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Price Variations of Cattle Grades: How Are Quality Attributes Related?

L. Emilio Morales and Nam Hoang

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Price Variations of Cattle Grades: How Are Quality Attributes Related?

L. Emilio Morales and Nam Hoang

UNE Business School
University of New England
AARES 60th Annual Conference
Canberra, Australia, 2016

Source: http://www.beefandlamb.com.au (2016).

Quality Differentiation

- **Quality differentiation in agro-food markets has increased** → More consumers are willing to pay premiums for high-quality products.
- **Differentiation is based on a specific or combination of attributes** → **Increase the chances** the product being **selected** by consumers (Gracia *et al*., 2014).
- **Premiums should be equivalent to the additional cost of producing high quality** (Lapan and Moshini, 2007).
- But, **consumers' willingness to pay for quality attributes varies** and **might not be enough to offset the additional costs!!** (Frank, 2006; Gracia *et al*., 2014; Viegas *et al*., 2014).

What Does Determine the Price of a Product?

- **Hedonic model** → Price is a **function of attributes** or features of each product. **Δ+ Attributes → Δ+$**
- **But, research has found substitution effects of attributes on consumers' willingness to pay** (Beranrd and Bernard, 2009; Gracia et al., 2014; Bronnmann and Asche, 2015).
- **Prices vary due to:**
  - Attributes and types of products (different grades).
  - Differentiation.
  - Consumer preferences.
  - What about price transmission between quality grades?
- Tomek and Kaiser (2014) suggested **that variations in prices of different grades are correlated.**

The Study

- This study aims to **analyse the impact of variations on prices of a specific quality grade on other grades.**
- Our empirical case study is cattle markets in **Queensland, Australia.**
- **The Australian beef sector is a highly competitive industry** → It provides an ideal case study.
- **This research tests the price relationships between: i) Base Grade, ii) Meat Standards Australia (MSA), iii) Grain-Fed 100 days, and iv) MSA-Grain-Fed 100 days.**

Data

- **Weekly average prices of cattle sold in Over The Hooks sales in QLD South (August 2014 to November 2015).**
- Prices in Australian cents per kilogram of carcass weight (AU cents/kg cwt) **of 260-280 kilograms steers.**
- **Prices of Base-grade, Grain-Fed 100 days, MSA-Grade and MSA-Grain-Fed 100 days cattle**.

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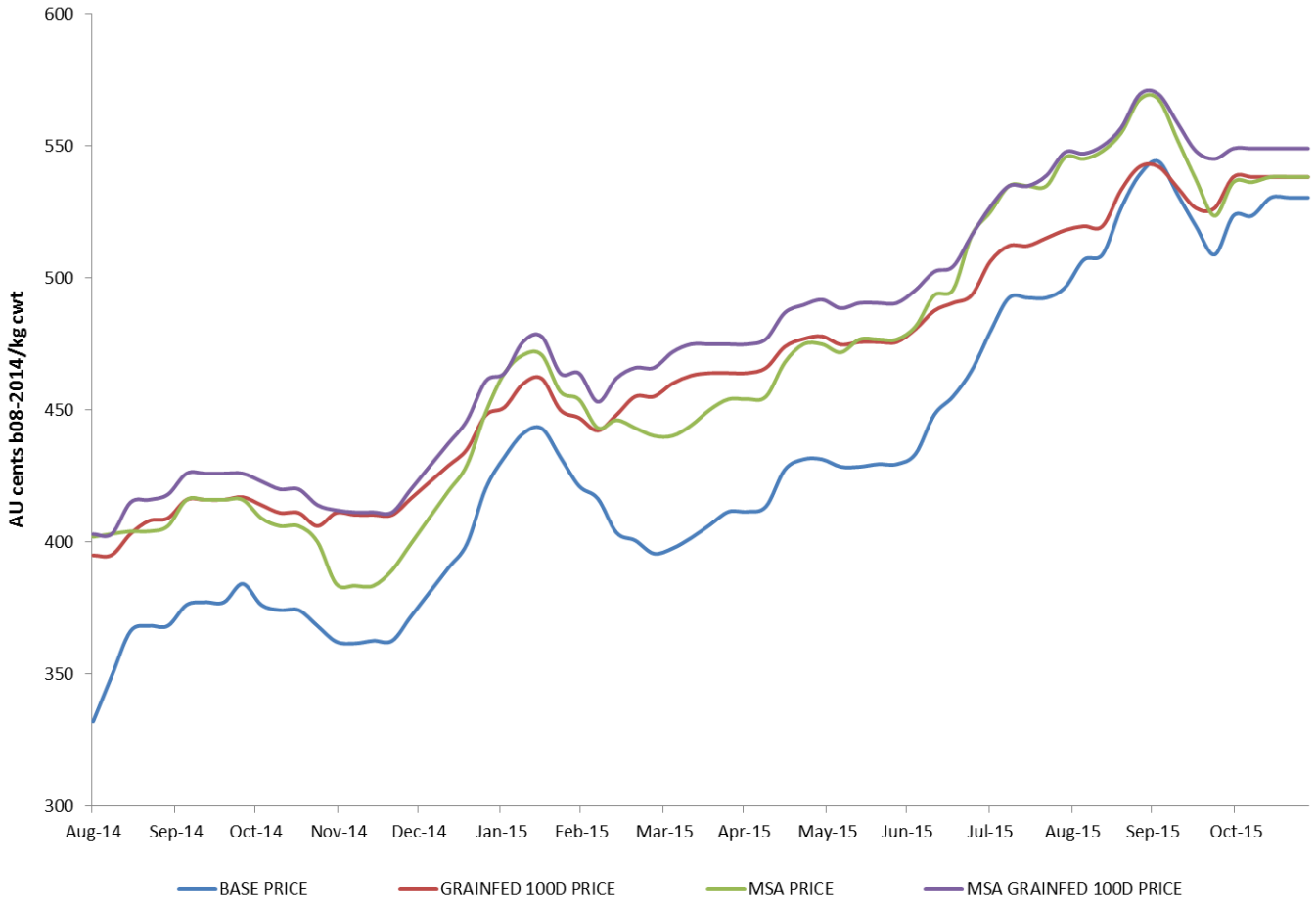
Cattle Prices in Queensland, Australia (August 2014 to November 2015)



