

The Role of Consumers' Health Concerns and Relative Prices in Explaining Sweetener Substitution in the US Food Processing Industry

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Agriculture Institute of Canada Conference , Tuesday, November 6, 2007, Edmonton, Alberta.

Context

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- Overweight and obesity have become increasingly problematic in the US, Canada, and other countries from an individual and a population perspective.
- Social costs (health care, productivity, and others):
 - Societal stigmatization
 - Increased risk for harmful health conditions
 - ✦ 2 diabetes,
 - ✦ cardiovascular diseases,
 - ✦ hypertension,
 - ✦ osteoarthritis, and
 - ✦ some cancers.

Context

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- Overweight and obesity are influenced by:
 - Genetics: race/ethnicity, age
 - Environment: physical activity and sedentary behaviors, **food consumption patterns** and smoking, **technological advancements**, and
 - ✦ psychological factors.
- **All sources of energy** consumed in excess of energy needs can contribute to the risk of overweight and obesity.

Context – Energy and HFCS

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- **✓ The truth is:**
 - **All sources of energy** consumed in excess of energy needs can contribute to the risk of overweight and obesity.
- **Several argument/hypothesis/:** (Forshee et al., 2007) several hypotheses concerning the causes of overweight and obesity have centered on HFCS.
 - ? HFCS is “**sweeter**” than sucrose, leading to greater energy intake,
 - ? Humans do not compensate for excess energy provided by HFCS, leading to greater energy intake, and
 - ? Increased levels of HFCS in **the food supply** has increased the fructose/glucose ratio of the American diet, leading to adverse **metabolic effects**.

Food Industry and Consumer Health Concerns

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- Health risk concerns related to HFCS have significant effects on:
 - Processed food consumption patterns, and
 - Food processing production practices.
- Sweetened **food demand** has been and continues to be affected by diet-health link information.
- Changes in input mix (corn vs. cane sugar) and **production practice** is guided by responses of consumers to medical information.
- Get disseminated through popular media.

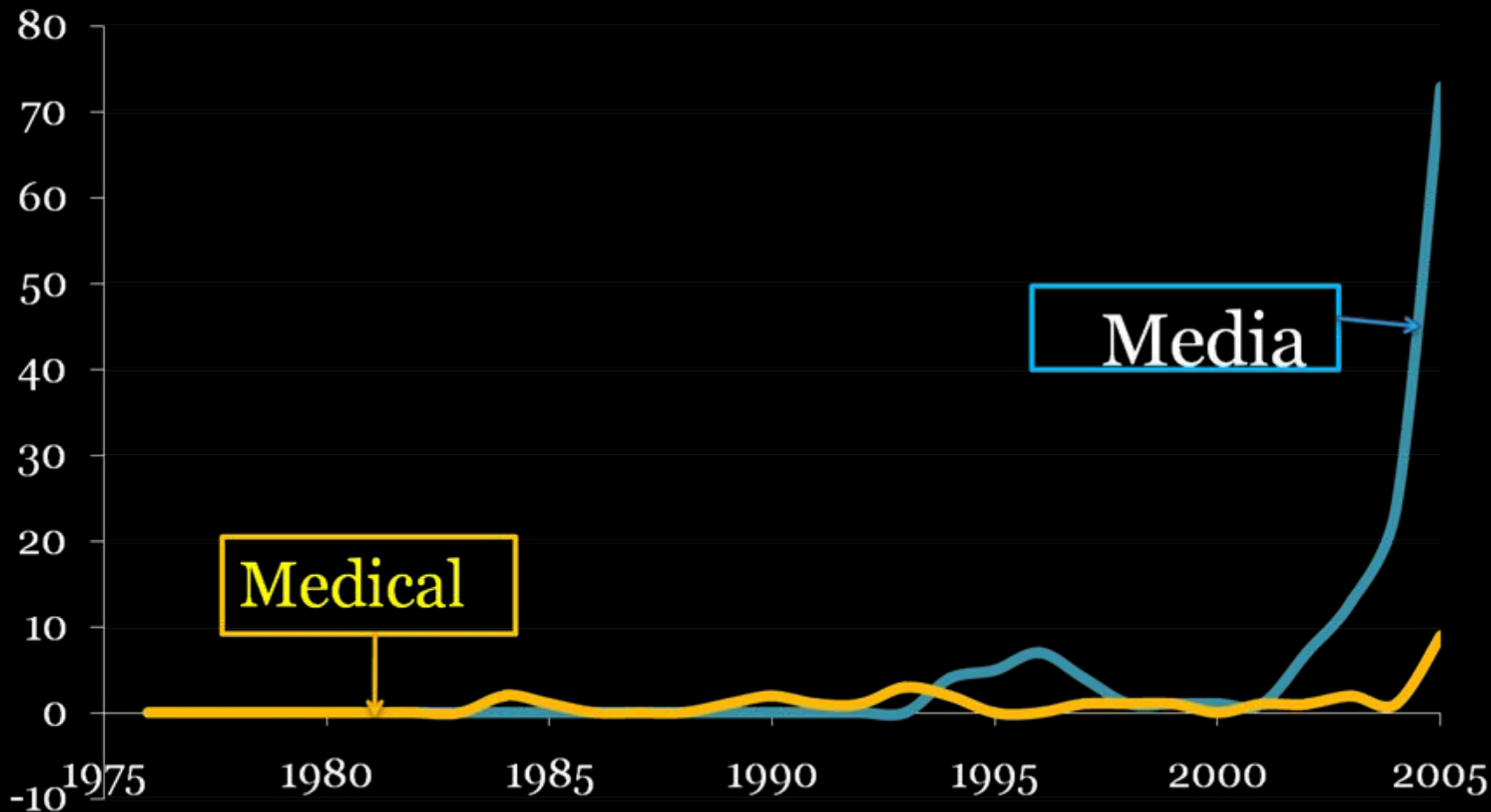
How do consumers/firms respond?

