

# Measuring Food Price Volatility in Georgia

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Agricultural Transitions along the Silk Road

Restructuring, Resources and Trade in the Central Asia Region

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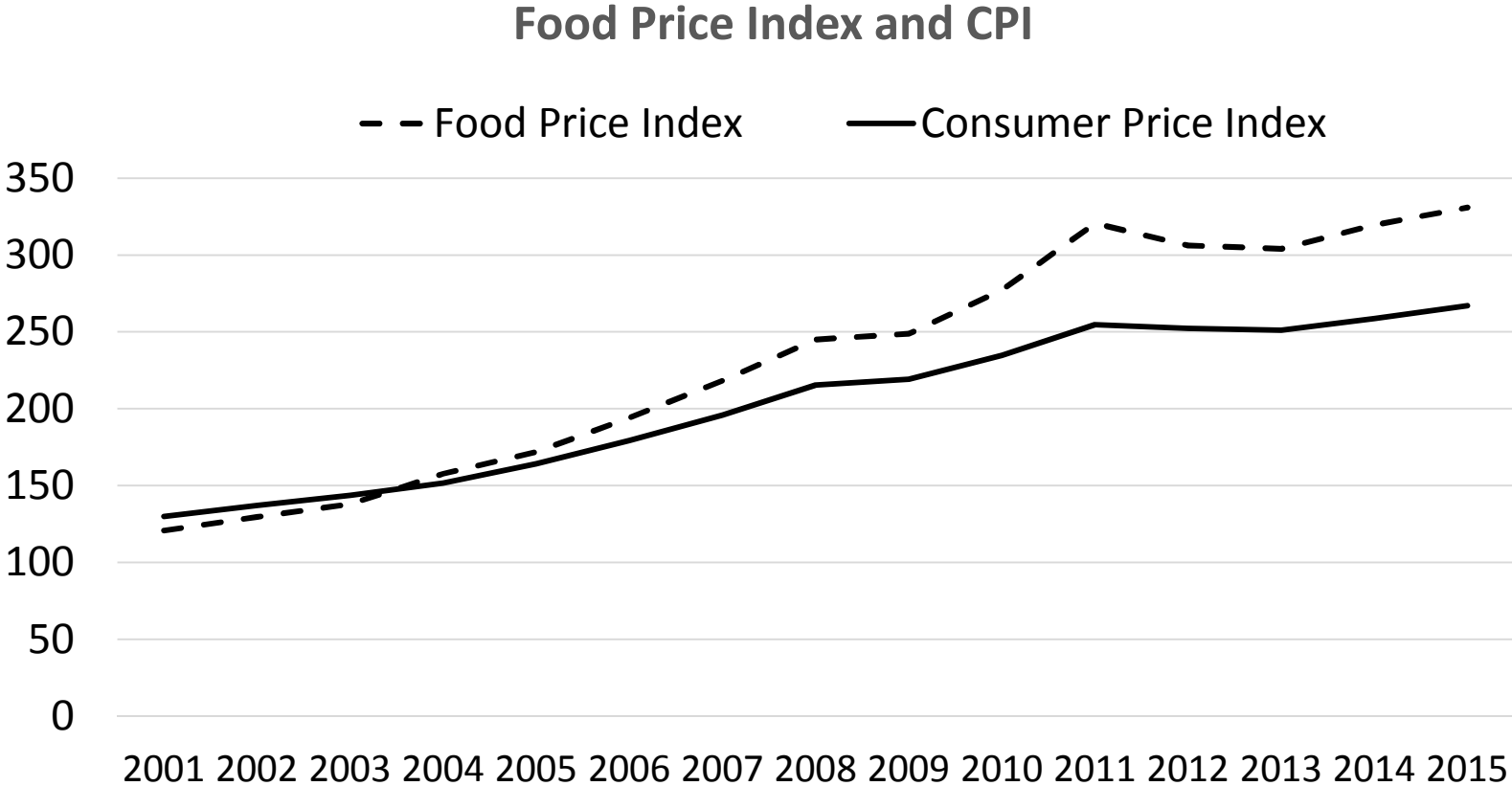
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# Introduction

- Georgia is an import dependent country
- Low self-sufficiency ratio enhances dependence of Georgian market on foreign markets
- Georgian households spend up to 40% of their income on food
- During the last 10-15 years food prices are steadily increasing

# Introduction cont'd



# Introduction cont'd

- The goal of this paper is to measure price volatility of the set of food products in Georgia
- Define major drivers of food price volatility
- Identify the most risky and less risky crops for producers to invest in
- Contribute to the policy on food security of Georgia as well as agricultural policy in general
  - Support agricultural insurance program
  - Assist agricultural loans project

