **information policies** may have the potential to **supplement** a **compliance-enforcement** approach with a more market-based **voluntary** approach?



# Current ICTs Supporting FIPP Networks

- **Buy It Like you Mean It (Bilumi.org)** database of user ratings about the social performance of players active in industries like the chocolate industry
- Conseil des appellations réservées et des termes valorisants of Québec's (**CARTV's**) Directory of **Québec Certified Organic Products**



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# CADBURY SCHWEPPE

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**Customized score : 2.8**

Ratings per interest:

- Ecological Sustainability: 2.3
- Community Involvement: 2
- Energy and Resource Efficiency: 2
- Human Rights: 1.8
- Labor Relations: 2.8
- Political Spending: 4
- Product Health/Safety: 3.4
- Transparent Practices: 4.9
- Fair Competition: 2

## To Search the Directory:

1. Select a geographical region. You may select just one region or the entire province of Québec.

Montréal



2. Select one category.

Processed products



3. Refine your research by selecting a product.

Coffee (all kinds)



\* The quoted addresses are those of the registered office of the company

### **A. L. Van Houtte inc.**

Address : 8300, 19e Avenue

Municipality: Montréal

Region : Montréal

Province : Québec

H1Z 4J8

Tel. : 514 593 7711

Fax : 514 593 4198

Product certified by : OCIA-International

### **Café Barista inc.**

Address : 9150, Meilleure, suite 105

# This Presentation

- Purpose
  - To describe a **research plan for my dissertation** in Information Science
- Why am I here?
  - **Seeking input** on research design, overall relevance, use of system dynamics, etc.

# Dissertation

- Task
  - Use **computer simulation** to explore the role of **non-price information** in stakeholders' **market and policy choices** under varying preference functions
- Desired outcomes
  - To identify a high leverage **set of product labeling and information policies**
  - To help stakeholders **make better decisions** about what products to buy and what government/ economic policies to support

# Benefits of Simulation

- **Evaluate different policy options** purported to enhance sustainability and increase market share
- **Holistic view** of the supply chain including its integration with market, agricultural and ecological forces
- Allow us to **explore hypothetical market configurations** that do not yet exist
- Researchers have been able to **explain the failures of policies commonly advocated** to reduce the overuse of resources through the application of simulation (Jones, Seville, & Meadows, 2002; Sustainability Institute, 2003)

# Model Description

- The simulation model will be a multi-sector model **integrating** established dynamic models of **commodity markets** and **supply chains** with **agricultural and ecological** dynamics
  - Peter Senge and Don Seville (2007) argue that **global supply chains** connecting producers and consumers are a **major cause of the social and environmental challenges** facing us today
  - **IBM** has embraced the idea of "**green supply chains**" and provides consulting services designed to reorganize a client's supply chain in a way that reduces environmental impact (IBM, 2008).
- Focus on **one product—Coffee grown in Mexico** and consumed in the U.S. and Canada

# Model Description

- A set of **policy options** will be identified
  - Most **drawn from literature**; some modeler proposed
  - **Not all** of the policy options will be **implemented simultaneously**
  - The policy options **will not be employed in an extreme way** (ex. 100% tax)

# Model Description

- Sitting on top of the model will be an **objective function sector** designed to rank order policy options in terms of the utility they provide to different stakeholders
- **Multiple levels of aggregation**
  - Model variables => Summary measures => Overall satisfaction with the system state

# Model Description

- **Objective function sector—why bother?**
- Simulation **models make simplifying assumptions** about the wide range of **judgment tasks** that surround both **model building and decision making** in real policy contexts
- For example, Forrester had a **preference for the final equilibrium outcomes** in his policy recommendations in **Urban Dynamics**. He stressed the *ends* and paid less attention to the consequences of the *means*