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- “Sweetener blamed for rise in obesity.”
– **The Globe and Mail, 2004**
 - “Are sodas the new cigarettes? ... the time has come for punitive action against beverage manufacturers and their nefarious products.”
– **The Washington Times, 2006**
 - “A soda maker, touting health, moves to cane sugar.”
– **The Wall Street Journal, 2006**
- “Dads Cookies” responded to such an opportunity through reorientation of its product ingredients in response to diet-health connection.
- More than a 1000 new low-fat and fat free products have been introduced since 1990 annually (International Food Information Council Foundation).

Medical and Media Health Information

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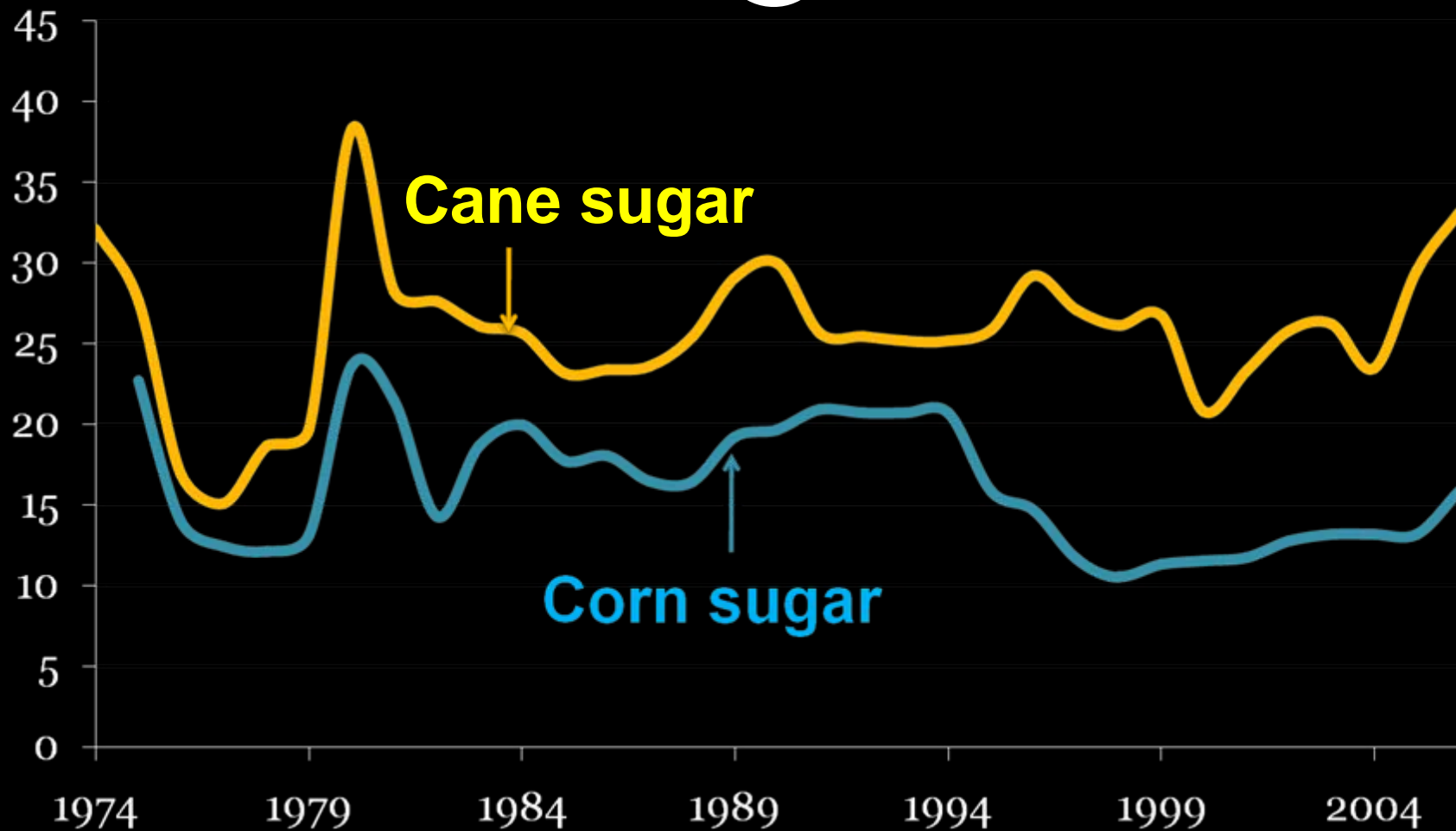