# Literature Review

- Ano Sujithan, K. et al. (2014) measured food price volatility for six major commodities and explained price volatility with indicators on real economic activity, biofuel production, oil prices and performance of financial markets.
- Brummer, B. et al. (2016) did a literature review of recent empirical research on food price volatility and discussed supply (e.g. climate change, productivity) and demand side drivers (e.g. population and income growth) of volatility.
- Jordaan, H. et al. (2007) focused on the measurement of volatility using the ARCH/GARCH approach allowing to distinguish between the predictable and unpredictable elements in the price process. It was concluded that more risk-averse farmers were more likely to produce wheat and sunflower seed instead of risky soybeans.
- FAO et al. (2011) focused on policy responses to food price volatility emphasizing the importance of market information, food stocks, domestic and trade policies etc.

# Methodology

Volatility measurement through standard dispersion measures:

- Standard deviation (SD)
- Mean absolute deviation (MAD)
- Inter-quartile ratio (IQR)

Or through:

- GARCH framework
- Nonparametric estimation

# Methodology cont'd

Measuring the effect of determinants on price and price volatility

OLS estimation

$$Price = \beta_0 + \beta_1 Price_{t-1} + \beta_2 Exr + \beta_3 GDP + \beta_4 Oil + \beta_5 trend + u$$

$$Var_{price} = \gamma_0 + \gamma_1 Price_{t-1} + \gamma_2 Exr + \gamma_3 GDP + \gamma_4 Oil + \gamma_5 trend + \varepsilon$$

*Note: estimations use first differences of oil price and exchange rate*

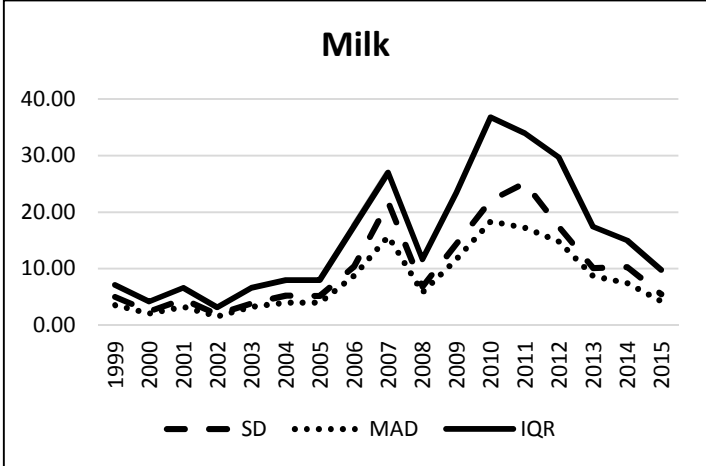
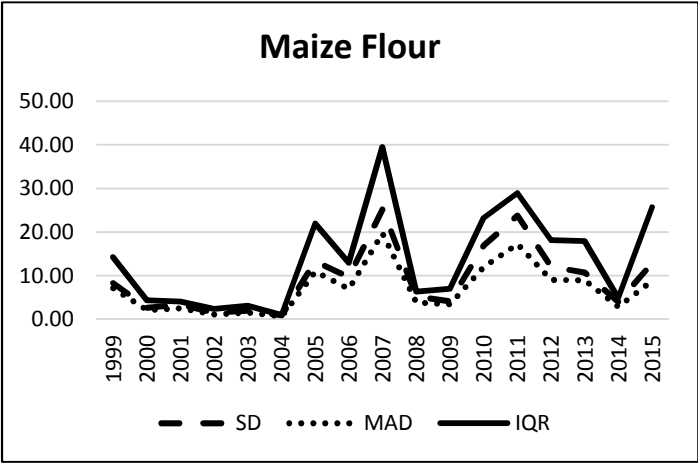
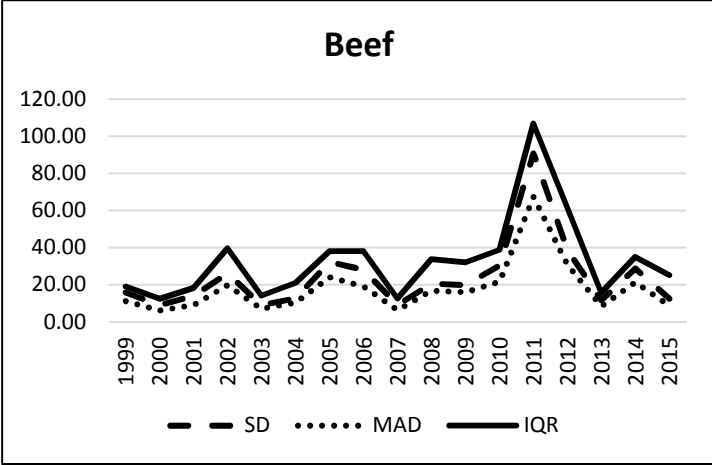
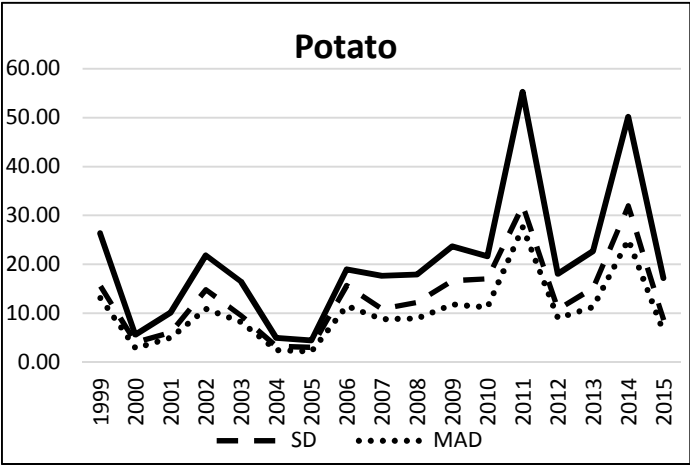


