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*Agenda to Mitigate Food Price  
Volatility in Mexico*

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Funds Instituted in Relation to Agriculture - FIRA

Presentation delivered at the 2013 Annual Meeting  
of the International Agricultural Trade Research Consortium (IATRC)  
Clearwater Beach, FL, December 15-17, 2013

# **Agenda to mitigate Food Price Volatility in Mexico**

**Rafael Gamboa González**

*International Agricultural Trade Research Consortium (IATRC)  
Annual Meeting*

**December, 2013**

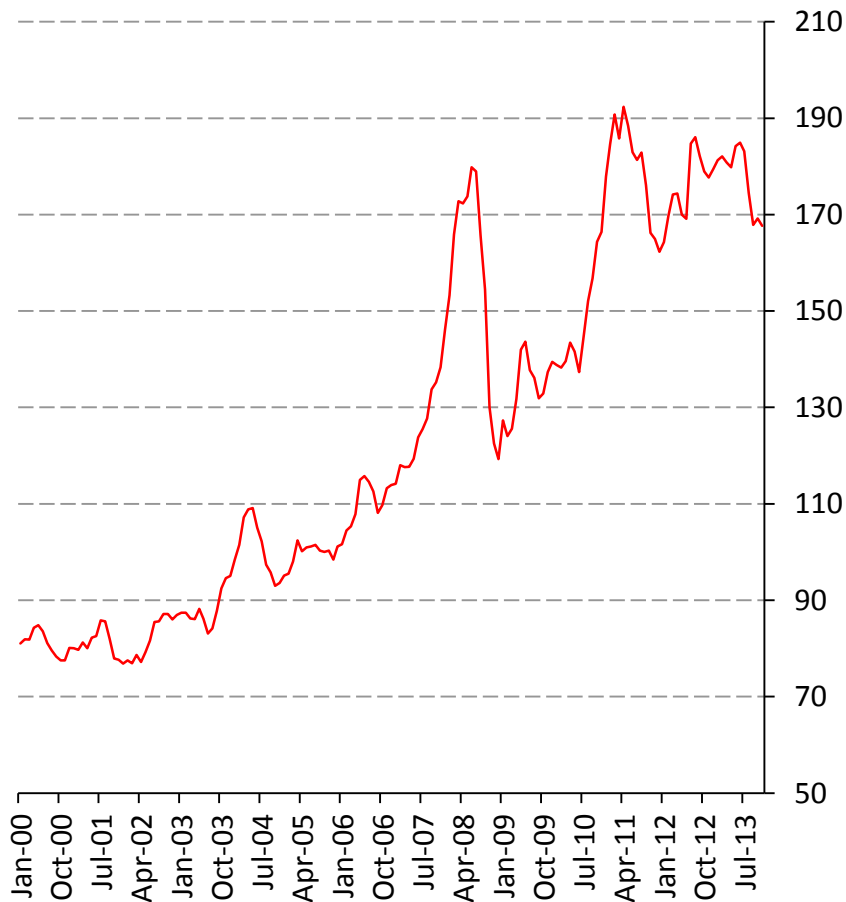
# Outline

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1. Context
2. Causes of agricultural and food price volatility
3. Effects of volatility in the Mexican economy
4. Policy measures to mitigate the volatility
5. Implementation in the Mexican framework

The prices of agricultural products have remained at relatively high levels and presented extreme volatility

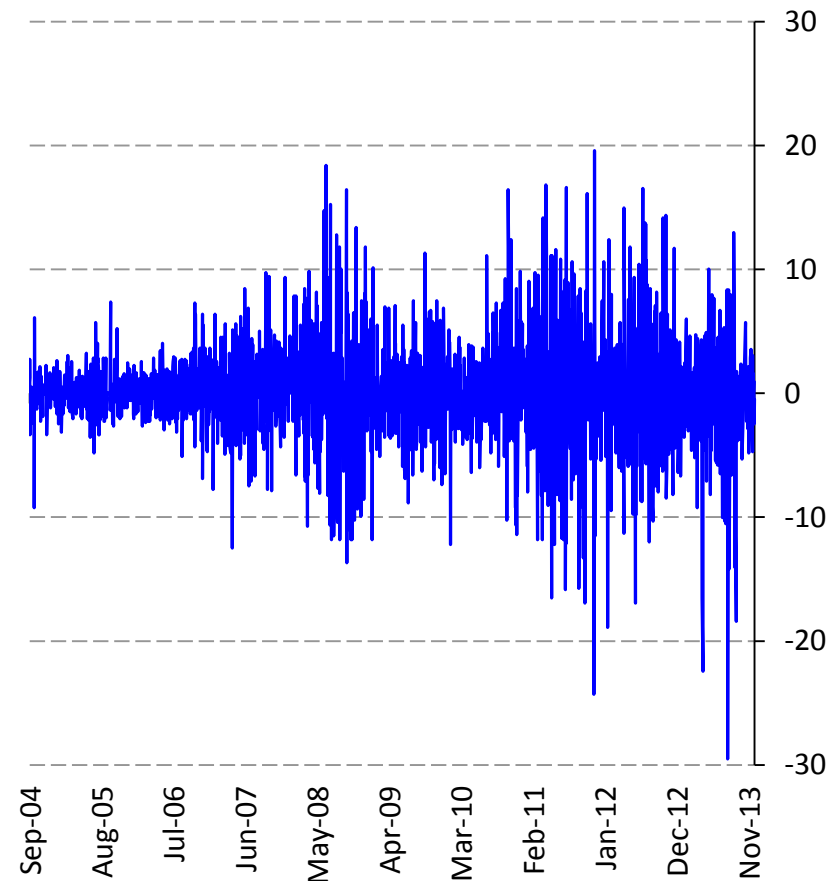
**IMF Food Price Index**  
(2005=100)



Source: IMF

Includes Cereal, Vegetable Oils, Meat, Seafood, Sugar, Bananas, and Oranges Price Indices