Relative Prices and Food Industry

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- New technology breakthroughs in corn sugar refining
- Sugar policy in the U.S.
 - Relative price:
 - have promoted the food manufacturers to consider modifying the sweetener combinations as a cost saving exercise.

Relative Price: Cane and Corn Sugar



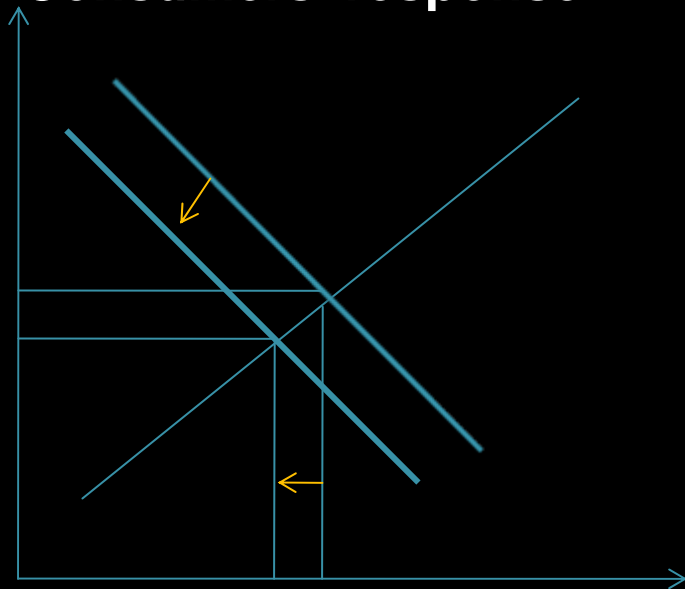
Relative Prices and Food Industry

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- Relative price
 - The decision to change the sweeteners input-mix in food processing is also driven by the relative price of corn sugar and cane sugar.
- Thus, the decision to change the input mix (the degree of substitution) reflects a trade-off between **market share** and **cost savings**.