# Data

- Quarterly time series data from 1991 till 2015
- 67 observations per food commodity
- 13 food commodities (bread, potato, beans, wheat flour, maize flour, beef, pork, chicken meat, vegetable oil, cheese, milk, eggs, sugar)

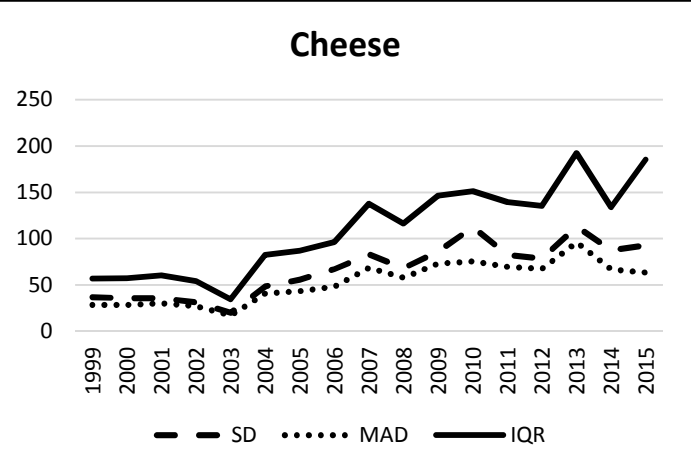
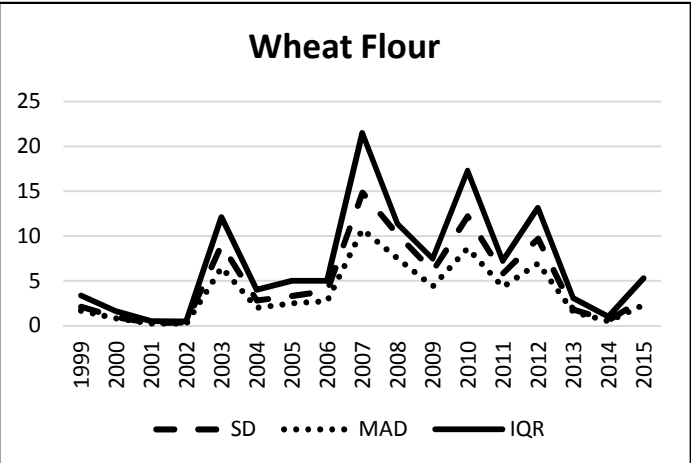
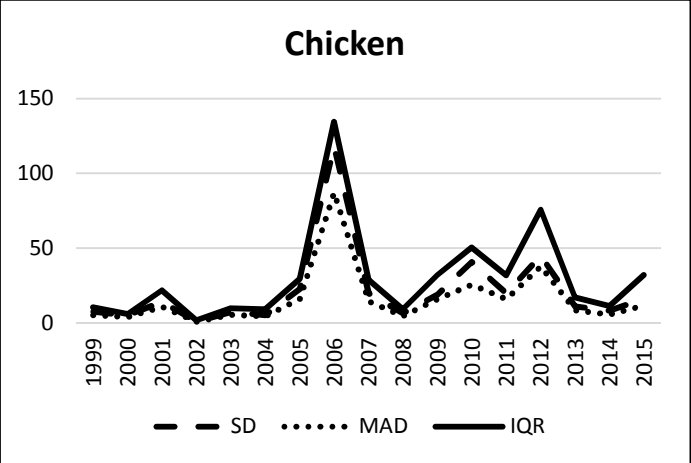
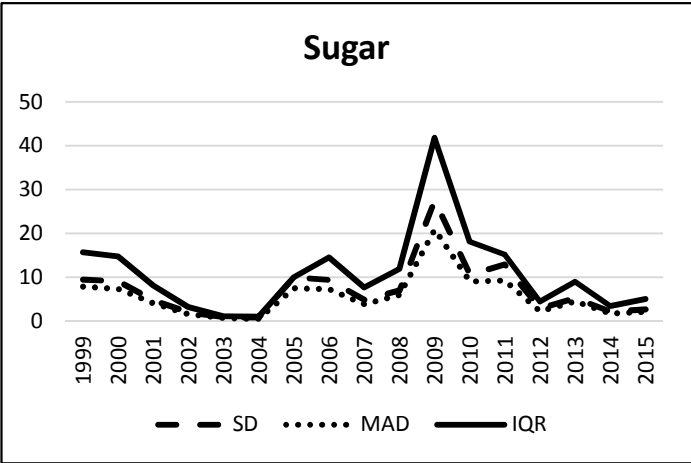
# Results

