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Transmission of the International Price of Maize to the Mexican Regions

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Transmission of the International Price of Maize to the Mexican Regions

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Abstract

- Are variations in international prices of corn transmitted to local markets in Mexico?
- How homogeneous is the transmission across the different regions of the country?
- I estimate to what extent changes in international prices of maize are transmitted to the different Mexican sub-national regions.
- The price of white maize in the Mexican regions is cointegrated with the international price of yellow maize but not with the international price of the Argentina Up River maize.
- The north has the largest price transmission elasticity among the Mexican regions, although all of the regions exhibit similar elasticities. Changes in the international prices have permanent effects on the average of local prices in Mexico.

Introduction

- Two episodes have rekindled the popular and academic interest in the transmission of international food prices to domestic ones and in price stabilization policies: The global food price crisis of 2007-2008, when the UN-FAO's Food Price Index rose by 61 percent between January 2007 and 2008; and the crisis of 2010-2011 when the largest one-month wheat price increase in decades was registered in the summer of 2010 (Minot, 2011; Bellemare, Barret and Just, 2013).
- I aim to know whether the variations in international prices of corn are transmitted to local markets in Mexico and estimate at what degree the transmission differs across sub-national divisions.
- A way to address these objectives is estimating a price transmission elasticity for each different Mexican region. The way to interpret this kind of elasticity is the following: let us say that good a has a price transmission elasticity of 0.1 to good b, it can be said that 10% of the proportional change in the price of a is transmitted to the price of b, on average.

Main Objective

- Estimate price transmission elasticities for each region.

Data and Methods

- Mexico is segmented into four regions: center, north, north-center and south; these are showed in Figure 1.
- Weekly prices of Argentina, Up river (Up river) and No. 2 Yellow, U.S. Gulf (yellow) maize from the Food and Agriculture Organization.
- White maize weekly prices as reported by the Mexican National Ministry of Economics.
- Prices are in 2008 U.S. dollars. The analyzed period comprises between the first week of January 1998 and the first of July 2013 (809 weeks in total).
- As proposed by Minot (2011), I estimate a number of Vector Error Correction Models (VECM; each consisting on the price of white maize in a Mexican region and an international price) to obtain the price transmission elasticities between the relevant international price and the price of white maize in each of the four defined sub-national regions.

