Canada's Compositional Cheese Standards and "*Use-it or Lose-it*" Import Licenses

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The New Cheese Compositional Standards

- CFIA amended the *Dairy Products Regulations* (DPR) and the *Food and Drug Regulations* (FDR)
- Revised regulation came into force on December 14, 2008
  - Minimum casein content derived from fluid milk
  - New import licensing system

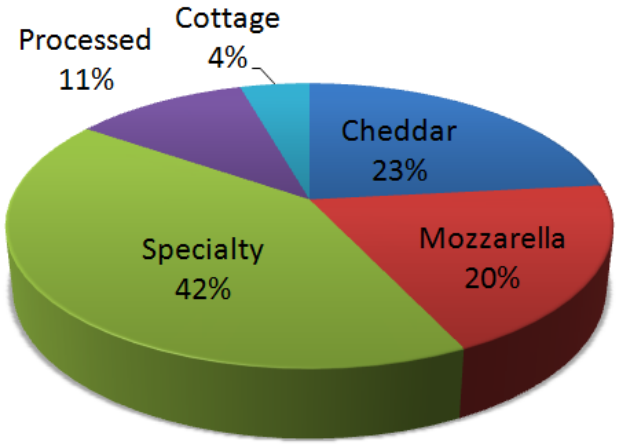
Types of cheese	Casein from milk used in the industry	Minimum ratio fixed by new regulation
Pizza Mozzarella	60%	63%
Cheddar-type cheeses and Mozzarella	70%	83% 100% for Aged Cheddar
Specific speciality cheeses	80%	95%

Motivations and Reactions

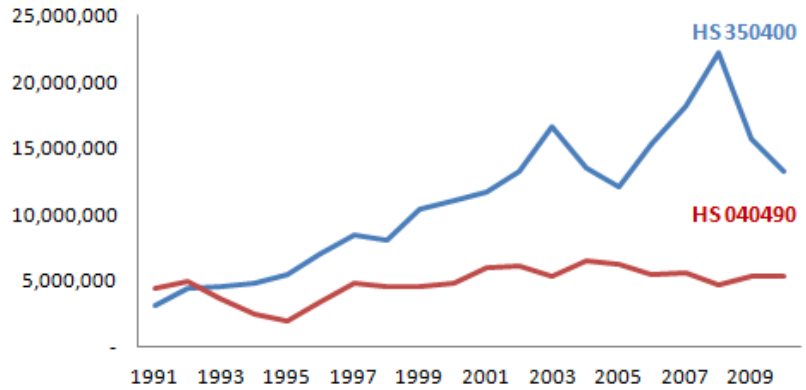
- Official motivations
  - Harmonizing existing federal regulations
  - Enhancing consumer interests
- Division within the Canadian dairy industry
  - Dairy producers (and Agropur)
  - Kraft, Parmalat and Saputo: the KPS coalition
- Criticisms from several trade partners: NZ, US, Australia, EU and Switzerland
  - Market access impact
  - Cost burden
  - Overly restrictive
  - Non-compliance with TBT Agreement and international standards (Codex Alimentarius)

The Canadian cheese production

- Supply-management system for milk production
- The Canadian cheese industry: the 4 “big cheeses”



Domestic production by cheese type



Imports of milk protein ingredients

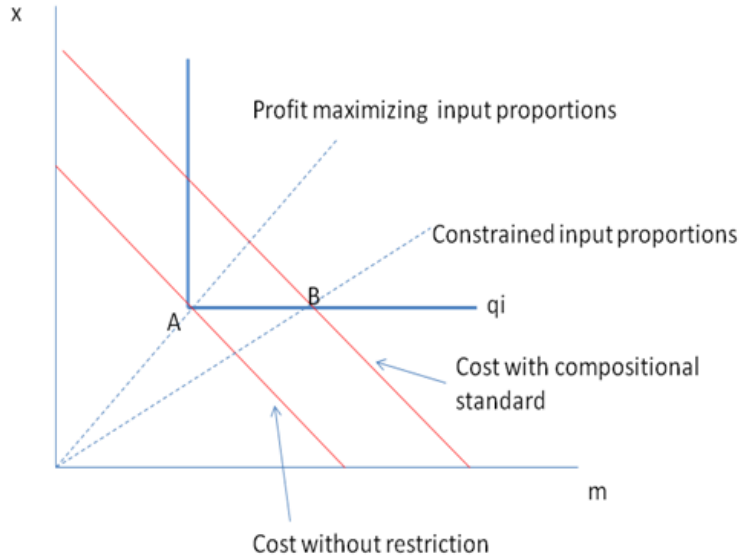
- Increasing use of milk protein products
  - Increasing imports of MPC/MPI
  - Cumulative protective measures