## Price volatility dynamics



# Results cont'd

## Price volatility dynamics



# Results cont'd

Dependence structure of volatility measurements for selected commodities

	Potato		Milk		Cheese	
	IQR	MAD	IQR	MAD	IQR	MAD
<b>SD</b>	0.98 (0.94) [0.80]	0.99 (0.96) [0.84]	0.98 (0.99) [0.90]	0.98 (0.99) [0.92]	0.96 (0.96) [0.84]	0.97 (0.93) [0.79]
<b>IQR</b>	–	0.99 (0.96) [0.87]	–	0.99 (0.99) [0.93]	–	0.96 (0.96) [0.89]

**Note:** The first line shows linear correlations  
Spearman's rho values are indicated in parentheses  
Kendall's tau values are displayed in brackets

# Results cont'd

Measuring the effect of determinants on the prices of selected commodities:

	Potato	Milk	Cheese
<b>Lprice</b>	0.497*** (0.110)	0.736*** (0.090)	0.316** (0.135)
<b>GDP</b>	-0.000 (0.000)	0.00001** (0.000)	0.000 (0.000)
<b>diffexr</b>	0.003 (0.370)	0.043 (0.329)	-0.712 (1.603)
<b>diffoil</b>	0.002 (0.002)	-0.001 (0.002)	-0.015 (0.010)
<b>time</b>	0.010*** (0.003)	0.001 (0.004)	0.049** (0.022)
<b>intercept</b>	-1.265*** (0.435)	-0.179 (0.499)	-6.362** (2.835)

Note: \*\*\* indicates 1 percent significance level, \*\* 5 percent significance level, \* 10 percent significance level;

The first line shows coefficients, standard errors are given in parentheses

# Results cont'd

Measuring the effect of determinants on the variance of prices for selected commodities:

	Potato	Milk	Cheese
<b>Lprice</b>	0.959*** (0.036)	2.885*** (0.099)	4.607*** (0.410)
<b>GDP</b>	-0.0001*** (0.000)	0.0004*** (0.000)	0.003*** (0.000)
<b>diffexr</b>	0.367*** (0.123)	0.969*** (0.361)	1.563 (4.877)
<b>diffoil</b>	0.003*** (0.000)	-0.003 (0.002)	-0.206*** (0.029)
<b>time</b>	0.014*** (0.001)	-0.017*** (0.004)	0.343*** (0.067)
<b>intercept</b>	-2.263*** (0.144)	-0.227 (0.547)	-70.318*** (8.628)

Note: \*\*\* indicates 1 percent significance level, \*\* 5 percent significance level, \* 10 percent significance level

The first line shows coefficients, standard errors are given in parentheses

# Further steps

- Improve model specification by controlling for
  - population growth
  - market structure
  - trade policy
- Increase the product coverage
- Include Armenia and Azerbaijan
- Expand analysis to Post-Soviet and developing countries

THANK YOU