# Model Description

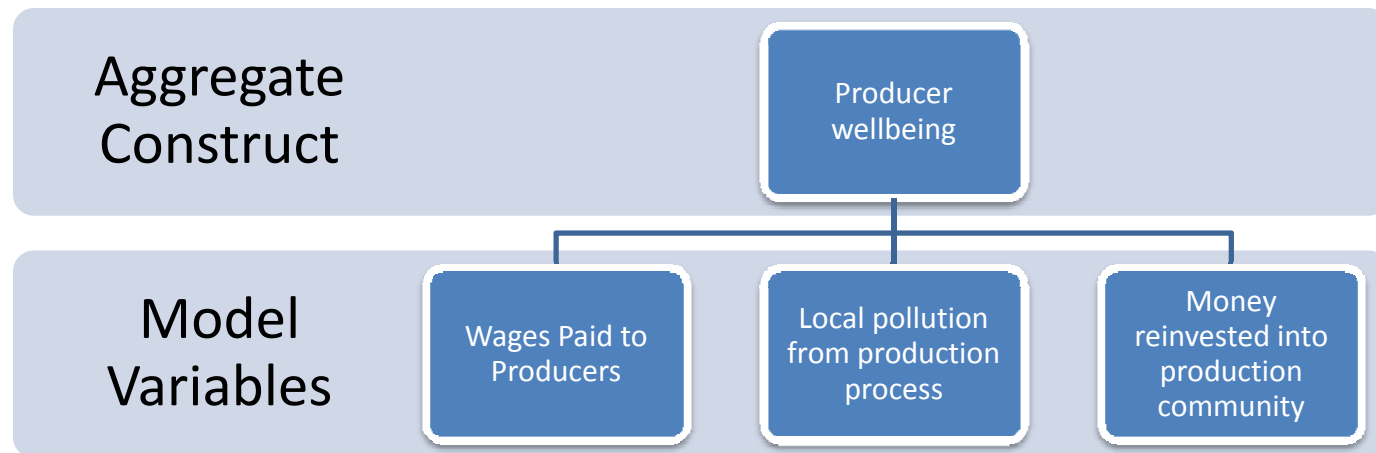
- There is **no right or wrong answer**
- Don't want the policy recommendations to be **tied to my personal beliefs** or preferences for time horizon, etc.
- Ultimately want to create a tool that will be a **useful decision aid to any stakeholder**  
(producer, middleman, wholesaler, retailer, politician, consumer, etc.)

# Defining an Objective Function Sector

- Step 1: Hold a **focus group** with a variety of different stakeholders
  - **Discuss** different models of **coffee production and distribution**
  - **Show them** different bags of coffee that contain **different pieces of information**
  - Determine **what pieces of information are useful to them, what additional information they would like, and how they group pieces of information together**

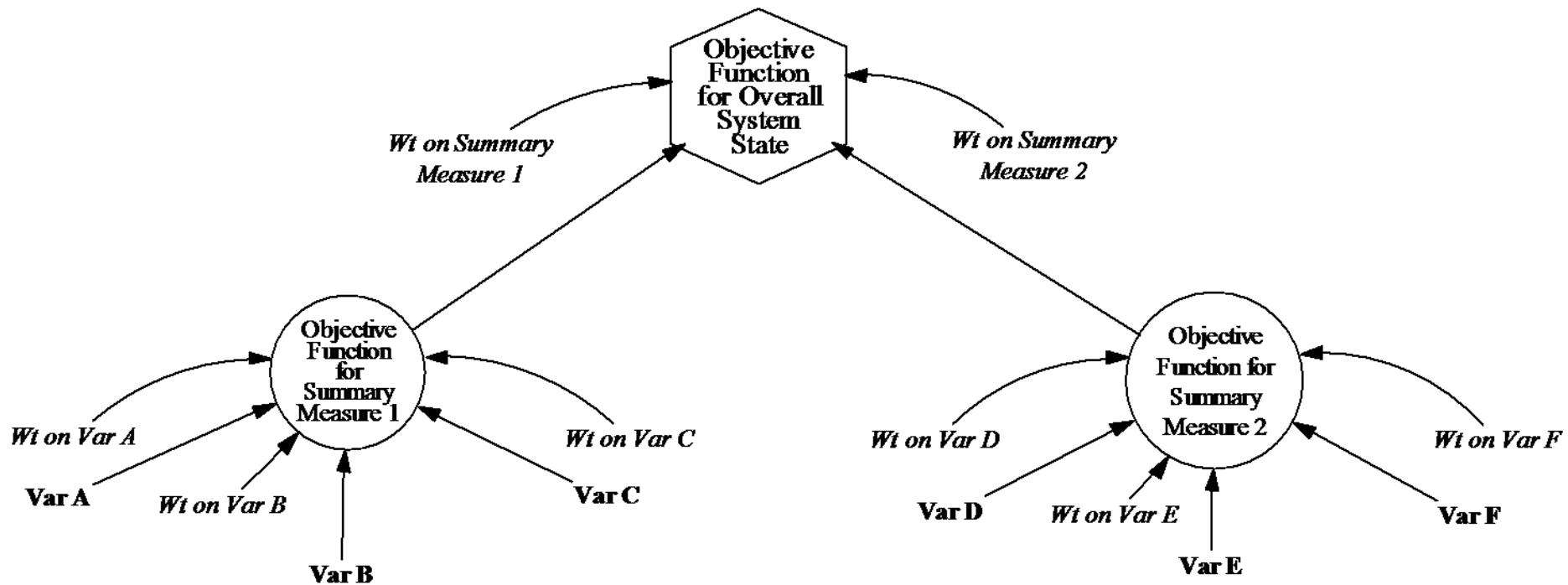
# Defining an Objective Function Sector

- Step 2: Based on feedback from the focus group, **aggregate model variables** into higher level constructs