Canadian cheese imports

- Tariff-rate quota (TRQ)
  - Annual import "quota" of 20,412 metric tons
  - EU reserve (2/3)
- Import permits (and import licenses)
  - Allocated on a historical basis
  - Not cheese-specific
  - "Use-it-or-lose-it" clause
- Canada's main cheese suppliers by category

HS 0406	**HS 0406.10 Fresh** *1%*	**HS 0406.20 Grated/Powdered** *6%*	**HS 0406.30 Processed** *6%*	**HS 0406.40 Blue-veined** *6%*	**HS 0406.90 Other** *81%*
USA	USA	USA	Switzerland	Denmark	France
France	Italy	Italy	France	UK	USA
Italy	Denmark	Netherlands	USA	France	Italy

Cheese production: Costs and constraints



- Leontief technology: $q_i \equiv min(\alpha_i m, \beta_i x)$
- Cost function: $C_i = q_i \left(\frac{w_m}{\alpha_i} + \frac{w_x}{\beta_i} \right)$
- Unit cost function: $c_i = \frac{w_m}{\alpha_i} + \frac{w_x}{\beta_i}$
- Increase in c_i from a binding standard s_i: $\Delta c_i = \left(s_i - \frac{1}{\alpha_i} \right) w_m$

Cheese market: Products and Firms

- 2 types of cheese, produced domestically and/or imported
- A representative consumer with quasi-linear preferences:
  $U = Z + A_1 X_1 + A_2 X_2 - 0.5\left(X_1^2 + X_2^2\right) - \gamma X_1 X_2$
- Inverse demands for 2 types of cheese:
  $p_1 = A_1 - \sum_{j=1}^{m_1} q_{1j}^A - \sum_{j=1}^{n} q_{1j}^B - \gamma \sum_{j=1}^{m_2} q_{2j}^A - \gamma \sum_{j=1}^{n} q_{2j}^B$
  $p_2 = A_2 - \sum_{j=1}^{m_2} q_{2j}^A - \sum_{j=1}^{n} q_{2j}^B - \gamma \sum_{j=1}^{m_1} q_{1j}^A - \gamma \sum_{j=1}^{n} q_{1j}^B$
- m_1 domestic firms producing type 1 cheese at unit cost c_1:
  $\pi_{1i}^A = \left(A_1 - \sum_{j=1}^{m_1} q_{1j}^A - \sum_{j=1}^{n} q_{1j}^B - \gamma \sum_{j=1}^{m_2} q_{2j}^A - \gamma \sum_{j=1}^{n} q_{2j}^B - c_1\right) q_{1i}^A$
- m_2 domestic firms producing type 2 cheese at unit cost c_2:
  $\pi_{2i}^A = \left(A_2 - \sum_{j=1}^{m_2} q_{2j}^A - \sum_{j=1}^{n} q_{2j}^B - \gamma \sum_{j=1}^{m_1} q_{1j}^A - \gamma \sum_{j=1}^{n} q_{1j}^B - c_2\right) q_{2i}^A$

Cheese market: Products and Firms

- n importers potentially purchasing both types of cheese at prices r_1 and r_2:

$$\pi_i^B = \left(A_1 - \sum_{j=1}^{m_1} q_{1j}^A - \sum_{j=1}^{n} q_{1j}^B - \gamma \sum_{j=1}^{m_2} q_{2j}^A - \gamma \sum_{j=1}^{n} q_{2j}^B - r_1\right) q_{1i}^B$$
$$+ \left(A_2 - \sum_{j=1}^{m_2} q_{2j}^A - \sum_{j=1}^{n} q_{2j}^B - \gamma \sum_{j=1}^{m_1} q_{1j}^A - \gamma \sum_{j=1}^{n} q_{1j}^B - r_2\right) q_{2i}^B$$

- "Use-it or lose-it clause" : $q_{2i}^B = \overline{Q_i} - q_{1i}^B$
- Reaction functions:

$$j_1^A(q_1^A, q_1^B, q_2^A) = 0, \quad j_2^A(q_1^A, q_1^B, q_2^A) = 0, \quad j^B(q_1^A, q_1^B, q_2^A) = 0$$

- Firms have Cournot conjectures

Comparative statics: Effects of cost increases induced by a compositional standard

