Structural Change in U.S. – Canada Bilateral Cattle and Beef Trade Flows: Detecting the Impact of COOL

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CATPRN Annual Meeting, September 29, 2012, Toronto, Ontario

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What is COOL?

- A provision in the U.S. 2008 Farm Act that mandates labeling of fruits, vegetables, peanuts, fish and shellfish, beef, pork, lamb, poultry, goat meat, macadamia nuts, ginseng, and pecans by country of origin

- Four meat labeling categories
    I.   Category A: Product of U.S
    II.   Category B: Product of U.S. and country X
    III. Category C: Product of country X and U.S.
    IV.   Category D: Product of country X

- Also
    - A + B = B
    - B + C = B

Why the debate about COOL?

- The theory:
  - ➢ Country of origin of a product is an informational cue that may influence the quality perception of a product
  - ➢ Imperfect information, hence market failure
  - ➢ Voluntary or mandatory labeling

- The reality:
  - ➢ Mixed evidence; COOL may surpass price and brand information in influencing perception of product quality attributes

- What does the WTO say?
  - ➢ The TBT Agreement provides for adoption of regulations that are necessary and appropriate to meet consumer interests
  - ➢ But Articles 2.1 and 2.2 prohibit discrimination against imports, and application of technical regulations that create unnecessary obstacles to international trade

So, what are the arguments?

- COOL is cool!
  - ➤ COOL would help allay consumers' food safety concerns while giving U.S. products a competitive advantage over imported ones
  - ➤ Consumers simply have a right to know the country of origin of their food purchases
  - ➤ Most U.S. consumers prefer domestic to imported products
  - ➤ Benefits outweigh costs

- No, it's not!
  - ➤ It is a non-tariff barrier; a technical barrier to trade
  - ➤ Imposes unnecessarily substantial transaction costs at all levels of the market chain
  - ➤ Voluntary COOL would have occurred already if, indeed, it were economically beneficial

Previous studies vs. current study

- Mostly *ex ante*
  - ➤ Valuation of willingness to pay (Umberger et al., 2003; Loureiro & Umberger , 2003, 2005 & 2007)
  - ➤ Simulation of market and welfare impacts (Brester et al. 2004; Lusk and Anderson, 2004; Schmitz et al. 2005; Rude et al., 2006)
- A few *ex post*
  - ➤ Structural change tests (Jones et al. 2009; Wozniak, 2010; Rude et al. 2010)
- No *ex post* study on impacts of COOL on Canadian cattle and beef industry
- **Objective:** to estimate structural breaks in U.S. import demand for Canadian cattle and beef due to COOL
  - ➤ COOL, a permanent policy shock, is likely to induce changes in the optimizing behavior of agents, hence structural change in some or all economic relationships in the industry
  - ➤ If unaccounted for, SC increases the deviation of a model's forecast from actual outcome

Method

- Analytical framework and empirical model
  - ➢ A non-spatial PE model of the Canadian and U.S. cattle and beef industries
  - ➢ Reduced-form U.S. import demand equations for Canadian feeder cattle, fed cattle, and beef
  - – Exogenous variables: monthly average hourly earnings in meat processing (beef supply shifter in both countries), seasonally adjusted labour income at 2005 constant dollars and seasonally adjusted personal income at 2005 dollars (beef demand shifters in Canada and U.S., resp), monthly average price of barley and corn (slaughter cattle supply shifters in Canada and U.S., resp), time trend, exchange rate
- Data: monthly data from January 2000 to February 2011 (N=134)
- Two issues in testing for structural change caused by COOL
  - ➢ Break point is unknown
  - ➢ COOL was implemented recently thus few observations are available, and a structural break is likely to occur at the end of the sample

Tests for SC by BP (2003) and Andrews (2003)

- A two-step approach
  1. The Bai and Perron [BP] test for multiple structural breaks endogenizes break dates. Three options:
  i. A test of no break versus a fixed number of breaks
  ii. A test of no break versus an unknown number of breaks given some upper bound (Double Maximum tests)
  iii. A test of l versus $l + 1$ breaks
  ➢ Upper bound for Double Maximum tests = 5
  ➢ Trimming factor = 0.15 hence 20 observations per segment
  2. Andrews' S test (a generalization of the Chow test) for testing for structural breaks that occur at the end of the sample
  ➢ Uses a parametric sub-sampling procedure to obtain critical values of the test statistic
  ➢ Requires data to be stationary and ergodic
  ➢ The null hypothesis is that of no structural break (just like in the BP test)

BP test results

Equation	Test	Test Statistic	Critical Value (5%)
Feeder cattle	Double Maximum		
	UDmax	628.34	25.81
	WDmax	628.34	27.53
	SupF		
	$(1 \mid 0)$	628.34	25.65
	SupF$(l+1 \mid l)$		
	$(2 \mid 1)$	39.08	25.65
	$(3 \mid 2)$	26.61	27.66
Fed cattle	Double Maximum		
	UDmax	76161.83	25.81
	WDmax	106171.24	27.53
	SupF		
	$(1 \mid 0)$	1167.85	25.65
	SupF$(l+1 \mid l)$		
	$(2 \mid 1)$	86220.59	25.65
	$(3 \mid 2)$	17.99	27.66
Beef	Double Maximum		
	UDmax	133.53	25.81
	WDmax	133.53	27.53
	SupF		
	$(1 \mid 0)$	133.53	25.65
	SupF$(l+1 \mid l)$		
	$(2 \mid 1)$	39.65	25.65
	$(3 \mid 2)$	58.77	27.66
	$(4 \mid 3)$	6.84	28.91

Estimated break dates

BP break dates	
Feeder cattle	May 2003 (Apr 2003 – Jun 2003) Jun 2005 (Apr 2005 – Jul 2005)
Fed cattle	May 2003 (May 2003 – Jun 2003) June 2005 (Jun 2005 – Jul 2005)
Beef	May 2003 (Apr 2003 – May 2003) Jan 2005 (Jan 2005 – Feb 2005) Apr 2008 (Mar 2008 – May 2008)
Andrews break dates	
Feeder cattle	Feb 2008 (p-value = 0.04)
Fed cattle	Feb & Mar 2010 (p-value = 0.02)
Beef	Mar 2010 (p-value = 0.04)

Further proof that SC is due to COOL

- Analysis extended to U.S. import demand for Canadian breeding cattle

  ➢ BP test: structural break in October 2007

  ➢ Andrews test: No structural break

Conclusion

➢ Mandatory COOL has caused a structural change in U.S. import demand for Canadian feeder cattle, fed cattle, and beef

➢ Need to account for shifts in structural parameters in import demand models for Canadian cattle and beef in future policy analysis

Thank You!

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