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Vertical Price Transmission and Relationships Between Selected Agri-food Value Chains in Australia and Colombia

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Price Transmission

- Key indicator to **assess the efficiency and degree of competition** in agri-food chains (incentives).
- **Imperfect price transmissions** could require **policy interventions** to raise:
 - **Welfare of specific actors.**
 - **Competitiveness** of the whole chain.
- **Inefficient outcomes** affect the **performance and viability** of the whole chain.

Price Transmission: **International to Domestic Prices**

- **Rising of international prices** is an **opportunity** for:
 - Agricultural development,
 - Poverty reduction and
 - Improvements in food security.
- **Not if domestic traders could keep high differences between international and farmer prices.**
- **Variations in prices may:**
 1. Not be transmitted through chains,
 2. Be transmitted with a lag or
 3. Be transmitted depending on the direction of the change.

Price Transmission in **Agri-food Chains**

- Price transmission will be affected by:
 - i. Nature or characteristics,
 - ii. Structure and
 - iii. Organisation of the chain.
- **Asymmetries and lags in price transmission have been found in different agri-food chains in several countries:**
 - **Beef, chicken and eggs** in the US by Vavra and Goodwin (2005),
 - **Sorghum and coffee** in Uganda by Kaspersen and Foyen (2010), and
 - **Pork** in Germany by Von Cramon-Taubadel (1998).

Price Transmission: Relationships Between Related Agri-food Products and Inputs

- **Farmer prices are also affected by prices paid in related agricultural products.**
 - Found by Harri *et al.* (2009).
 - Limited studies in this area.
- **Oil price and other marketing input prices also affect farmer prices.**
 - Studied by Wholgenant and Mullen (1987), among others.

Motivation of the Study and Research Question

- **Australia and Colombia export some agri-food products in common... But have different production conditions!!**
- **Limited research about relationships between prices of related agricultural products** paid to farmers.

- **In This Context...???**

What are the factors affecting farmer-export/wholesale price spreads along selected agri-food chains and between them in Australia and Colombia?



Source: solodialogue.wordpress.com (2014).

Vertical Price Spread from Wholesale to Farm

- Wholgenant and Mullen (1987):

$$P_{ft} = f(P_{wt}, Q_{ft}, C_t)$$

where:

P_{ft} = **Farmer price** in time t .

P_{wt} = **Export/wholesale price** in time t .

Q_{ft} = **Quantity of farm input** in time t .

C_t = **Marketing input prices** in time t , including transportation costs (**oil price**) and wage rates (**GDP per capita used as proxy variable**), among others.

Australian and Colombian Data

- Australian and Colombian data including:
 - i. Production,
 - ii. Farmer prices and
 - iii. Export prices.
- Of 1) banana, 2) beef cattle and 3) sugar cane from 1970 to 2010 was obtained from FAOSTAT (2013).
- International Oil Prices and GDP per capita data was also collected.

Modelling Price Transmission and Relationships Between Farmer Prices

- An **Error Correction Model (ECM)** can be used when:
 1. Prices are the same integration order and
 2. Pricers are cointegrated.
- An **Asymmetric Error Correction Model (AECM)** was used → **ECM including asymmetric adjustment terms** as proposed by Granger and Lee (1989).
- **Asymmetry** if positive and negative variations of the error correction term lagged one period are *different*.

Asymmetric Error Correction Model

$$\Delta P_{fit} = \varphi + \gamma^+ v_{t-1}^+ + \gamma^- v_{t-1}^- + \sum_{k=0}^n \delta_k \Delta P_{wit-k} + \sum_{k=1}^n \theta_k \Delta P_{fit-k} + \sum_{j=1}^n \tau_j \Delta P_{fjt} + \sum_{h=1}^n \omega_h \Delta C_{ht} + u_t$$

where:

ΔP_{fit} = First difference of the **farmer price in the chain i** in time t .

ΔP_{wit-k} = First difference of the **wholesale/export price in the chain i** in time $t-k$.

ΔP_{fit-k} = First difference of the **farmer price in the chain i** in time $t-k$.

ΔP_{fjt} = First difference of the **farmer price in the related chain j** in time t .

ΔC_{ht} = First difference of the **prices of marketing input h** in time t .

v_{t-1}^+ = Positive variations of the error correction term lagged one period.

v_{t-1}^- = Negative variations of the error correction term lagged one period.

ADF and Engle-Granger Tests: Results

- **All series are I(1):**
 - Have unit root in levels and
 - Do not have unit root in first differences.
- **Price series are cointegrated** (Exception: Colombian sugar cane).
- Evidence of **vertical price transmission in the long run** in most of the selected agri-food chains.