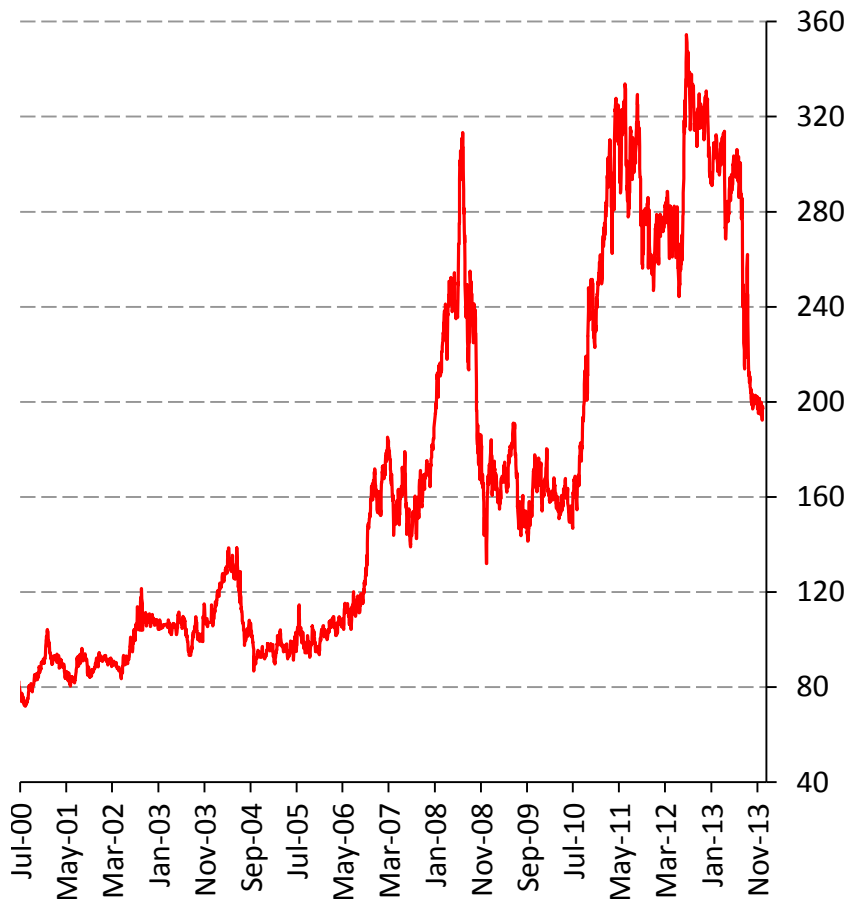
**Yellow #2 Corn Spot Price Daily Variations**  
(Differences, USD/ton)



Source: Reuters.

Grains are mainstay of the diet in many countries, therefore, price increases and volatility are an international concern.

**Yellow #2 Corn Spot Price**  
(USD/ton)



Source: Reuters.

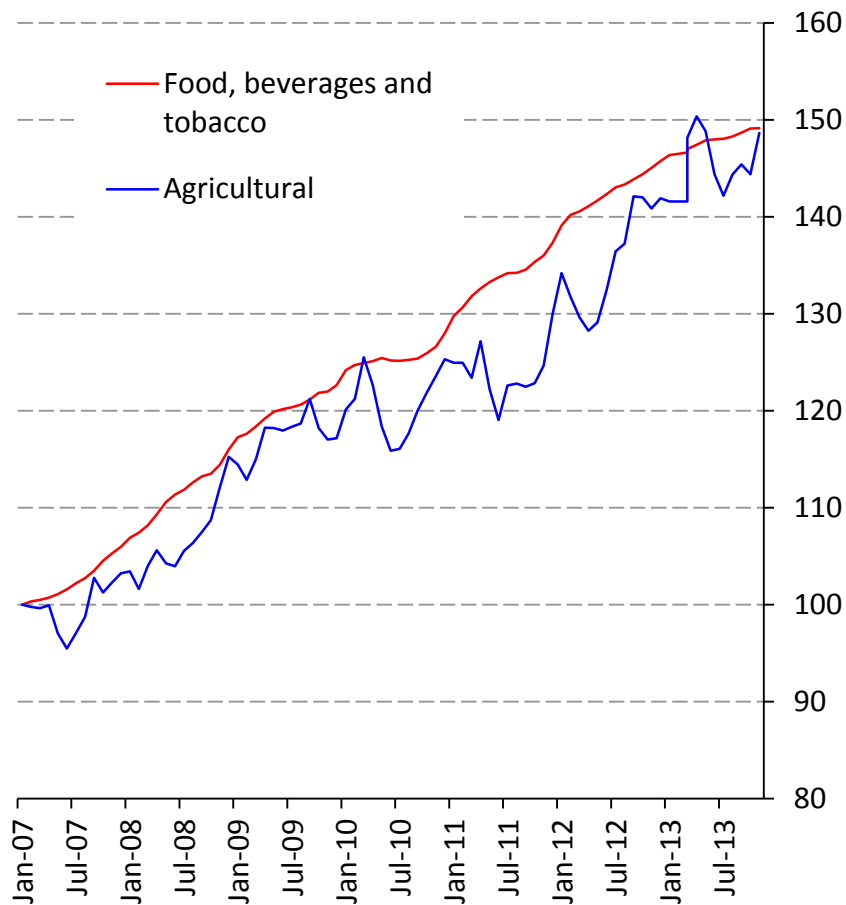
**Hard Red Winter Wheat Spot Price**  
(USD/ton)



Source: Reuters.

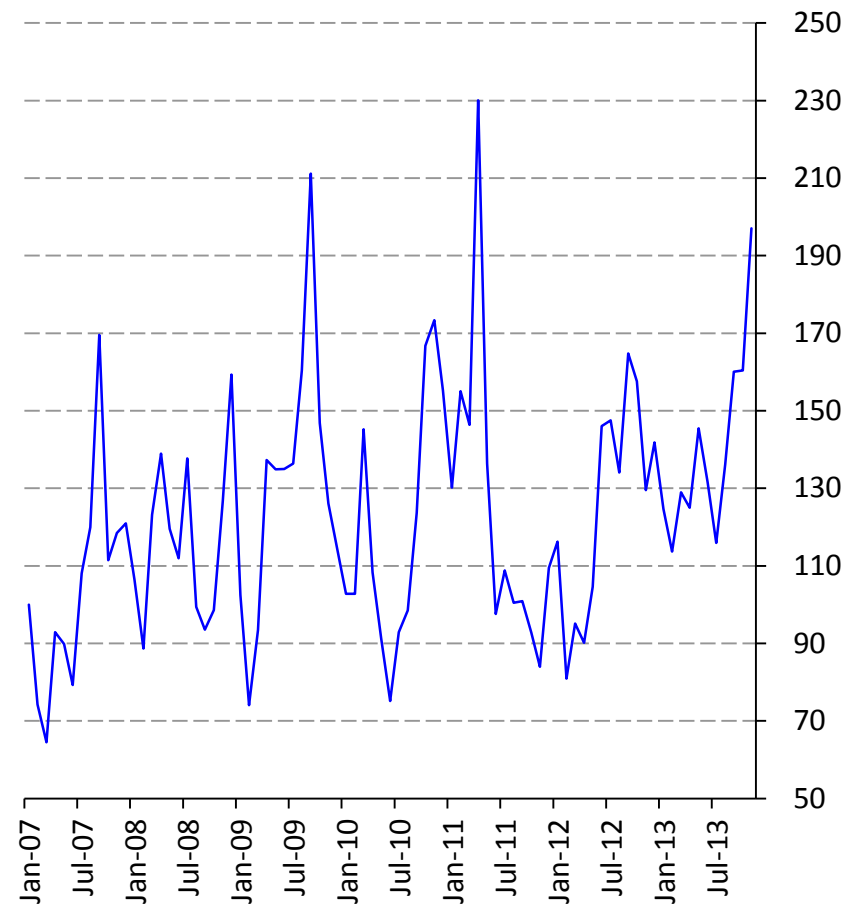
## This has also been the case in Mexico