The Trade-offs

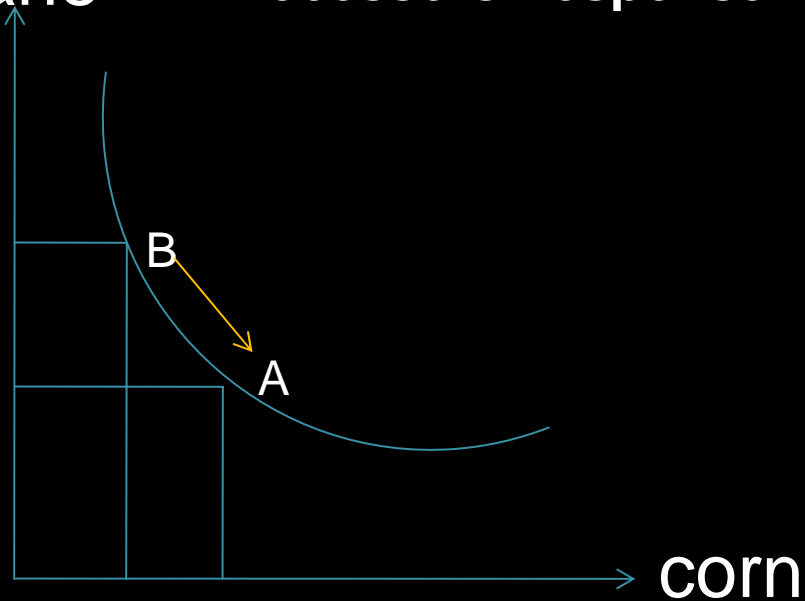
Consumers' response



Market Share

cane

Processors' response



Cost saving

$$\Pi = Q \cdot P - \text{Cost}$$

Previous Research

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- **Previous studies focused on consumer response:**
 - Brown and Schrader (1990) – cholesterol and eggs
 - Chern and Zou (1995) –
 - Kinnican et al. (1997) – US meat
 - Kim and Chern (1997, 1999) – fats and oils
 - Rickertsen et al. (2003)
- **No previous study has investigated the influence of health information on food processors response.**

Data and Method

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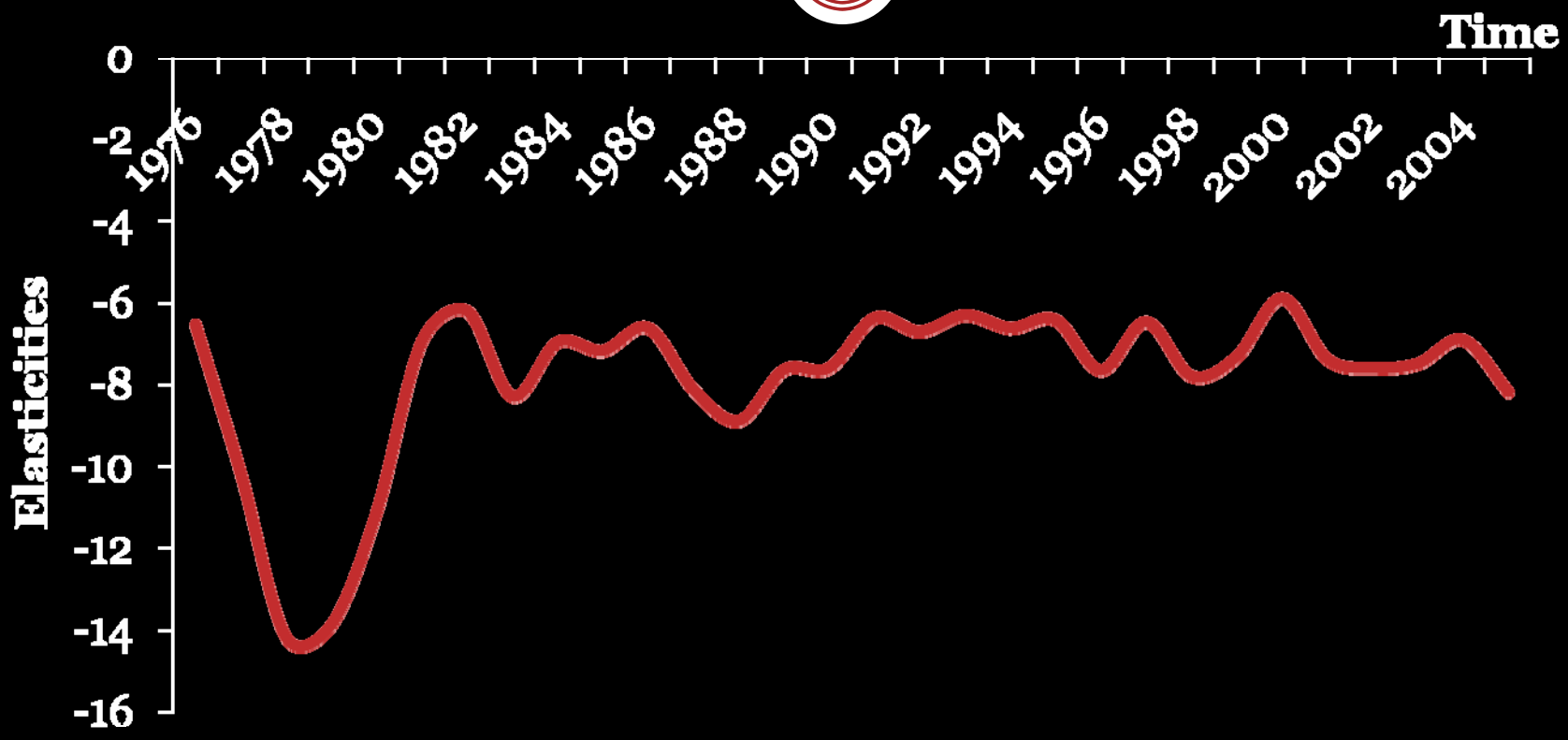
- Data on Inputs, output, and prices:
 - United States Department of Agriculture (USDA), and Annual Survey of Manufacturers (ASM).
- Data on Health Information
 - Factiva (media articles)
 - Medline (Scientific articles).
- Example of Key words:
 - *HFCS –health, obesity, diabetes, cardiovascular, heart disease, metabolism, bodyweight, cancer, fructose, dental caries, corn syrup, taste, food, soft drink, corn sugar ...*