Asymmetric Error Correction Models for Selected Agri-Food Chains in Australia and Colombia

Variable	First Difference Farmer Prices Australia			First Difference Farmer Prices Colombia		
	Banana	Beef Cattle	Sugar Cane	Banana	Beef Cattle	Sugar Cane
Constant	175.3238	-39.4160	-0.7275	-29.7814	-45.7564	-1.2621
Positive residuals cointegration equation lagged one period	-0.9779***	-0.6319***	-0.5468***	-0.3261	-0.2366***	-
Negative residuals cointegration equation lagged one period	-0.0903	-0.7607***	-0.5397**	-0.6056	0.0017	-
First difference export price banana	0.0883	-	-	0.4494	-	-
First difference export price beef cattle	-	0.0546	-	-	0.0041	-
First difference export price sugar cane	-	-	0.5261***	-	-	-0.0239***
First difference farmer price banana lagged one period	0.0409	-	-	0.0026	-	-
First difference farmer price beef cattle lagged one period	-	-0.0494	-	-	0.0766	-
First difference farmer price sugar cane lagged one period	-	-	-0.1251***	-	-	-0.0171
First difference farmer price banana	-	-0.0080	0.0024**	-	-0.4394	0.0032
First difference farmer price beef cattle	0.0831	-	-0.0003	-0.0750*	-	0.0075
First difference farmer price sugar cane	6.6859	13.7940***	-	1.0229	7.2135**	-
First difference GDP per capita	-0.2070*	-0.0454	0.0001	0.5024***	1.2507**	0.0152
First difference oil price	0.4079	13.3568*	-0.0057	-0.9833	-0.1214	0.0327
Dummy 1977	-	-	-	-	489.0295***	-
Dummy 1991	-	-	-	-	-	25.3260***
Dummy 2007	1345.1210***	-	-	-	-	-
R-squared	0.8112	0.6811	0.9229	0.4711	0.5723	0.5623
Adjusted R-squared	0.7374	0.5747	0.9000	0.3300	0.4395	0.4634
Corrected violation	None	Heteroskedasticity	None	None	None	Autocorrelation

(*), (**) and (***) correspond to significance levels at $\alpha = 10, 5$ and 1% , respectively.

Source: Developed by the authors using information from FAOSTAT (2013), BP (2013), BLS (2013) and ERS (2013).

Results

- **Prices are transmitted from exporters to farmers** but:
 - Could take some periods.
 - Variations are **more quickly transmitted in Australia.**
- **Asymmetries in price transmission** found in the **Australian banana and Colombian beef cattle chains.**
- **Positive shocks are more quickly transmitted to farmers**
→ **Wholesalers could hold substantial margins.**
- **Australian chains are more intensive in capital** than the **Colombian chains that use more labour.**
- **Some relationships between farmer prices in both countries were found significant, but not reciprocal.**

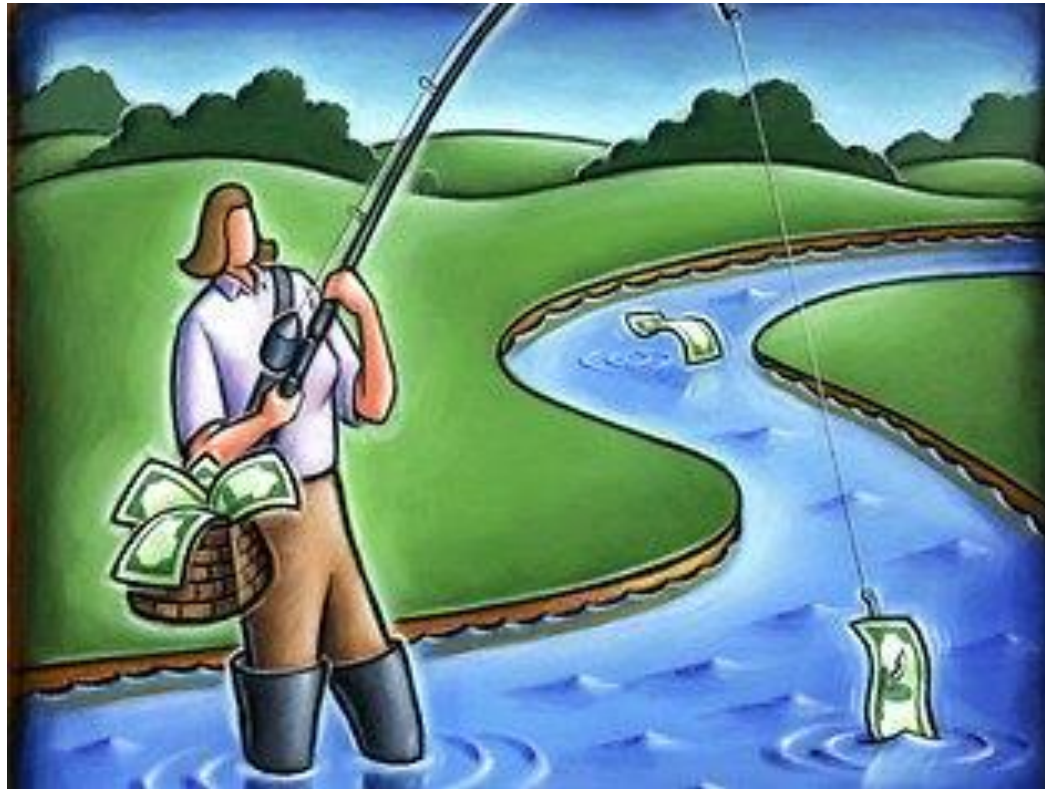
Conclusions

- Price variations are vertically transmitted in most of the agri-food chains, but **there is asymmetry and variable speed** in the transmission.
- **There are some relationships** between some of the selected chains in Australia and Colombia!!
- Further research is recommended, where **data availability will be crucial** to:
 - Use more sophisticated techniques, **including (VECM)**.
 - **Account for horizontal interactions** between farmer prices among agri-food chains.

Thank You Very Much!!

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Comments? / Questions?



Source: theaustralian.com.au (2014).