**CPI for “Food, beverages and tobacco” and  
“Agricultural products”**  
(Index, Jan 07=100)



Source: INEGI

**Wholesale price for “Rome tomatoes”**  
(Index, Jan 07=100)



Source: SNIIM, Ministry of Economy

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# The increase of agricultural and food price volatility in Mexico is due to external and internal causes

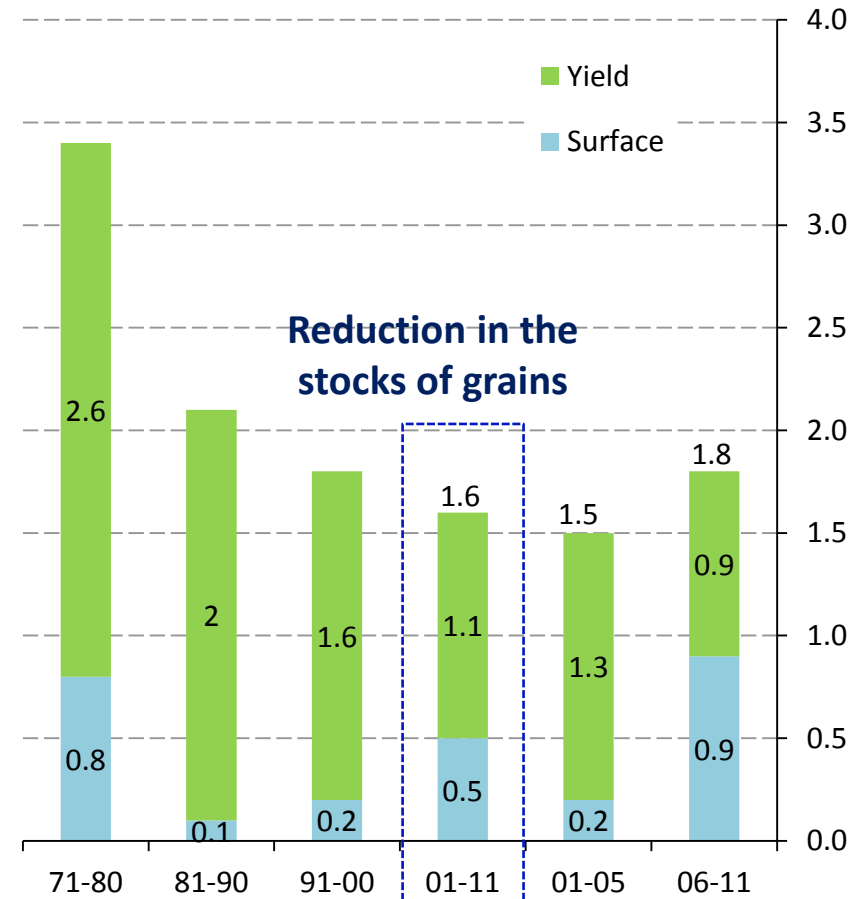
- External influences comes from:
  - ✓ *Higher demand of grains from fast developing countris*
  - ✓ *Supply shocks in the main producing countries (i.e. due to droughts).*
  - ✓ *A high correlation between national and world prices, particularly for products with important international trade flows. This is significant for a small open economy as Mexico.*
- Internal factors include:
  - ✓ *Weather and sanitary contingencies reduced the production of agricultural products generating extreme movements in local supply.*
  - ✓ *The concentration of production in few regions increases the vulnerability of domestic production to these contingencies.*
  - ✓ *Local value chains are poorly integrated, which is an obstacle for efficient production and commercialization processes.*

In recent years, the demand for grains has grown. The recent increase in production is primarily due to an unsustainable increase in surface.

**Growth rate of food consumption**  
Percent



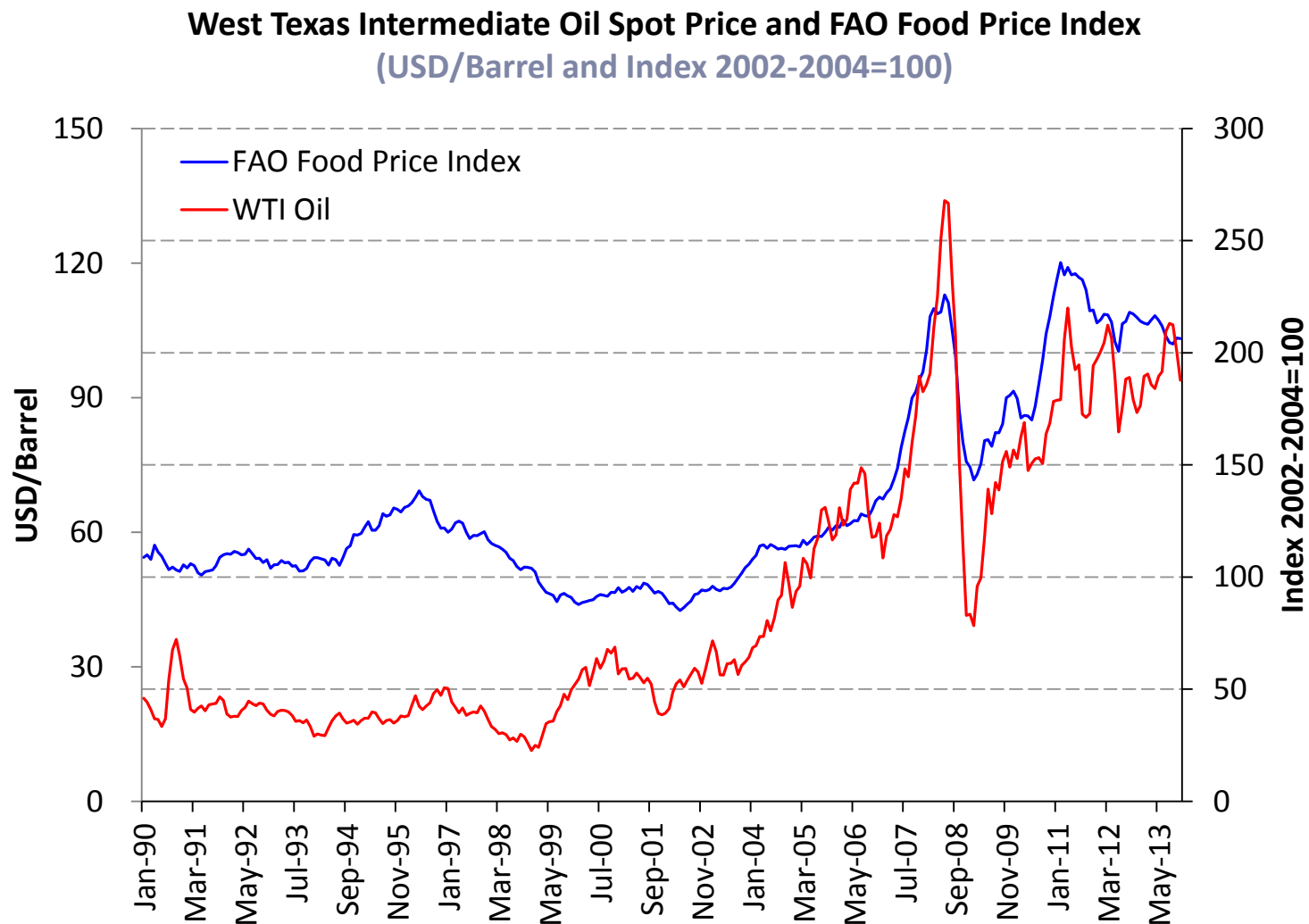
**Growth rate of production of rice, corn and wheat**  
Percent



