Effects of Biofuels Policy on Global Trade Flows

Brooke Fridfinnson
Dept. of Agribusiness & Agricultural Economics
University of Manitoba

with

James Rude
Dept. of Rural Economy
University of Alberta
Introduction

Biofuels Background

1st Generation Biofuels

- Biofuels
  - Ethanol
    - Sugar cane
    - Corn
  - Biodiesel
    - Canola
    - Soybeans
    - Wheat
Biofuels Background

Initially there were...

- High oil prices
- Relatively low commodity prices
- Strong agriculture lobby
- Strong government involvement
  - Blending/consumption mandates
  - Production quotas
  - Import tariffs
  - Excise tax exemptions
  - Repayable loans for capital costs/construction
  - Purchase of surplus stocks for biofuels
Introduction

Research Problem

- What are the price impacts of global biofuels policies, and to what extent do they affect trade flows?

- How are biofuels linked to the principles of the World Trade Organization, and what issues are raised by increased biofuel trade?
United States

- Corn-based ethanol
  - 2007 production: 5.8 billion gallons/year
- Soybean-based biodiesel
  - 2007 production: ~ 172 million gallons/year
- Goals:
  - Under RFS, 7.4 B gallons by 2012
- Motivations: energy security, agricultural support, environmental benefits
European Union

- **Rapeseed-based biodiesel**
  - Production (2006): 1.6 B gallons/year

- **Goals:**
  - 2% of total transportation fuel use from biofuels by 2005
  - 5.75% by 2010

- **Motivations:** environment, energy security, agricultural support
Canada

- Wheat/corn-based ethanol
  - 725 million litres/year
- Canola-based biodiesel
  - 100 million litres/year

Goals:
- 5% renewable content in gasoline by 2010
- 2% in diesel and heating oil by 2012

Motivations:
- environment, agricultural support, rural development
AGLINK

- Dynamic partial equilibrium model
- Multi-region, multi-commodity
  - Crude oil, sugar exogenous
- Exogenous shocks
- Issues:
  - Value of the by-products
  - Emergence of second-generation biofuels
United States Ethanol Production

- Coarse grains consumption
  \[ QC_{CG}^{US} = CG_{FE}^{US} + CG_{FO}^{US} + CG_{OU}^{US} \]

- Apply the exogenous shock to \( CG_{OU}^{US} \)

- Account for by-products
  \[ \ln (CG_{FE}^{US}) = \alpha + \beta_1 \ln (PRICE_{CG}^{US}/PRICE_{WT}^{US}) + \beta_2 \ln (PRICE_{OM}^{US}/PRICE_{WT}^{US}) + \beta_3 \ln (QP_{NR}^{US}) + (1-\beta_3) \ln (QP_{RU}^{US}) + \beta_4 \ln (TRND) + \ln (R. CG_{FE}^{US}) \]

as per Westcott (2007):

- CORN: \( 0.75 \times ((0.8 \times BF @ 100\%) + (0.1 \times DAIRY @ 45\%) + (0.05 \times PK @ 85\%) + (0.05 \times PLTRY @ 55\%)) \)
- SOY: \( 0.75 \times ((0.1 \times DAIRY @ 55\%) + (0.05 \times PK @ 15\%) + (0.05 \times PLTRY @ 45\%)) \)
Canadian Biodiesel Production

- **Demand for oilseeds**
  \[ QC_{OS}^{CAN} = OS_{CR}^{CAN} + OS_{FE}^{CAN} \]

- **Oilseed crush demand**
  \[
  \ln(OS_{CR}^{CAN}) = \alpha + \beta_1 \ln((\text{PRICE}_{OM}^{CAN} \times \text{YLD}_{OM}^{CAN} + \text{PRICE}_{OL}^{CAN} \times \text{YLD}_{OL}^{CAN})/\text{GDP}^{CAN}) - 0.9 \times \beta_2 \ln(\text{PRICE}_{OS}^{CAN}/\text{GDP}^{CAN}) \\
  + \beta_3 \ln(OS_{CR(-1)}^{CAN}) + \ln(R.OS_{CR}^{CAN})
  \]

- **Bumping the crush automatically adjusts the oil meal markets**
Price Impacts

World Corn Market

2008: 31% increase
Price Impacts

World Vegetable Oil Market

2007: 22% increase

USD/t
Price Impacts

World Wheat Market

2008: 7.7% increase

USD/t
Trade Impacts

European Union 25

- Coarse grain exports fall by 5%
- Beef exports drop by roughly 9%
- Oilseed imports remain fairly constant
- Vegetable oil net trade declines by over 50%
Trade Impacts

United States

- Coarse grain exports decline nearly 50%
- Beef and veal exports of live animals and meat decrease by roughly 3%
- Oilseed exports fall by approximately 3%, with another 62% decrease in vegetable oil net trade
- Wheat exports drop by 14%
Trade Impacts

Canada

- Oilseed net trade decreases by 2.5%
- Wheat net trade falls by 11%
- Pork meat exports fall by roughly 5%
- Beef and veal net trade averages a decline of 1%, with increasing losses
  - Feed expenditures increase by an average of 15% over the projection period
Trade Issues

- How should biofuels be classified under WTO definitions?
- Blending requirements: national treatment?
- Cross-subsidization?
- Effects of reducing current trade barriers?
- Increased regional trade agreements?
Westin Harbour Castle Hotel
Toronto, Ontario
February 8-9, 2008