Price Transmission SVAR Dynamic Model

- Fackler and Goodwin (2001) and Enders (2014):

$$A_0 LnP_t = C_0 + \sum_{s=1}^{S<T} C_s LnP_{t-s} + u_t$$

$$LnP_t = A_0^{-1} C_0 + \sum_{s=1}^{S<T} A_0^{-1} C_s LnP_{t-s} + A_0^{-1} u_t$$

$$\Delta LnP_t = A_0^{-1} C_0 + \sum_{s=1}^{S<T} A_0^{-1} C_s \Delta LnP_{t-s} + A_0^{-1} u_t$$

where:

P_t = **vector of prices** at time *t*.

$A^{-1}u_t$ = **random stochastic residuals matrix e_t** estimated from the residuals u_t.

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Ng and Perron Unit Root Tests

Ng and Perron (2001) Unit Root Test Results of Price Series

	MZα test statistic with variables in levels	MZα test statistic with variables in first differences
Natural Logarithm of Base Grade Cattle Prices (AU cents b08-2014/kg cwt)	-16.4440*	-18.3068**
Natural Logarithm of Grain-Fed 100 Days Grade Cattle Prices (AU cents b08-2014/kg cwt)	-13.6411	-20.4619**
Natural Logarithm of MSA Cattle Prices (AU cents b08-2014/kg cwt)	-14.9725	-20.4312**
Natural Logarithm of MSA-Grain-Fed 100 Days Grade Cattle Prices (AU cents b08-2014/kg cwt)	-33.6255***	-19.6546**

Null hypothesis: Series has unit root.

(***), (**) and (*) indicate that the parameter is significant at the 1%, 5% and 10% levels, respectively.

Reduced-Form VAR or SVAR?

- **Contemporaneous effects can be tested through Cholesky decomposition.**

	Coefficients Matrix A_0^{-1}			
	DLNBGP	**DLNGFP**	**DLNMSAP**	**DLNMSAGFP**
First Difference of Natural Logarithm of Base Grade Cattle Prices (DLNBGP) (AU cents b08-2014/kg cwt)	0.014756***	0	0	0
First Difference of Natural Logarithm of Grain-Fed 100 Days Grade Cattle Prices (DLNGFP) (AU cents b08-2014/kg cwt)	0.007064***	0.007265***	0	0
First Difference of Natural Logarithm of MSA Cattle Prices (DLNMSAP) (AU cents b08-2014/kg cwt)	0.01064***	0.003279***	0.009960***	0
First Difference of Natural Logarithm of MSA-Grain-Fed 100 Days Grade Cattle Prices (DLNMSAGFP) (AU cents b08-2014/kg cwt)	0.007895	0.006705***	0.003040***	0.003991***

(*), (**) and (***) indicate that the parameter is significant at the 1%, 5% and 10% levels, respectively.