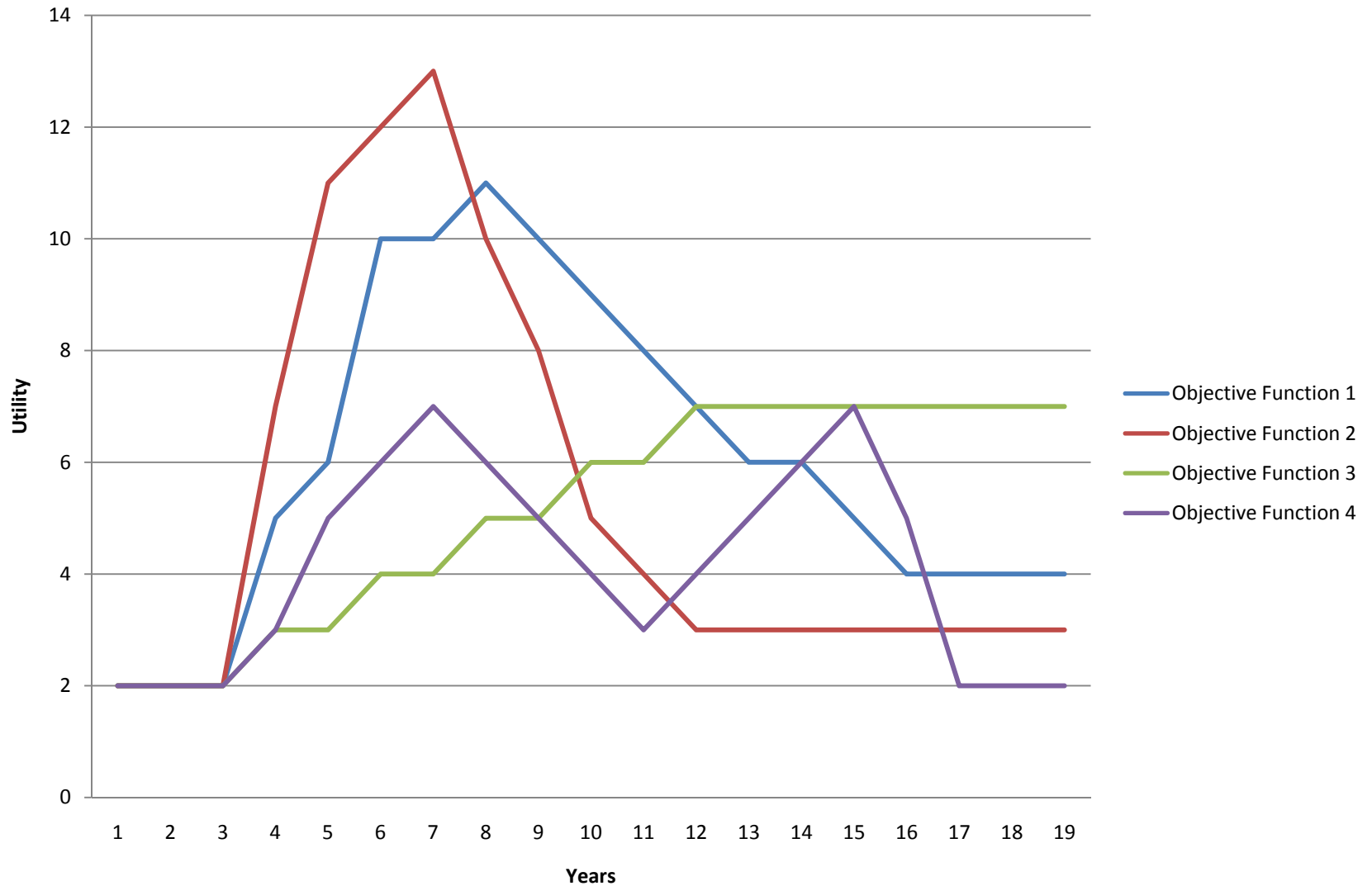


# Defining an Objective Function Sector

- Step 3: Create objective function sector by **applying weights**



# Evaluating Longitudinal Objective Functions



# Evaluating Longitudinal Objective Functions

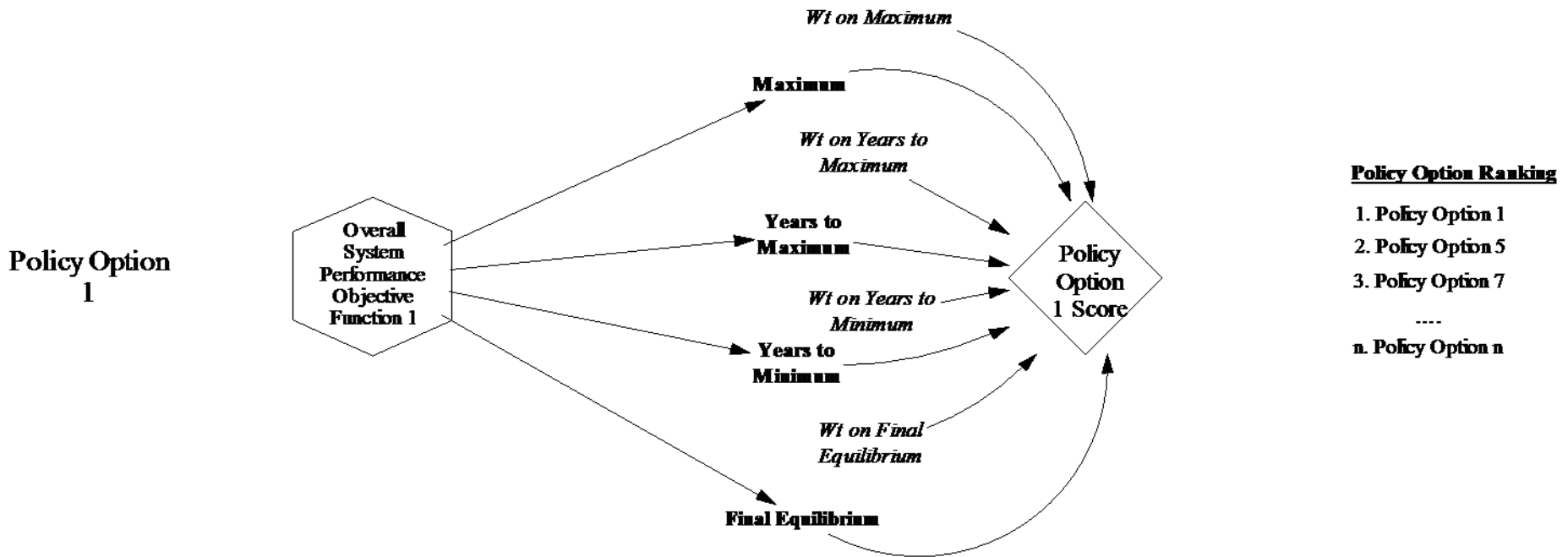
- **Which one is best?**
  - The one that reaches the **highest equilibrium?**
  - The one that **never decreases?**
  - The one that is **most stable?**
  - The one that reaches the **highest maximum?**
  - The one that produces the **quickest results?**

# Determining the Optimal Policy

- Evaluating **longitudinal objective functions**
  - Identify **four characteristics of curves**
    - Years to maximum
    - Years to minimum
    - Maximum
    - Final equilibrium

(Andersen & Rohrbaugh, 1992)
- **Score** the overall objective function **according to these criteria** for each policy option tested
- **Rank order** the policy options in terms of desirability

# Determining the Optimal Policy



# Model Weights

- Where do the weights used in objective function sector come from?
  - **Hypothetical weights** will be used and subjected to a **sensitivity analysis**
  - **Originally intended** to derive weights by performing regression on a series of judgment tasks (**Social Judgment Analysis**)
    - Suggested problems with validity
    - Failed to get resident expert's blessing for this approach

# Things I'm Looking For

- Identifying the pieces of **information that are most important** in determining market/policy choices
- Exploring the possibility of a policy option that produces the most **optimal results regardless of preferences**
- Determining the **level of sensitivity** of policies to preference weights
- Exploring the **role of objective function trajectory** in optimal policy selection
- Determining how to make this tool a **useful decision aid** for stakeholders

# In the Future

- Carefully craft a series of **valid judgment tasks to replace the hypothetical objective functions**
- If judgment tasks are inconsistent, **examine why**
- **Automate the tool** so that it is available in a **web-based** format and can become **one of the ICTs** used to promote FIPP networks

# Questions/Comments