Source: The World Bank

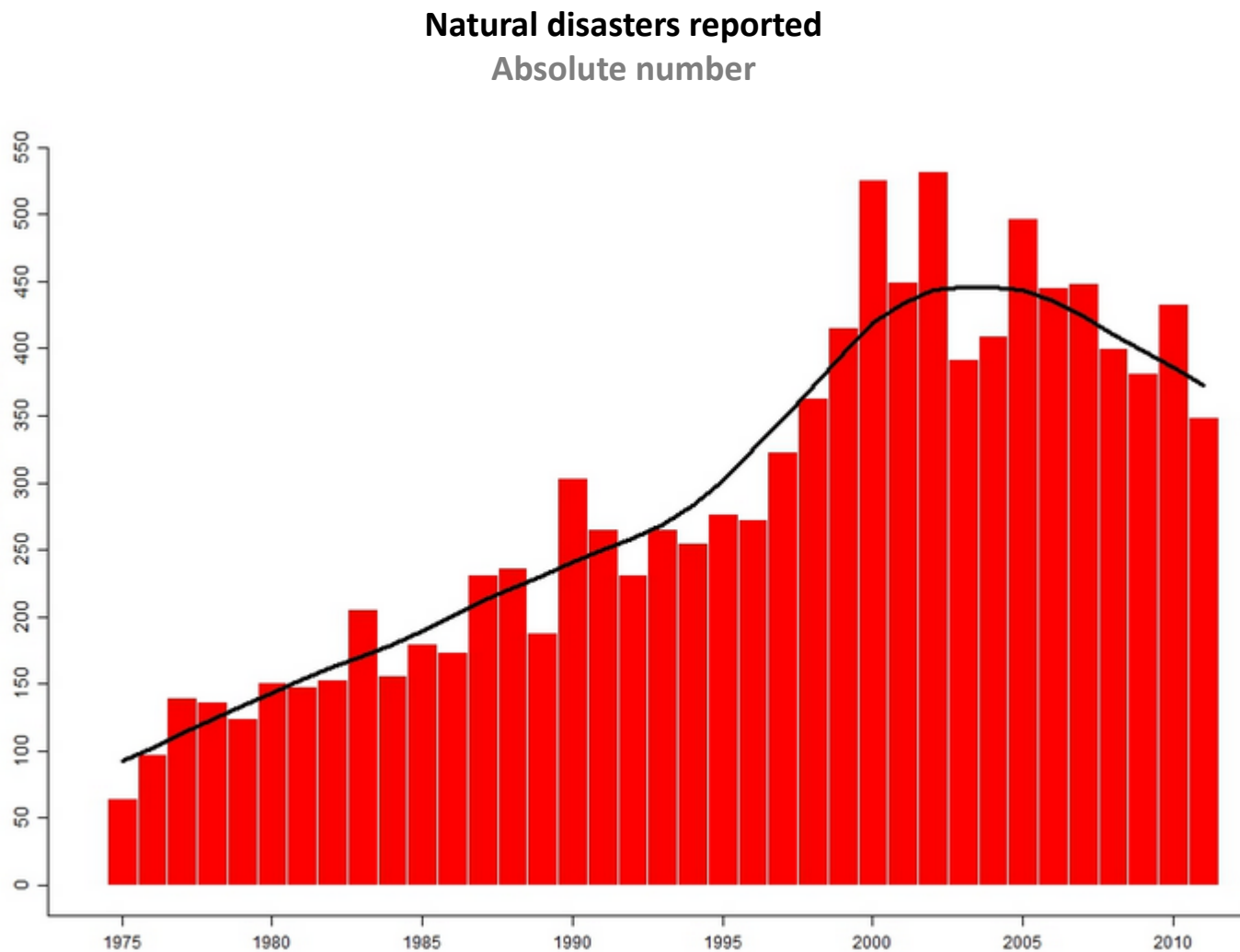
Source: The World Bank

Increases in energy prices generated pressure to food prices.



Source: FAO and Bloomberg.

Recent years have seen more natural disasters.



# In Mexico there have been important agricultural contingencies that have significantly impacted supply.



## ***Freeze in Sinaloa, 2011***

- Affected an area of 400 thousand hectares and it reduced the volume of corn produced in the Sinaloa by 74 percent



## ***Freeze in Sinaloa, January 2013***

- Affected 169 hectares, corresponding to the following crops: corn, 91%; bean and chickpea, 7% and green tomato, tomato, and potato with 2 percent.



## ***Freeze in the central part (Mich, Gto, Jal, Qro, Mex, Hgo, Pue, Tlax), March 2013***

- Affected crops such as wheat, barley, oats, broccoli, strawberry, tomato, zucchini and green tomato



## ***Drought in Tamaulipas, January - May 2013***

- 70 percent of the surface was severely affected, an estimated contraction from 2.3 million to 1 million tons of sorghum.

## And there have also been important sanitary contingencies



### ***“Swine flu” AH1N1, 2009***

- No effect shown in the pig production.
- Demand collapsed because the market called it "swine flu".



### ***White spot virus in shrimp on the coast of Sonora, 2010***

- 50 percent contraction in local production between 2009 and 2011.
- Investments are needed for the containment and control of the disease.

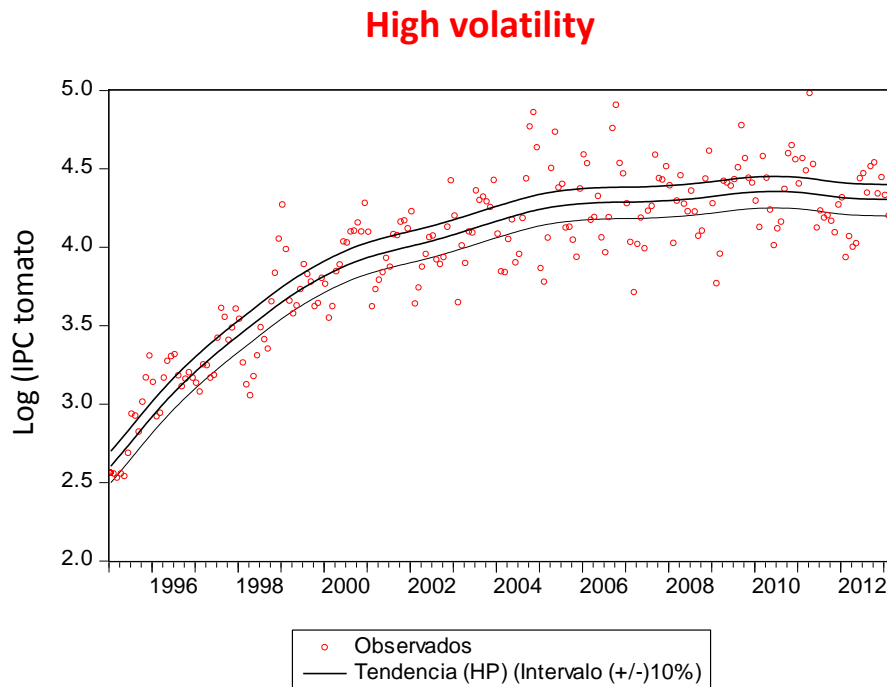


### ***Avian flu H7N3, 2012-2013***

- 28 million birds were sacrificed, affecting the supply of eggs and chicken.
- Prices of eggs and chicken increased 100 and 40 percent, respectively.