1. Increase in r_1: standard binds on foreign type 1 cheese manufacturers only

$r_1 \nearrow$					
Consumption of type 1	$\searrow$		Consumption of type 2	$\nearrow$	
Total domestic cheese production	$\searrow\!\!\nearrow$	if $m_1 \lessgtr m_2$	Total cheese consumption	$\searrow\!\!\nearrow$	if $m_1 \lessgtr m_2$
Domestic demand for milk	$\searrow\!\!\nearrow$	if $\frac{m_1+B}{m_2+B} \lessgtr \frac{\alpha_1}{\alpha_2}$	Value of trade	$\nearrow$ *or* $\searrow$	if $r_1 \lessgtr r_2$

$$\begin{array}{ccc} \Delta q_1^B < 0 & \Rightarrow & \Delta q_2^B > 0 \\ \Downarrow & & \Downarrow \\ \Delta q_1^A > 0 & & \Delta q_2^A < 0 \\ \hline \Delta(m_1 q_1^A + n q_1^B) < 0 & & \Delta(m_2 q_2^A + n q_2^B) > 0 \end{array}$$

Comparative statics: Effects of cost increases induced by a compositional standard

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Domestic demand for milk	$\searrow \nearrow$	if $\frac{m_1+B}{m_2+B} \lessgtr \frac{\alpha_1}{\alpha_2}$	Value of trade	$\nearrow$ or $\searrow$	if $r_1 \lessgtr r_2$

$$\begin{array}{ccc} \Delta q_1^B < 0 & \Rightarrow & \Delta q_2^B > 0 \\ \Downarrow & & \Downarrow \\ \Delta q_1^A > 0 & & \Delta q_2^A < 0 \end{array} \quad \Big| \quad \Delta(m_1 q_1^A + m_2 q_2^A) < 0 \text{ if } m_1 < m_2$$

Comparative statics: Effects of cost increases induced by a compositional standard

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Total domestic cheese production	$\searrow$	if $m_1 \lesseqgtr m_2$	Total cheese consumption	$\searrow$ if $m_1 \lesseqgtr m_2$
	$\nearrow$			$\nearrow$
Domestic demand for milk	$\searrow$	if $\frac{m_1+B}{m_2+B} \lesseqgtr \frac{\alpha_1}{\alpha_2}$	Value of trade	$\nearrow$
	$\nearrow$			$\nearrow$ or $\searrow$ if $r_1 \lesseqgtr r_2$

$$\Delta q_1^B < 0 \quad \Rightarrow \quad \Delta q_2^B > 0$$

$$\Downarrow \qquad\qquad \Downarrow$$

$$\Delta q_1^A > 0 \qquad \Delta q_2^A < 0$$

$$\Delta\left(\frac{m_1}{\alpha_1} q_1^A + \frac{m_2}{\alpha_2} q_2^A\right) < 0$$

if $m_1 < m_2$, when $\alpha_1 = \alpha_2$

Comparative statics: Effects of cost increases induced by a compositional standard

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$$\begin{array}{ccc} \Delta q_1^B < 0 & \Rightarrow & \Delta q_2^B > 0 \\ \Downarrow & & \Downarrow \\ \Delta q_1^A > 0 & & \Delta q_2^A < 0 \end{array} \quad \Big| \quad \Delta(nq_1^B r_1 + nq_2^B r_2) < 0 \text{ if } r_1 >> r_2$$

Comparative statics: Effects of cost increases induced by a compositional standard

2. Increase in c_1: standard binds on domestic type 1 cheese manufacturers only

$c_1 \nearrow$			
Consumption of type 1	$\searrow$	Consumption of type 2	$\nearrow$ *or* $\searrow$
Total domestic cheese production	$\searrow$	Total cheese consumption	$\searrow$
Domestic demand for milk	$\nearrow$ *or* $\searrow$	Value of trade	$\nearrow$ / $\searrow$ if $r_1 \gtrless r_2$

$$\begin{array}{ccc} \Delta q_1^A < 0 & & \Delta q_2^A > 0 \\ \Downarrow & & \Downarrow \\ \Delta q_1^B > 0 & \Rightarrow & \Delta q_2^B < 0 \end{array}$$

