Trade Linkages and Terminal Markets

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Power Point Presentation for the
International Agricultural Trade Research Consortium
Analytic Symposium
"Confronting Food Price Inflation:
Implications for Agricultural Trade and Policies"

June 22-23, 2009
Seattle, Washington

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Introduction

- Two elements of free trade that are sometimes overlooked are market institutions are interactions between wholesalers and retailers
- Terminal markets are one example of institutions that have an impact on both demand and prices and therefore gains from free trade
- The mix of retailers in the domestic market affects how wholesale market functions
- We follow a very micro-level approach using producer and wholesale data for oranges in terminal and non-terminal markets
- Canada relies on imports to meet demand for fresh produce, so import prices are key determinants of domestic prices

Key differences between Toronto and Montreal wholesale markets

- Wholesalers in Montreal both larger and fewer in number than in Toronto, which has a terminal market

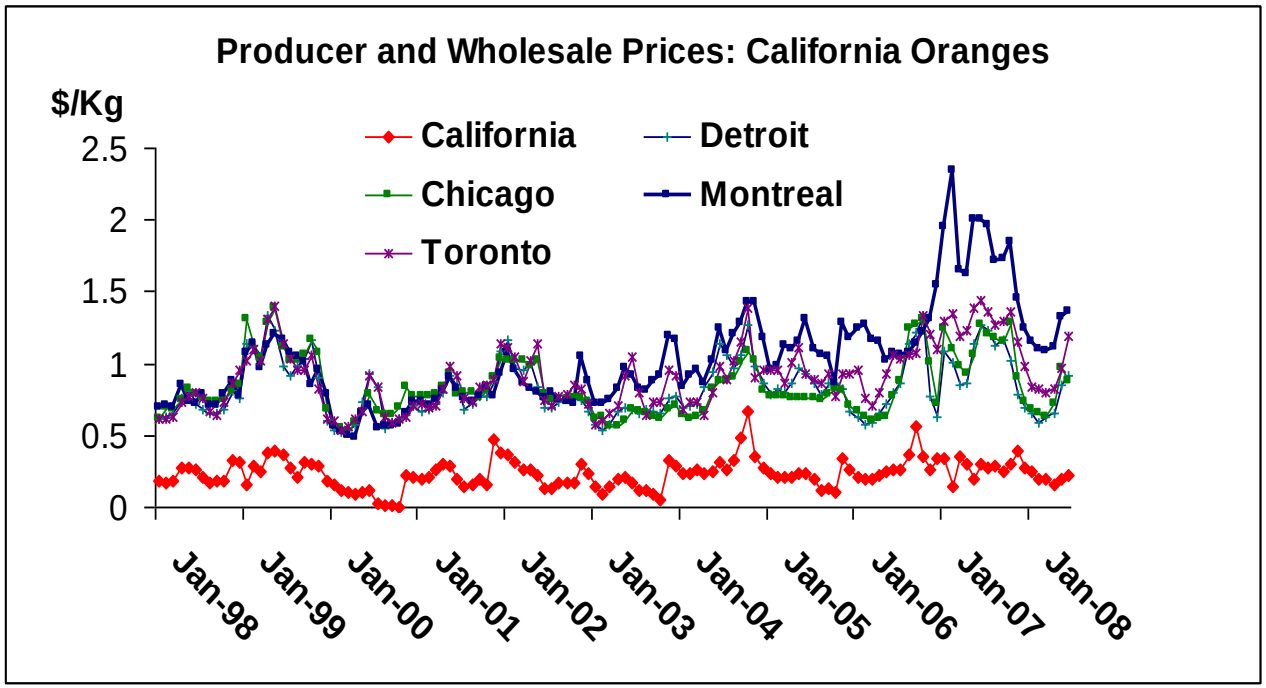
- Retailers near these markets differ in composition
  - 67% of grocery retailer in Quebec are franchised or unaffiliated versus 54% in Ontario
  - Franchised or unaffiliated retailers have a higher proportion of total sales in Quebec (60%) than in Ontario (38%)

- Our hypothesis is that wholesaler to retailer prices will be higher in Montreal than in Toronto