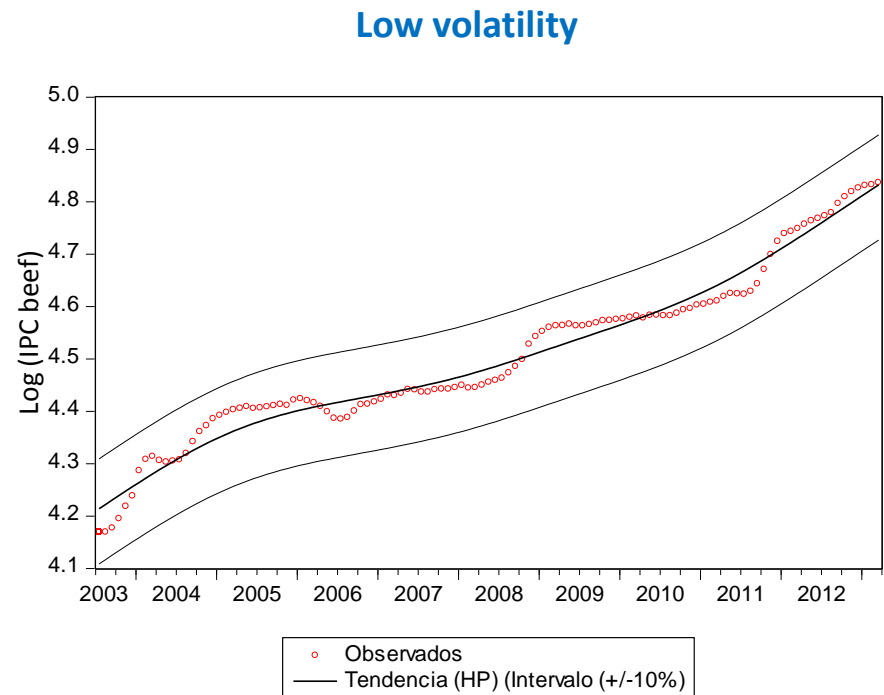
Among agricultural products, there are important differences in the volatility and its causes.

Observations outside the trend for tomato CPI  
Interval (+/-) 10%



Observations outside the range = 67%

Observations outside the trend for meat CPI  
Interval (+/-) 10%



No observations outside the range

Source: FIRA with INEGI data.

Both series are in logs. Then the Hodrick-Prescott filter was applied to obtain the trend. Finally, the observations outside a range of +/- 10 percent around the trend were counted.



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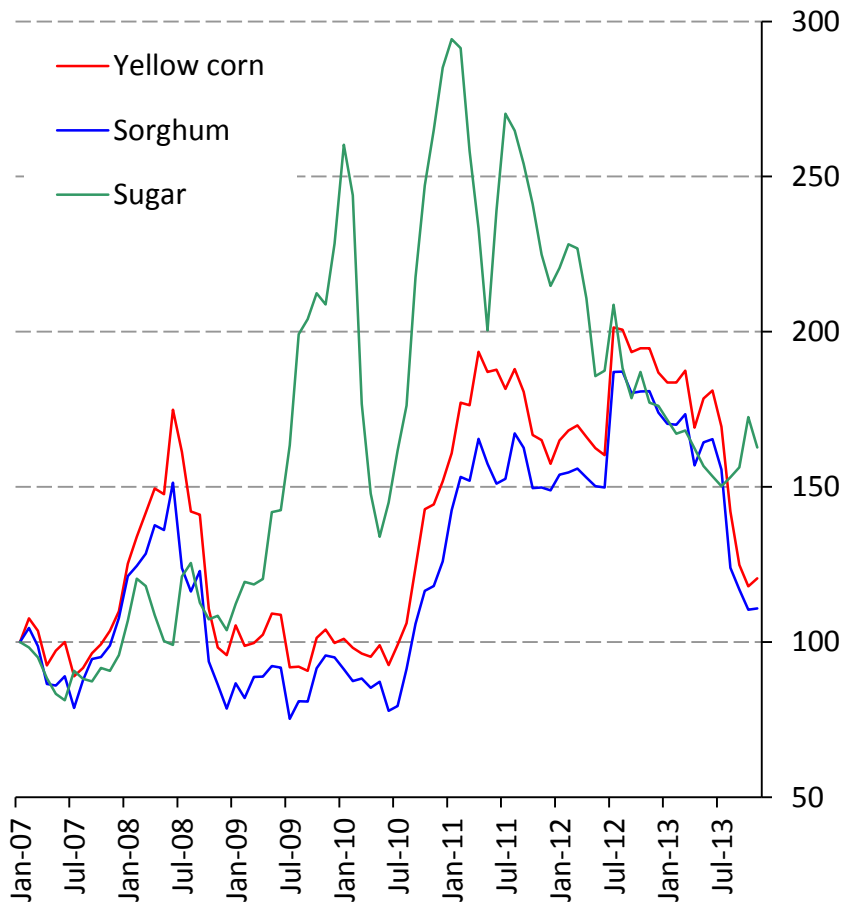
## Price uncertainty has adverse effects on production

- It discourages investments to increase production.
- A World Bank report estimated that when the volatility doubles, production is reduced by 23 percent, approximately.<sup>1/</sup>
- With lower production, the agricultural prices remain in high levels.

1/ «Responding to higher and more volatile World food prices» May 2012. The World Bank.