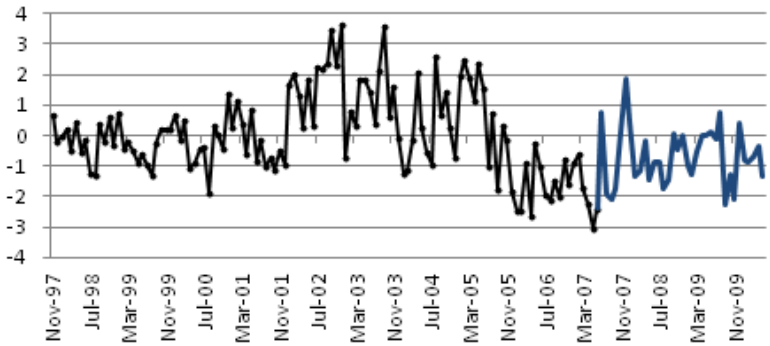
Testing for structural breaks: Method

- Andrews(2003) test:
  - Variant of the Chow test
  - Detects *end-of-sample* structural change
- Bai and Perron(1998, 2003) test:
  - *Endogenously* determines number and dates of breaks
- $Y_t = \begin{cases} X_t\beta_1 + u_t & t = 1, \ldots, n \\ X_t\beta_2 + u_t & t = n+1, \ldots, n+m \end{cases}$
- Timeline:
  - June 2007: notification to the WTO
  - December 2007: adoption by the Canadian parliament
  - September 2008: MPI is added to the Canadian ICL
  - December 2008: enforcement

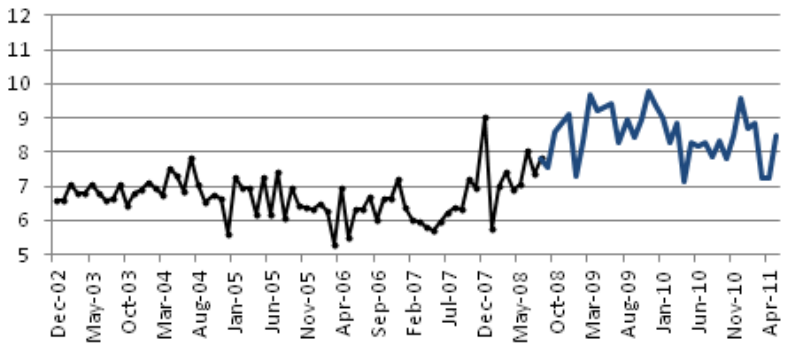
Testing for structural breaks: Results

Structural change in unit values of Canadian cheese imports by HS6 category ***from all sources***

Cheese type	**Bai and Perron test**	**Andrews test**	
	(on full sample)	Estimation period	Results
Fresh cheese	May 2010***	Jan 1997-*end* Jan 1997-May 2010	Jan-Jun 2010*** Jun,Sep,Oct 2007*
Grated/Powdered cheese	*stability*	*full sample*	*stability*
Processed cheese	Nov 2002**	Dec 2002-*end*	Feb 2009**, Jul-Sept 2008*
Blue-veined cheese	*stability*	*full sample*	*stability*
Other cheese	*stability*	*full sample*	*stability*



Fresh cheese from all sources



Processed cheese from all sources

Testing for structural breaks: Results

*Structural change in unit values of Canadian cheese imports **by main suppliers** and HS6 category*

Cheese type	Origin	**Bai and Perron test**	**Andrews test**	
		(on full sample)	Estimation period	Results
Fresh cheese	Italy	Dec 2001**	Jan 2002-*end*	Mar 2010**
	US	May 2010***	Jan 1997-*end* Jan 1997-May 2010	Nov 2009-Jun 2010** Jun,Oct 2007***
Grated/Powdered cheese	US	*stability*	*full sample*	*stability*
Processed cheese	France	*stability*	*full sample*	*stability*
	Switzerland	Sept 2002***	Oct 2002-*end*	Oct,Nov 2010*
	US	*stability*	*full sample*	Feb 2009*
Blue-veined cheese	Denmark	*stability*	*full sample*	Mar-May 2008*
	France	*stability*	*full sample*	*stability*
Other cheese	France	*stability*	*full sample*	*stability*
	Italy	*stability*	*full sample*	Feb-Apr 2011**
	Switzerland	*stability*	*full sample*	*stability*
	US	Mar 2005**	Apr 2005-*end*	May 2009**

Conclusion

- Varying standards effects according to:
  - cheese type
  - manufacturer and country of origin
- Theoretical model:
  - important role of domestic market structure
  - “ratchet effect”
  - potential peculiar effects
- Empirical analysis:
  - mainly upward shifts in unit values: beneficial for EU
  - abrupt decrease in MPC unit values: detrimental for NZ