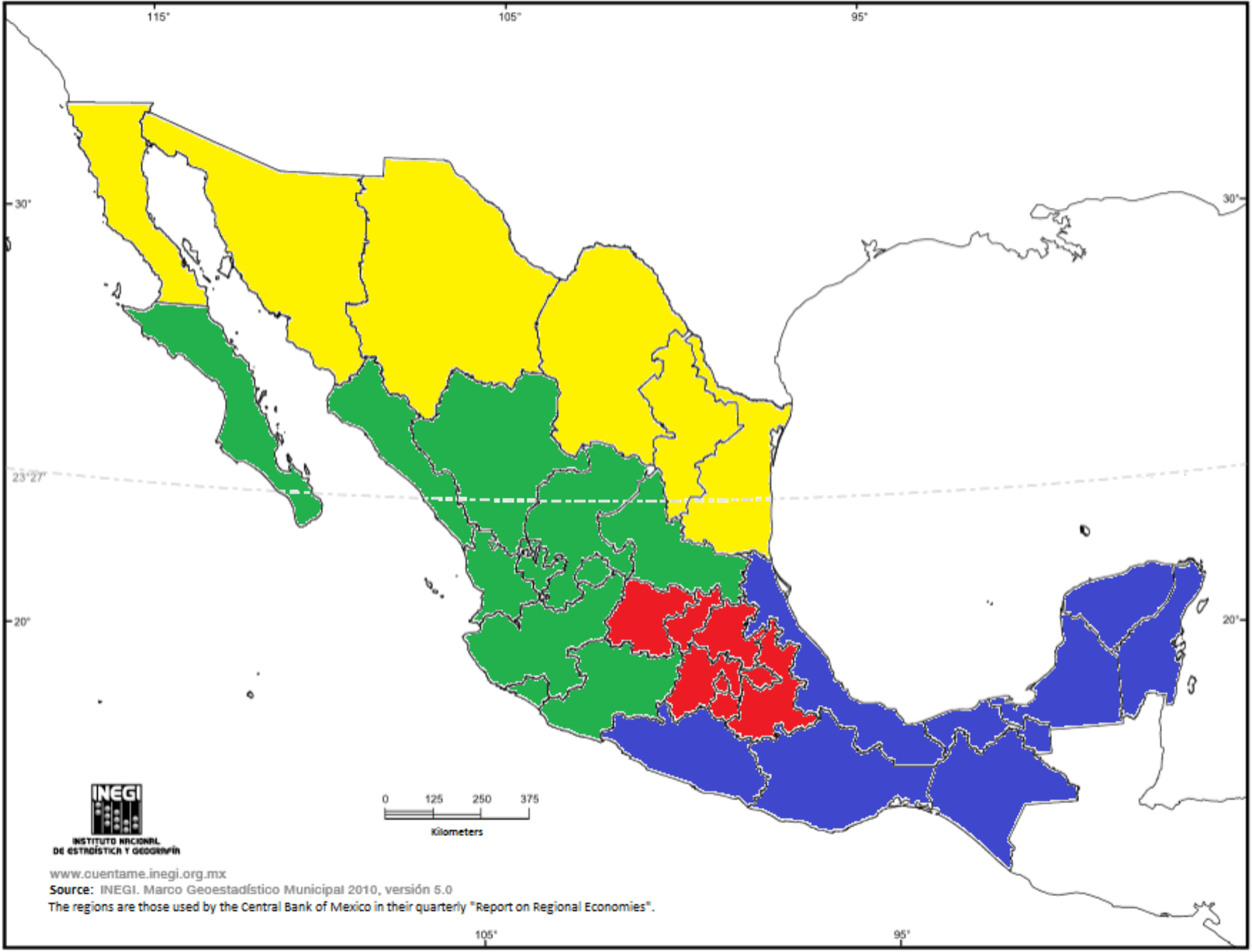


Figure 1: The Regions: Northern in yellow, central-north in green, central in red and southern in blue.

Price Transmission Elasticities Estimation (VECM)

I estimate a Vector Error Correction Model per region with the following general form:

$$\Delta p_t^d = \alpha + \theta(p_{t-1}^d - \beta p_{t-1}^w) + \sum_{k=1}^q \delta_k \Delta p_{t-k}^w + \sum_{k=1}^q \rho_k \Delta p_{t-k}^d + \varepsilon_t$$

- p_t^d is the natural logarithm of the domestic price.
- p_t^w is the natural logarithm of the international price.
- ε_t is the stochastic error term.
- α is the parameter determining the trend component.
- β is the long run price transmission elasticity of the international price to the local one, this the most important parameter for this analysis.
- δ_k are the k parameters capturing the short run elasticity of international prices to local ones.

- ρ_k are the k coefficients on the autoregressive terms.

In order to correctly estimate a VECM, it has to be the case that each series should be nonstationary and $I(1)$ and both series should be cointegrated.

Unit Roots, Selection of Lags and Cointegration

I tested the existence of unit roots in each international (Yellow and Up River) and local price series with both: the Augmented Dickey-Fuller and the Phillips-Perron methods. The null hypothesis is the presence of a unit root. There is not enough evidence to say that the series of prices (international and local ones), except for local prices in the North Central region, are $I(0)$.

Series in VAR	Lags in VAR	Lags in VECM
Central and Yellow	2	1
North and Yellow	3	2
North Central and Yellow	3	2
South and Yellow	2	1

Table 1: Selected number of lags

In order to identifying the correct lag order of the underlying VAR in each VECM I used the Hannan and Quinn information criterion (HQIC) and the Schwarz's Bayesian Information Criterion (SBIC). When the criteria differs in the suggested number of lags, I include the maximum number of lags indicated by any of the

tests.

The Johansen cointegration test suggests that none of the sub-national series of maize prices are cointegrated with the Up River maize prices. All of the regional series of maize prices are cointegrated with the international prices of yellow maize.

Results

Region	β (Elasticity)	θ	δ_1	δ_2	ρ_1	ρ_2
Central	-0.4871** (0.0599)	-0.0568** (0.0112)	-0.0123 (.0318)	. .	-0.1230** (0.0346)	. .
North	-0.5957** (0.0427)	-0.0916** (0.0165)	-0.0743 (0.0395)	-0.0355 (0.0392)	-0.1057** (0.0346)	-0.2212** (0.0342)
North Central	-0.5094** (0.0763)	-0.0876** (0.0180)	0.0211 (0.0627)	0.0389 (0.0623)	-0.3499** (0.0356)	-0.1992** (0.0346)
South	-0.5016** (0.0449)	-0.0864** (0.0163)	-0.0069 (0.0386)	. .	-0.2757** (0.0339)	. .