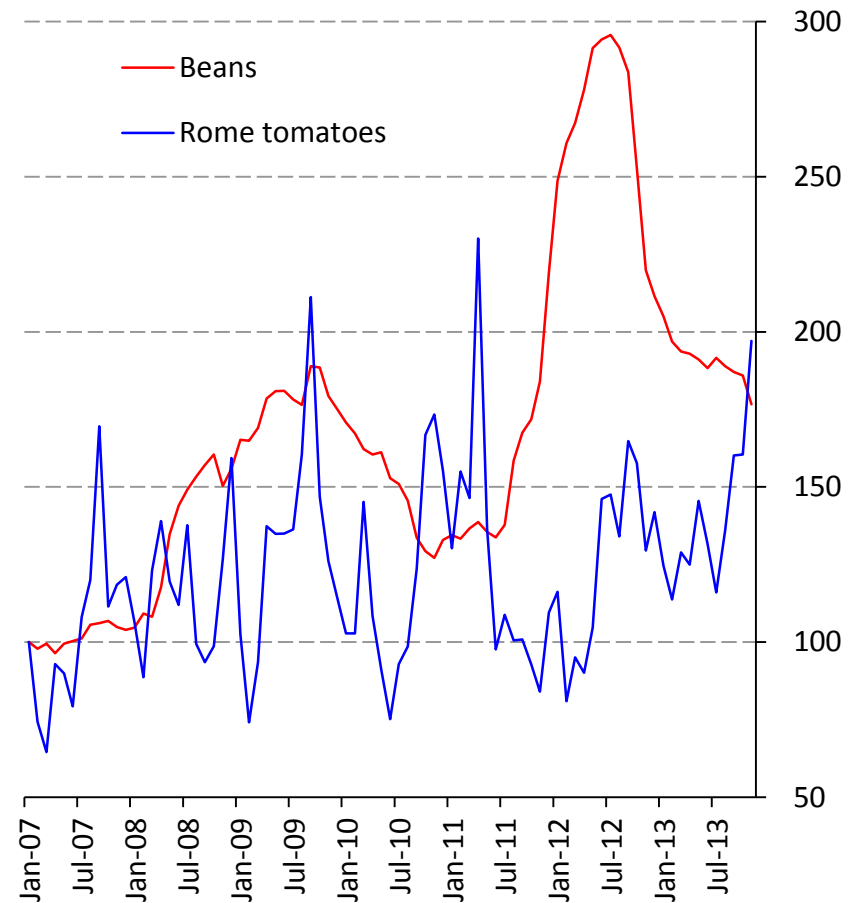
# Abrupt declines in the price of key agricultural products affect income and the survival of producers

**International spot price**  
(Index, January 07=100)



Source: Reuters

**Wholesale price in Mexico**  
(Index, January 07=100)



Source: SNIIM, Ministry of Economy

## There are also negative impacts on consumer welfare

- Volatility in food prices has effects in the nutrition of the **poorest and most vulnerable population**, since they spend almost half of their expenditure in food consumption.
  - ✓ *It is estimated that **more than half a million households fell into food poverty in Mexico between 2006 and 2010 due to the observed increases of food prices in those years.***<sup>1/</sup>
  - ✓ *It is estimated that the nutrients intake of the lowest decile of the population decreased in the last decade (for example, energy 5.5 percent, protein 2.3 per cent and carbohydrates 5.8 percent) which is associated with the increase in the prices of grains, fruits and vegetables in such period.*<sup>2/</sup>

1/ Magaña, D. (2013). "Essays on price dynamics, welfare analysis, and household food insecurity in Mexico", disertación doctoral en la Universidad de Texas A&M.

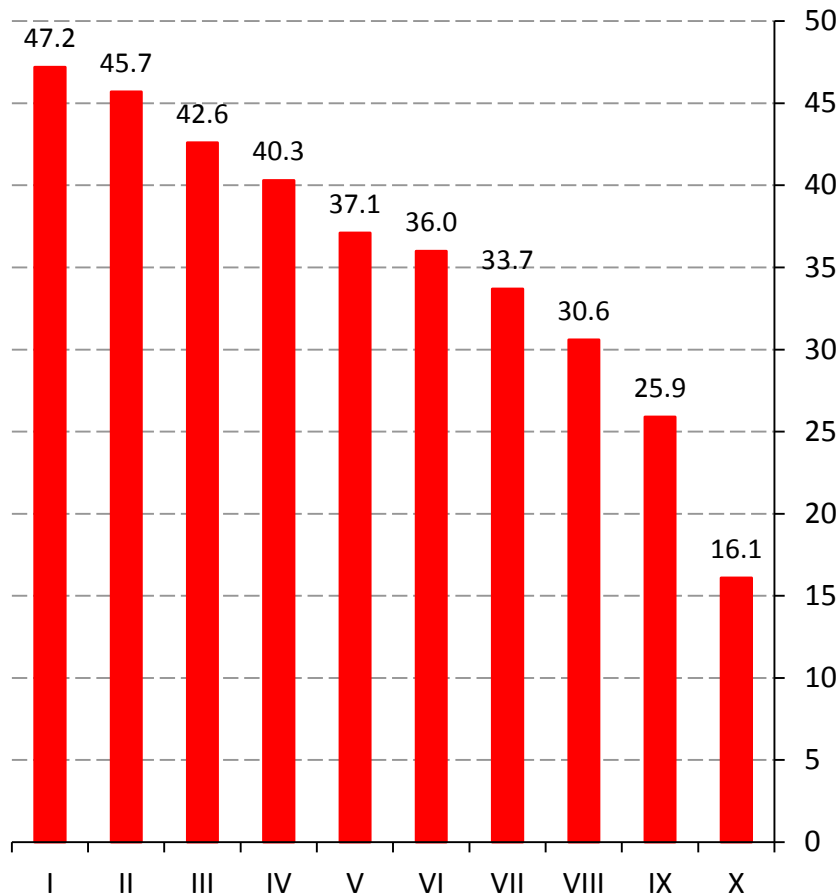
2/ Juárez, M. (2013). "The Impact of Food Price Shocks on the Consumption and Nutritional Patterns of Mexican Households", por aparecer en la serie de Documentos de Investigación del Banco de México.

Volatility also affects key variables for the macroeconomic stability of a country.

- In a context of macroeconomic stability and a low inflation rate, the level and volatility of **food prices have a high incidence on inflation** and, therefore the attainment of the inflation target by the Central Bank.
- Excluding agricultural products from the Mexican CPI, the inflation rate would have been lower in recent years and, since January of 2011, had been located within the Central Bank's inflation target. Instead, it has surpassed the upper limit of the tolerance band in 11 out of the 32 months in this period.