Results and Discussion

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- Contrary to our expectation, cane and corn sweeteners are complement (i.e., a partial replacement of sucrose)
 - possibility of blending corn and cane sugars in a complementary manner to maintain palatability and taste of certain food products.
- For example, in a fat-reduced muffins, “a suggested usage would be a 50% replacement of HFCS (baking), a 50% replacement of HFCS-90 for sucrose in order to maintain product quality” (Conforti et al., 2001:p.7).

Degree of Complementarity – cane vs. corn



Cane sugar and demand for labour

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- Cane sweetener and labour are substitute.
 - The negative effect of cane sugar prices on employment losses in the sweetener containing product (SCP) industries, as reported by US Department of Commerce (USDC), supports this argument.
 - According to the Bureau of Labor Statistics, employment in sweetener containing product industries decreased by more than 10,000 jobs between 1997 and 2002 (BLS, 2005).
 - A saving of one sugar growing or harvesting job has led to a loss of three confectionary jobs (USDC, 2007).

Cane sugar and demand for capital

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- Cane sweetener and capital are substitute:
 - Measures to sustain the domestic cane price at exorbitantly higher levels may have possibly led to this effect.
 - According to USDC, destinations such as Canada and Mexico have attracted the attention of the US food manufacturers.
 - Relocation of many US SCP manufacturers to lower sweetener priced countries like Canada and Mexico has increased the need for additional capital.
 - Reports from the United States Department of Commerce substantiate this argument (USDC, 2007).

Relative price and health information

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- Relative prices
 - had a positive effect on the magnitude of complementarity (or blending).
- Positive health information:
 - had a negative effect on the magnitude of complementarity.
- However, the impact of relative price is more pronounced.

Concluding remarks and policy implications

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- Both relative prices and health information have influenced the decision on food manufactures, although the effect of price is stronger.
- Alerts the scientific community towards the need for conclusive research the link between health and type of sweeteners.
- Provides useful insights for regulating information and product labelling issues.

Acknowledgement

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- Consumer and Market Demand Network
- The University of Guelph, FARE