Shipping Routes

- We examine wholesale prices for oranges in Montreal and three northeastern cities with terminal markets: Toronto, Chicago and Detroit
- Shipping costs between cities are assumed to be marginal compared to shipping costs from California

Wholesale prices for California Oranges



- These prices represent average prices to franchised and independent grocers who rely on these markets
- Prices in Montreal tend to lie above other cities
- We seek to test if differences may be related to market institutions and market structure

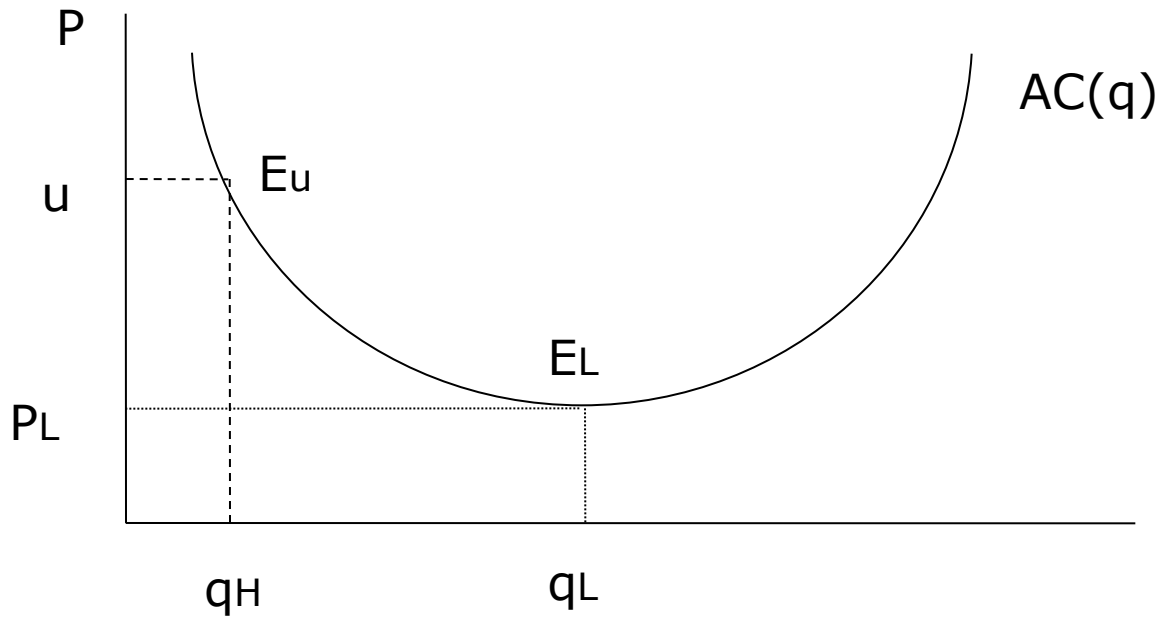
Analytical Framework

- We distinguish between two sets of relationships in the market:
  1. The relationship between producers and wholesalers
  2. The relationship between wholesalers and independent and unaffiliated retailers
- Wholesalers are treated as price takers.
  - Minimize costs for a given quantity purchased given fixed inputs
- Retailers consider search costs when deciding which wholesale price to accept
- Cities differ in wholesaler fixed costs and proportion of retailers willing to search for lowest price

Wholesaler & Retailer Behaviour (1)

- Our assumptions for wholesaler and retailer behaviour are based upon Salop and Stiglitz (1977):
  - Wholesalers in any city have a common average cost curve, up to differences in fixed costs
  - Retailers in each city are identical, except for search costs
  - Retailers will not pay more than their common reservation price, u
  - Each city has two types of retailers, R_1 and R_2, who differ in terms of their search costs, c_1 and c_2, where $c1 \leq c2$
  - Search costs and the proportions of R1 and R2 may vary by market
  - Retailers take their search costs into account by weighing benefits of paying $P_{min} + c_i$ versus expected going price
  - Wholesalers take the proportions of R_1 and R_2 into account when setting prices

Wholesaler & Retailer Behaviour (2)