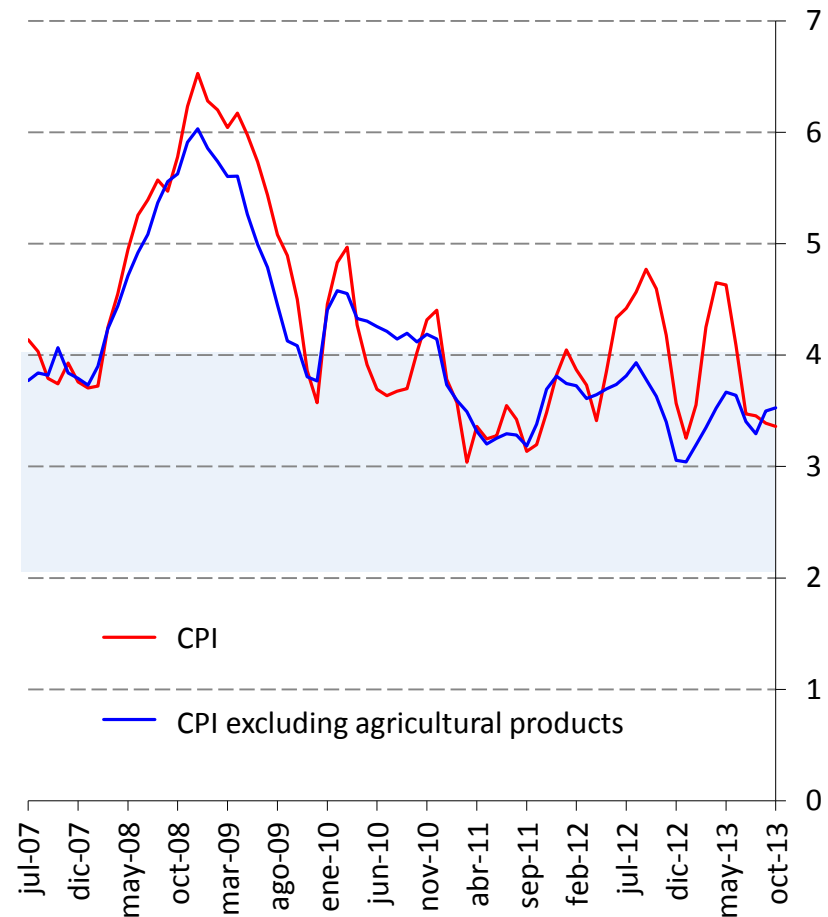
# Lowest decile of the income distribution spends almost 50% in food and food price increases adds to the number of people under the poverty line

**Expenditure of households in food and beverages by decile of income**  
(Percentage of total expenditure)



Source: FIRA with information from INEGI 2010.

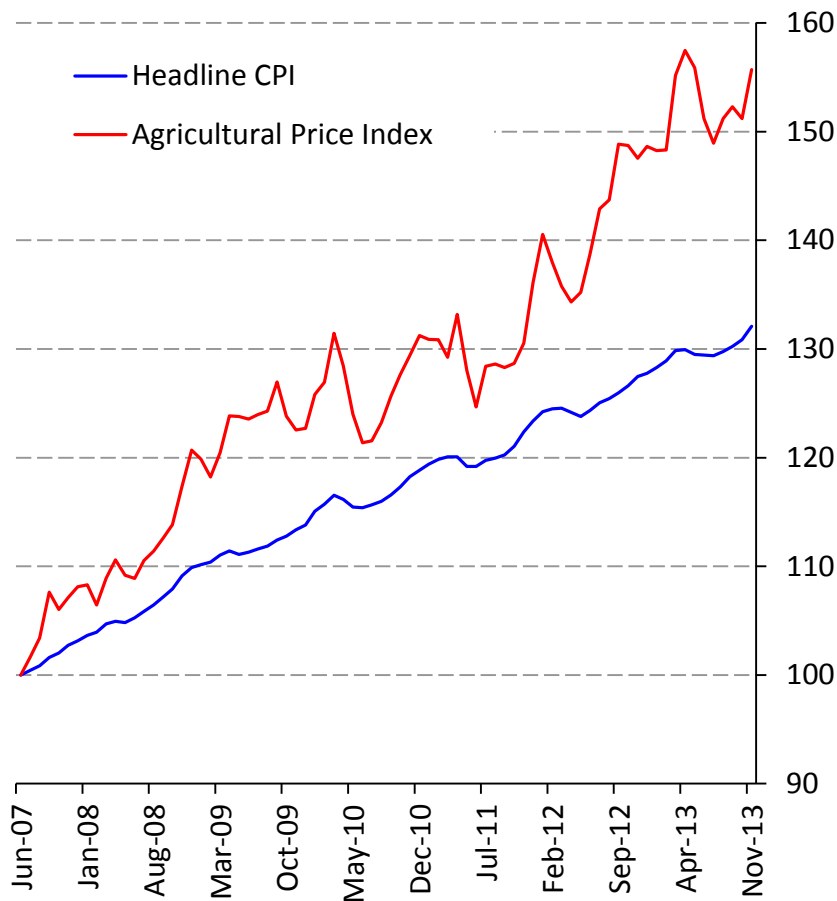
**Annual headline inflation and inflation excluding agricultural products**  
(Percent)



Source: INEGI.

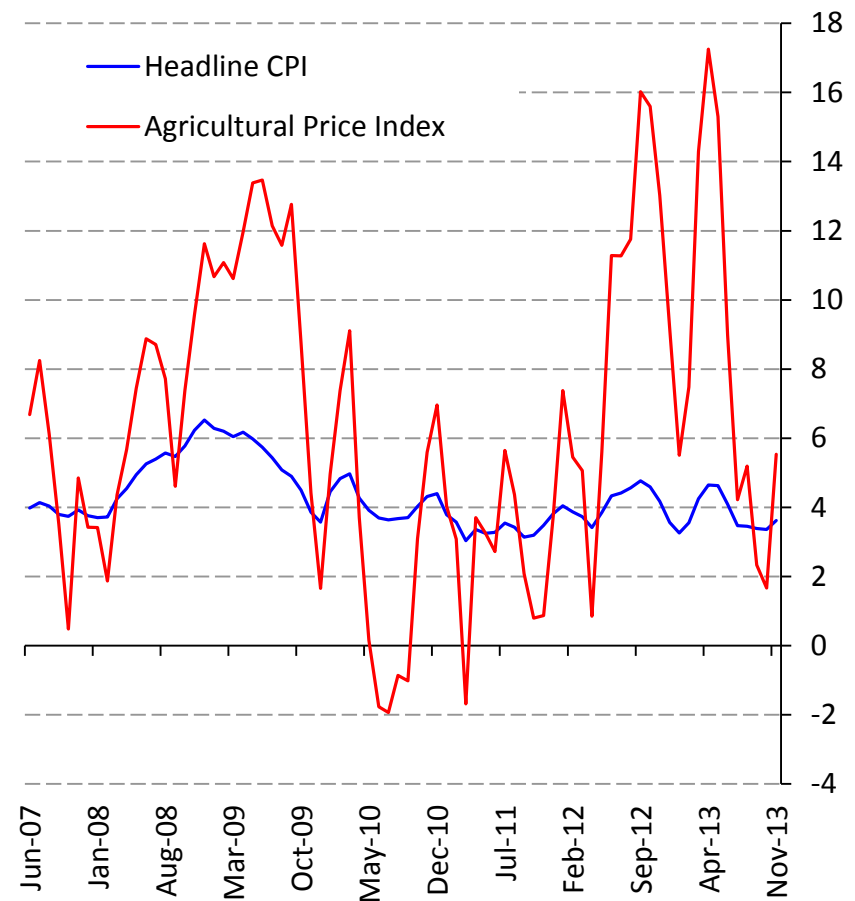
# Agricultural products prices have shown a higher increase and volatility than CPI

**Headline CPI and Agricultural Price Index**  
(June 2007 = 100)



Source: INEGI

**Headline CPI and Agricultural Price Index**  
(Annual change, %)



Source: INEGI

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# There are several public policies to mitigate price volatility

## General policies

### Trade and tax policies

- Reduction of tariffs and import quotas.
- Increased taxes and export quotas.