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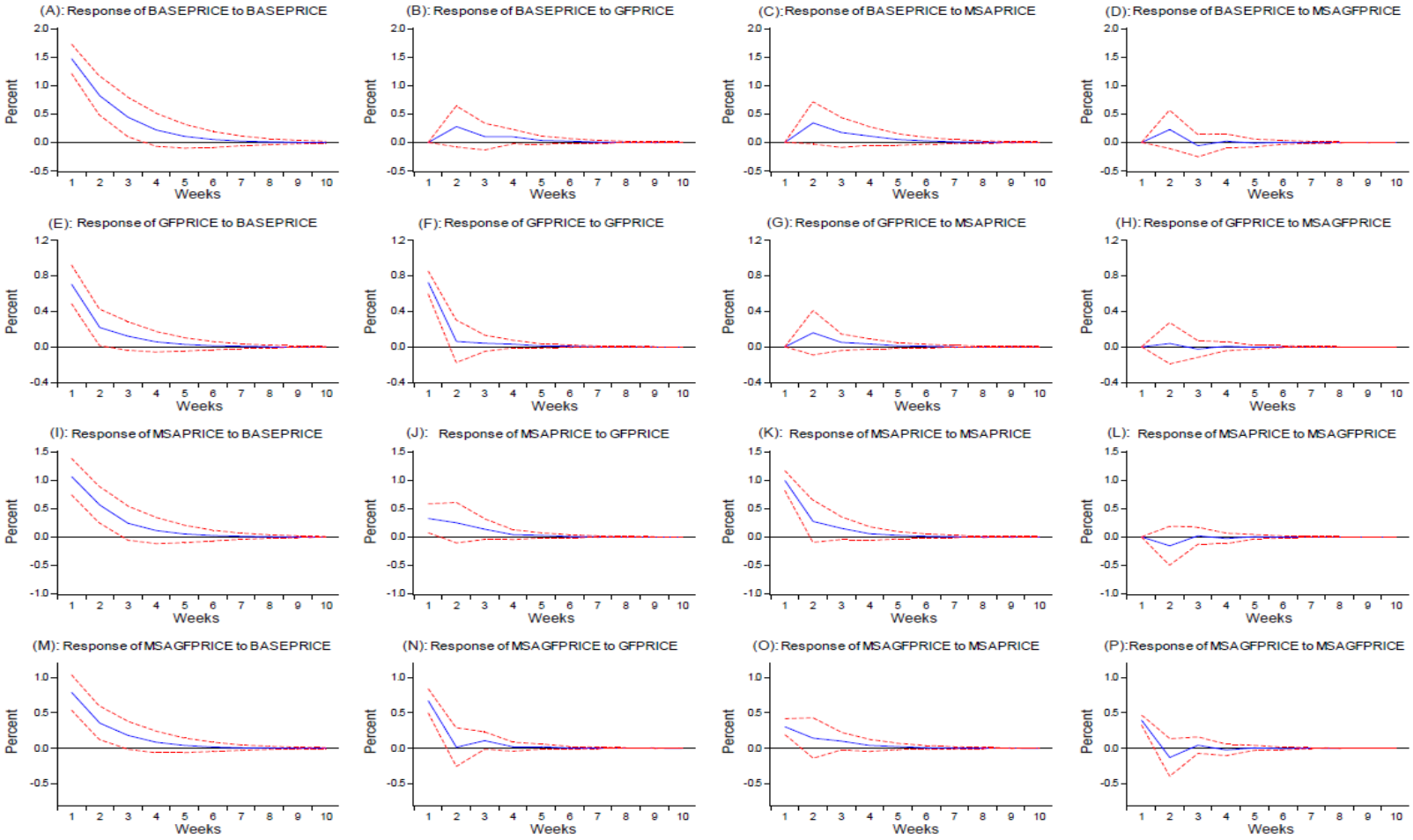
Ranges for Impulse Response to Shocks on Cattle Prices Using Cholesky Decompositions