- For any city, there are four possible equilibria: Eu, El, a two-price equilibrium and none
- Differences between configurations depend on relative proportions of low search cost and high search cost retailers.
- A terminal market city will have a lower AC, implying both a lower minimum price and a lower observed price, but greater price dispersion

Inter-City Relationships

- Some low search-cost retailers are prepared to look at markets in other cities
- This effectively takes them out of the market at home, at least in the short run
- Wholesalers in high AC cities must monitor prices in other cities
- An increase in the producer price can cause retailers in a high AC city to shop in other cities
- Not having a terminal market is reflected by the rate of price transmission

Empirical Model

- The Johansen Trace test suggests 4 cointegrating equations embodied our Vector Error Correction model, which is specified as:

$$\Delta P_t = \alpha \beta^{*T} \begin{bmatrix} P_{t-1} \\ D_{t-1} \end{bmatrix} + \Gamma_1 \Delta P_{t-1} + \upsilon_t$$

- Our hypothesis is that price transmission equality will hold for pairs of terminal market cities but not for mixed pairs of cities
- To do this, we test if long-run price transmission coefficients in β* are equal in Chicago and Detroit and in Toronto and Montreal

Data

- We focus on orange imports from California, which are a pure import, continuous and non-trivial
- Data consists of a "representative orange" wholesale price series for each city along with California producer prices

$$P_t = \begin{pmatrix} P_{t,Toronto} \\ P_{t,Montréal} \\ P_{t,Chicago} \\ P_{t,Detroit} \\ P_{t,California} \end{pmatrix}, t = \{1998:1, ..., 2008:6\}$$

- Representative wholesale price series are monthly averages computed from daily high and low offer prices
- We control for variety, size and packaging to ensure a relatively standard product

Estimation Results (1)

Matrix of Short-Run Adjustment Terms (Alpha)				
	Toronto	Montreal	Chicago	Detroit
dToronto	-0.635**	0.293**	0.230	0.003
dMontreal	0.448**	-0.135*	-0.074	-0.328*
dChicago	0.313**	-0.015	-0.352**	-0.049
dDetroit	0.120	0.072	0.034	-0.470**
dCalifornia	-0.139	0.136**	0.161*	0.024
*Significant at 90%; **Significant at 95%				

- Diagonal terms are negative and significant
- Wholesale prices in each city revert back towards equilibrium relationship with producer prices after deviation
- Montreal and Toronto adjust to deviations in each others' prices

Estimation Results (2)

Matrix of Cointegrating Relationships (Beta*)				
	Toronto	Montreal	Chicago	Detroit
	1	--	--	--
	--	1	--	--
	--	--	1	--
	--	--	--	1
California	-2.826**	-4.921**	-1.882**	-1.668**
Constant	-0.218**	0.208	-0.393**	-0.431**
D2007	-0.273**	-0.736**	-0.070	-0.070
*Significant at 90%; **Significant at 95%				

- Columns represent long-run relationship between wholesale prices particular city and California producer prices
- Eg: $P_{TOR,t-1} = 0.218 + 2.826P_{CA,t-1} + 0.273D_{2007,t-1} + \varepsilon_{t-1}$
- The matrix of short-run adjustment terms responds to εt-1, the deviation from the long run relationship at t-1

Hypotheses Tests

- Toronto is paired with Montreal (540 km) and Chicago is paired with Detroit (450km)

- We assume similar cost structures, reservation prices and proportions of retailers in the two U.S. cities

- We reject the joint hypotheses of equality in price transmission in both city pairs (W=25.5) (ie: at least one pair does not exhibit equality)

- We cannot reject the null of equality for Chicago and Detroit (W=1.5)

- But we do reject the null of equality for Toronto and Montreal (W=17.5)

- In our opinion, these results support our hypotheses that price transmission differs between terminal market city pairs and mixed city pairs