### Inventory management

- Accumulation or reduction of inventories to moderate price movements.
- Inventories could be private or public (the latter, in turn, can be classified into inventories for emergencies or for stabilizing prices).

## Specific policies

### Stabilization of production

- Geographical diversification of production.
- Greenhouses.
- Implementation of effective sanitary practices.
- Promotion of technological change to increase productivity.
- Development of local storage.
- Establishing mechanisms to industrialize surplus.

### Market integration

- Creating systems of public information on prices and quantities available for different regions and to improve the distribution and marketing of products.



Policy measures to mitigate volatility are more effective if they are specific to each product.

- Domestic and external factors impact the level and volatility of the food prices in different ways for each product.
- For instance, while fruit and vegetable prices have shown extreme volatility, meat prices have presented an increasing trend with lower volatility.
  - ✓ *For fruits and vegetables, the volatility is result of the natural seasonality in the production, the geographical concentration and the high vulnerability to weather. For products that have a high volume of trade with other countries, trade policy barriers also play a role (i.e. tomatoes).*
  - ✓ *For other products (i.e. meat), the increase in price comes from the increase in international and input prices, poor integration of the value chain and trade difficulties (lack of contracts, transportation cost).*

***Therefore, general policy measures are less efficient to mitigate such volatility that specific actions in the markets for each commodity.***

General policies are less efficient, while specific measures are more effective.

## Trade and tax policies

- ✓ *Removing barriers to imports: the effects are bounded by the feasibility of importing certain products and the initial level of tariffs. Furthermore, the implementation of import quotas takes time given the regulations.*
- ✓ *Imposing export barriers: dissociates domestic prices from international prices, so domestic producers do not receive the international signals and domestic production is discouraged.*

## Inventory management

- ✓ *International experiences to stabilize prices with national storage have not been successful.*
- ✓ *The fiscal cost of maintaining inventory is high and as a result, many countries have reduced their inventories.*
- ✓ *Inventories require strong government administrative agencies to prevent the programs from being "captured" by interest groups.*
- ✓ *They must be accompanied by some measures of trade policy to dissociate domestic from external prices.*

The effectiveness of those policies depends on specific circumstances for each product

### **Stabilization of production**

- ✓ *Greater geographic diversification of production helps to reduce price volatility by reducing supply vulnerability to climatic and sanitary events.*
- ✓ *Geographic diversification can also spread the supply of products over time.*
- ✓ *The use of greenhouses increases productivity and reduces vulnerability to climatic events.*
- ✓ *The implementation of sanitary measures reduces supply vulnerability.*

### **Market Integration**

- ✓ *The lack of reliable and opportune information of evolution of production, demand, inventory levels and import/export flows, is a major cause of price volatility.*
- ✓ *A reduction in volatility is given by providing opportune information to traders and by reducing uncertainty.*

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## In order to mitigate volatility of agricultural prices with specific measures, 14 products were selected

- In order to propose specific measures to mitigate food price volatility, 14 products were selected: avocado, sugar, pumpkin, pork, beef, onion, egg, tomato, milk, lemon, corn, chicken, tomato and wheat. <sup>1/</sup>
- The selected products and their derivatives are important in the agricultural sector, in the food expenditure of lower income households , and they have a high impact on inflation:
  - ✓ *In 2012, the value of production for these products as a percentage of the value of agricultural production was 65.5 percent.*
  - ✓ *The selected agricultural products and their derivatives represent 60.8 percent of the food expenditure of households in the lowest income decile.*
  - ✓ *The prices of the selected agricultural products contributed, on average, with 38 basis points to the headline inflation since 2004.*
  - ✓ *The behavior of the prices of the selected products and their derivatives increased by 6.1 percent the volatility of the monthly headline inflation (measured as the standard deviation) .*

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1/The products were selected according to (i) its importance in consumption expenditure of households in the lowest income, (ii) the impact of commodity prices on the monthly inflation rate, and (iii) a relatively high volatility product prices.

## The analysis of the causes and the statistical evidence suggest 4 types of measures to mitigate the volatility of the selected products

- The proposed measures include specific actions on **productivity, geographic diversification, storage** and **market information systems**.
- Based on statistical evidence of those factors with impact on price volatility, it was determined the investment required to reduce price volatility of the selected products and their derivatives by 17 percent (to reach similar values to those exhibited on average by the headline CPI). <sup>1,2/</sup>
- From the coefficients, elasticities for each of the proposed policy measure were calculated and the increases needed in each of them to achieve the objective .
- The total cost of the proposed measures is 17.1 billion pesos (1.32 billion dollars). If we consider a horizon of 5 years, the annual cost would be 3.4 billion pesos.

1/ The measure of volatility used was the standard deviation of monthly inflation of each generic product by city and year.

2/We used a panel data with information on price indices for 54 products (the selected products and its derivatives) in 46 cities for the period 2000 – 2012. Then, it was estimated an Autoregressive Model (AR) with OLS.

The dependent variable is the standard deviation of the monthly inflation for each product by city and year. The independent variables are associated with the proposed measures to reduce volatility: Number of users of the National Information System and Market Integration (SNIIM), storage capacity of maize and wheat, yields of cyclic crops (corn, wheat, tomatoes, zucchini, tomato and onion), yields of perennial crops (lemon, avocado and sugar cane) production of meat (beef, pork and poultry) and milk production.

## FIRA will promote and finance specific projects to encourage investment in 3 of the proposed types of measures

1. **Productivity**: investment projects to increase productivity through a higher technification of production (irrigation systems, for example), to reduce costs through improved transportation, to process the production or to improve the sanitary infrastructure, among others.
2. **Geographic diversification**: investment projects that promote the production in new geographical regions (where it is not concentrated) and suitable for diversifying these crops. Where appropriate, to promote the use of greenhouses. The objective is to establish new production centers to complement the production seasonality between regions and, if possible, near the centers of consumption.
3. **Storage**: investment projects of infrastructure and storage equipment (i.e. in the production centers or in those regions where the new production of grain and/or poultry is taking place) and cold storage equipment.

## FIRA has a plan to encourage and promote the financing of projects related to the 4 types of measures

- Among other actions, FIRA:
  - ✓ Will structure specific projects and coordinate the agents involved (grain producers in the Southeast and warehouses, for example).
  - ✓ Will give priority to projects and products in the areas selected for funding through bank loans and non-bank financial institutions and granting loan guarantees.
  - ✓ Will devote resources for technical assistance and training on these projects.



## Additional actions

- Based on the analysis conducted, besides these investments, other public policy measures are relevant to mitigate the volatility of agricultural prices :
  - ✓ *To improve the regulation associated with the operation of the warehouses, for example, adding an operational certification.*
  - ✓ *To promote competition in the different stages of the value chain, particularly in commercialization.*
  - ✓ *To focus subsidies of financial hedges for producers and retailers.*
  - ✓ *To encourage the integration and standardization of agricultural information systems, in line with international best practices.*
  - ✓ *To analyze the convenience of imposing mandatory reporting of prices and volumes of agricultural products as in other countries (for example, it is mandatory in the U.S.).*

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