Table 2: Results VECM: Local prices and International Price of Yellow corn

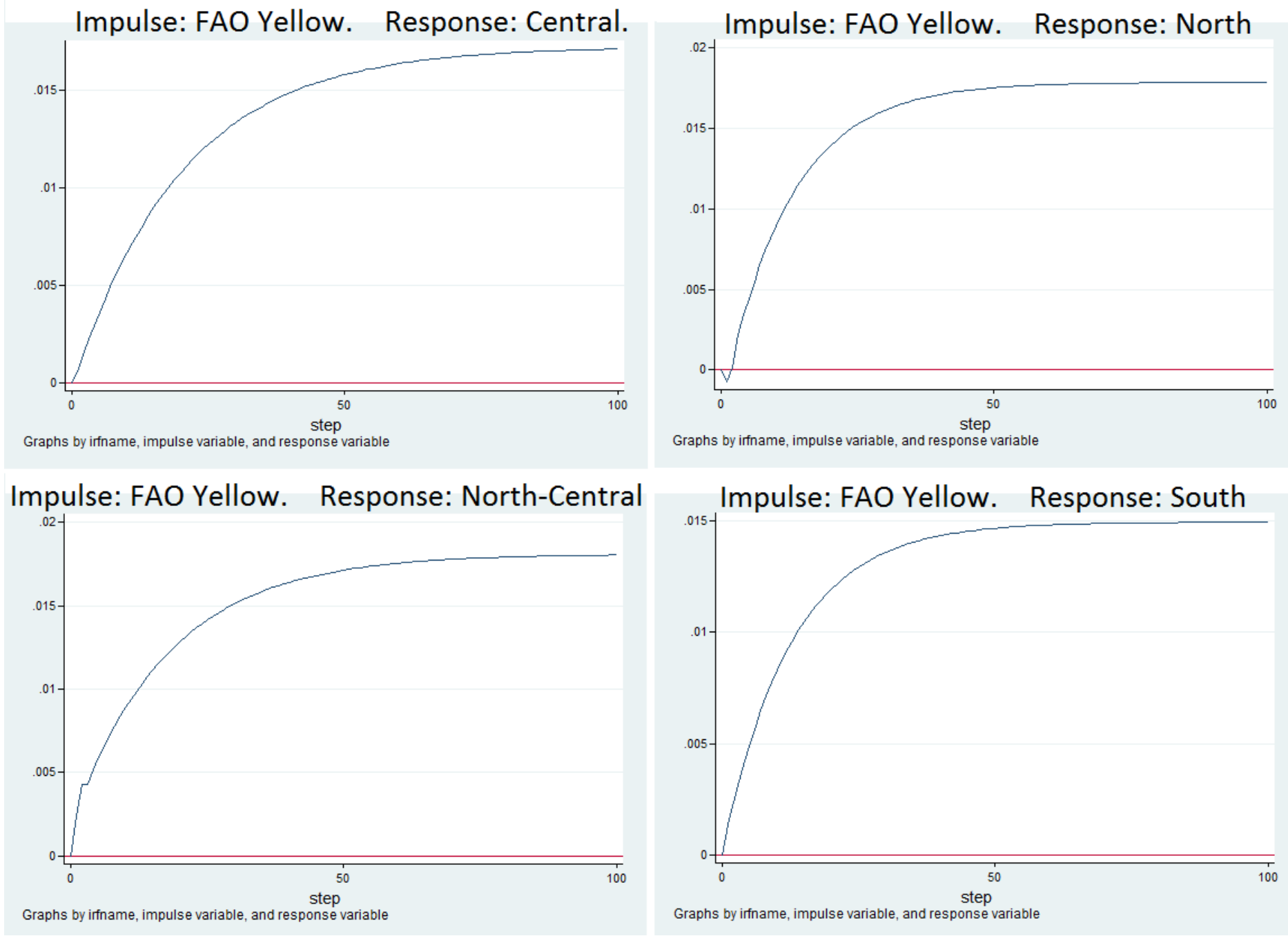


Figure 2: Impulse-response functions: Temporal local effects of a shock in the international price of corn

- The results suggest that, in the long run, 48.71, 59.57, 50.94 and 50.16 percent of proportional changes in the international price of yellow maize are transmitted to the prices in the central, northern, north central and southern Mexican regions, respectively.
- According to the estimated speed of adjustment coefficients (and the associated impulse-response functions), an orthogonalized shock to the average international price of yellow corn has a permanent effect on the average local prices of corn in Mexico.

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Disclaimer

Results are subject to change in subsequent revisions. A fraction of this research project was developed while I was an M.S. student at the University of Minnesota with financial support from CONACYT and Fulbright programs.