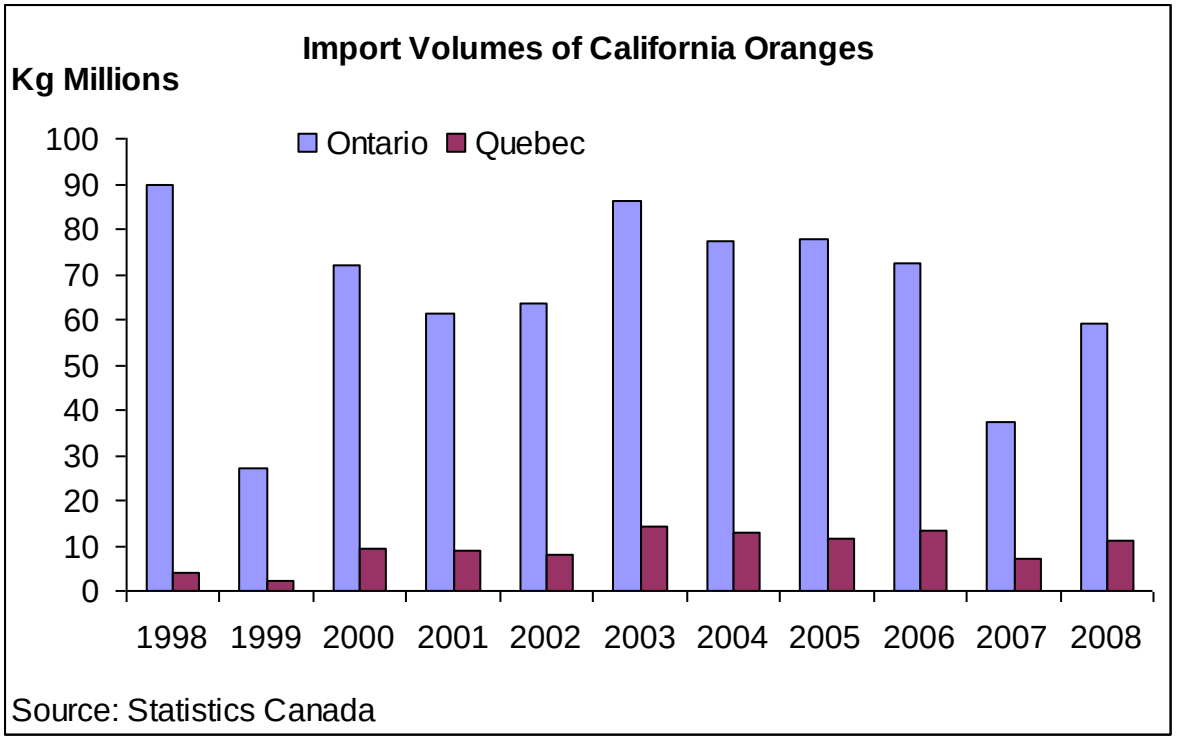
- However, without more information on retail structure, we cannot separate terminal market effects from retail composition effects

Conclusions

- Terminal markets matter in determining local gains from free trade
- There are trade-related implications for consumers in non-terminal market cities
- There may be a role for government in reducing the gap between terminal and non-terminal market cities evaluating and stimulating construction of terminals or replicating some of their key functions
- Our understanding of retailer and wholesaler behaviour is limited at the moment
- For example, we would like to know more about:
    - Volumes shipped between cities
    - The composition of retailers in each city

Thank you

Ontario and Quebec Orange Imports from California



- There are two key aspects to orange imports in Central Canada:

1. Most imports enter via Ontario due to trucking routes

Empirical Model

- The Johansen Trace test suggests 4 cointegrating relationships
- Our Vector Error Correction model is specified as:

$$\Delta P_t = \alpha \beta^{*T} \begin{bmatrix} P_{t-1} \\ D_{t-1} \end{bmatrix} + \Gamma_1 \Delta P_{t-1} + v_t$$

- Where:
  - ΔPt is a vector containing first-differenced wholesale prices for each city and first-differenced producer prices in period t
  - β*'=[β' η'] defines our price transmission between producer prices and wholesaler prices
  - Together, β*', P_{t-1} and deterministic terms D_{t-1} tell us the deviation from the LR equilibrium in the last period
  - α tells us how system adjusts deviations from LR equilibrium in t-1
- We use β* to test if price transmission differs between pairs of terminal market cities and mixed pairs of cities (eg: Toronto and Montreal)