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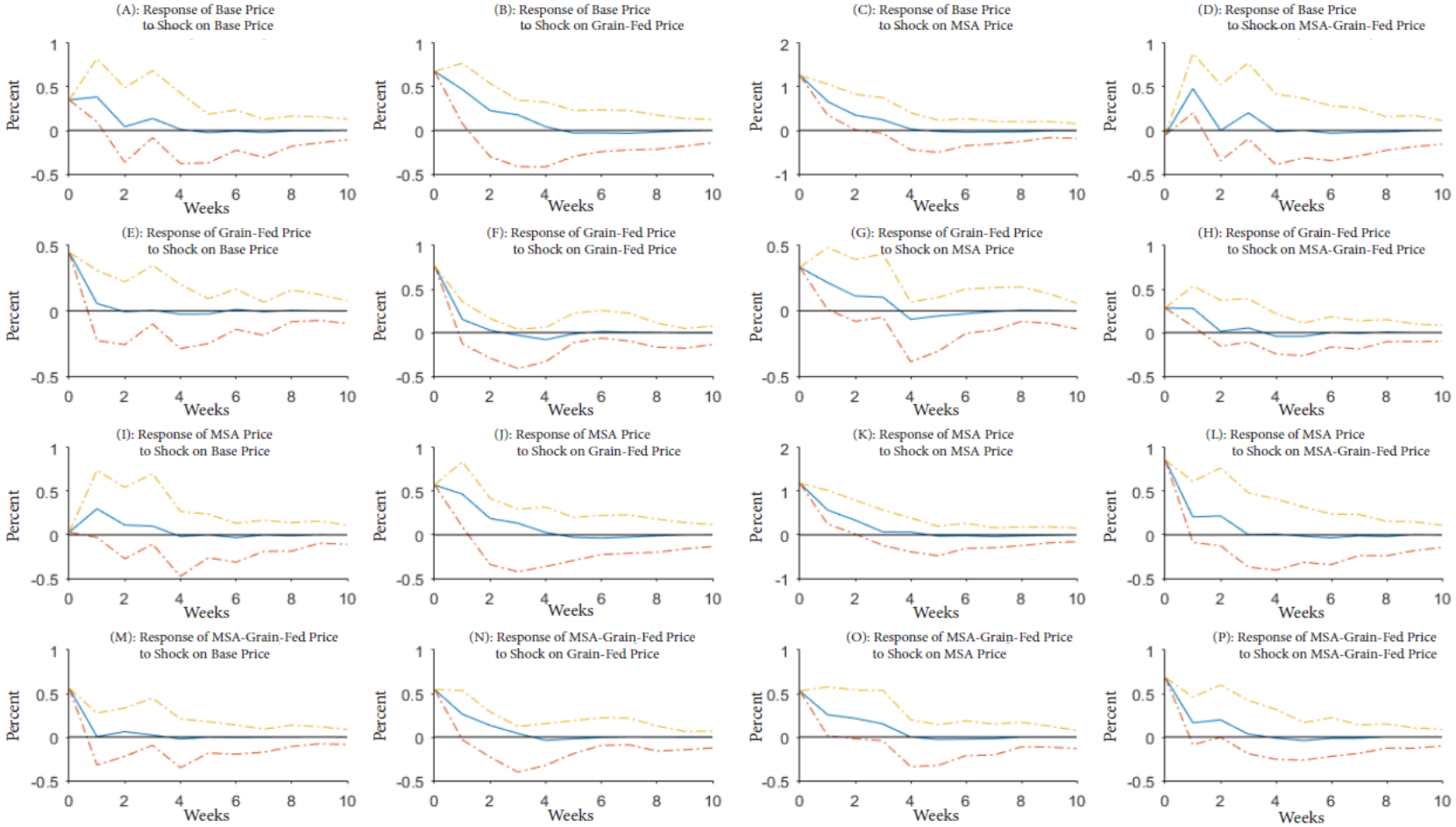
Ranges for Impulse Response to Shocks on Cattle Prices Using Sign Restriction Identification



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Conclusions

- **Cattle quality grades are integrated in Queensland**, Australia, although imperfectly.
- **Price shocks are partially contemporaneously transmitted and the transmission occurs within a month.**
- Future studies:
  - Should analyse the **price transmission between substitutes and complementary products.**
  - Should study **how price variations in quality grades are vertically transmitted throughout value chains and how they affect producers' welfare.**

Thank You Very Much!!

Dr. L. Emilio Morales
UNE Business School
University of New England
Armidale NSW 2351
emilio.morales@une.edu.au

University of New England

Comments? / Questions?

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