Price dispersion and inflation rates: evidence from scanner data

E. Castellari, D. Moro, S. Platoni, P. Sckokai

Università Cattolica del Sacro Cuore, Piacenza

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1. BACKGROUND

Price dispersion, i.e. perfectly homogeneous products sold at different prices by different sellers, has been often observed in grocery markets as a deviation from the law of one price.

In a scenario with identical buyers and sellers and perfect information we know the Bertrand Outcome (perfectly equal prices) is the only possible Nash Equilibrium.

What can be the reasons causing Price dispersion?

1. BACKGROUND

• Imperfect Information:

firms can act as local monopolist since consumers incur in search cost to find the lower price.

•Product differentiation:

An identical product sold by different sellers can be perceived as differentiated due to specificity in locations (Hotelling, 1929)

Furthermore…

Setting prices randomly seller can prevent consumers to identify stores with low-prices (Lach, 2002; Varian, 1980)

2. RESEARCH QUESTION

I. Does Price Dispersion of a specific good contribute to price inflation rate?

II. Specifically, having a market with higher/lower price dispersion among the major retailer's chain can have a negative/positive impact on the average price consumers pay?

3. LITTERATURE REVIEW

I. Reinsdorf (1994) has found a negative relationship between price dispersion and inflation rates;

II. Other studies have found a positive relationship (see, for example, Caglayan et al, 2008).

III. Most of the available literature is focused on the impact of expected and unexpected general inflation (typically measured by a Consumer Price Index (CPI) or similar) on price dispersion.

IV. Very few papers analyse the relationship between Product Specific (PS) inflation and price dispersion (one exception is Caglayan et al, 2008).

Scanner Data are from IRI Group

- 156 weeks (2009-2011)

- 400 points of sale (POS) described by
  - Chain name (blinded as “chain A”)
  - Retailer, type of store (Hyper, Super, Superette)
  - We don’t know where the store is located (just in Italy), discounts are excluded

- Dairy Products: three segments of the refrigerated milk (high quality, skimmed and semi Skimmed), spreadable cheese, mozzarella cheese and butter.

3. METHODOLOGY :

1) We aggregate the dataset by Retailer Chains

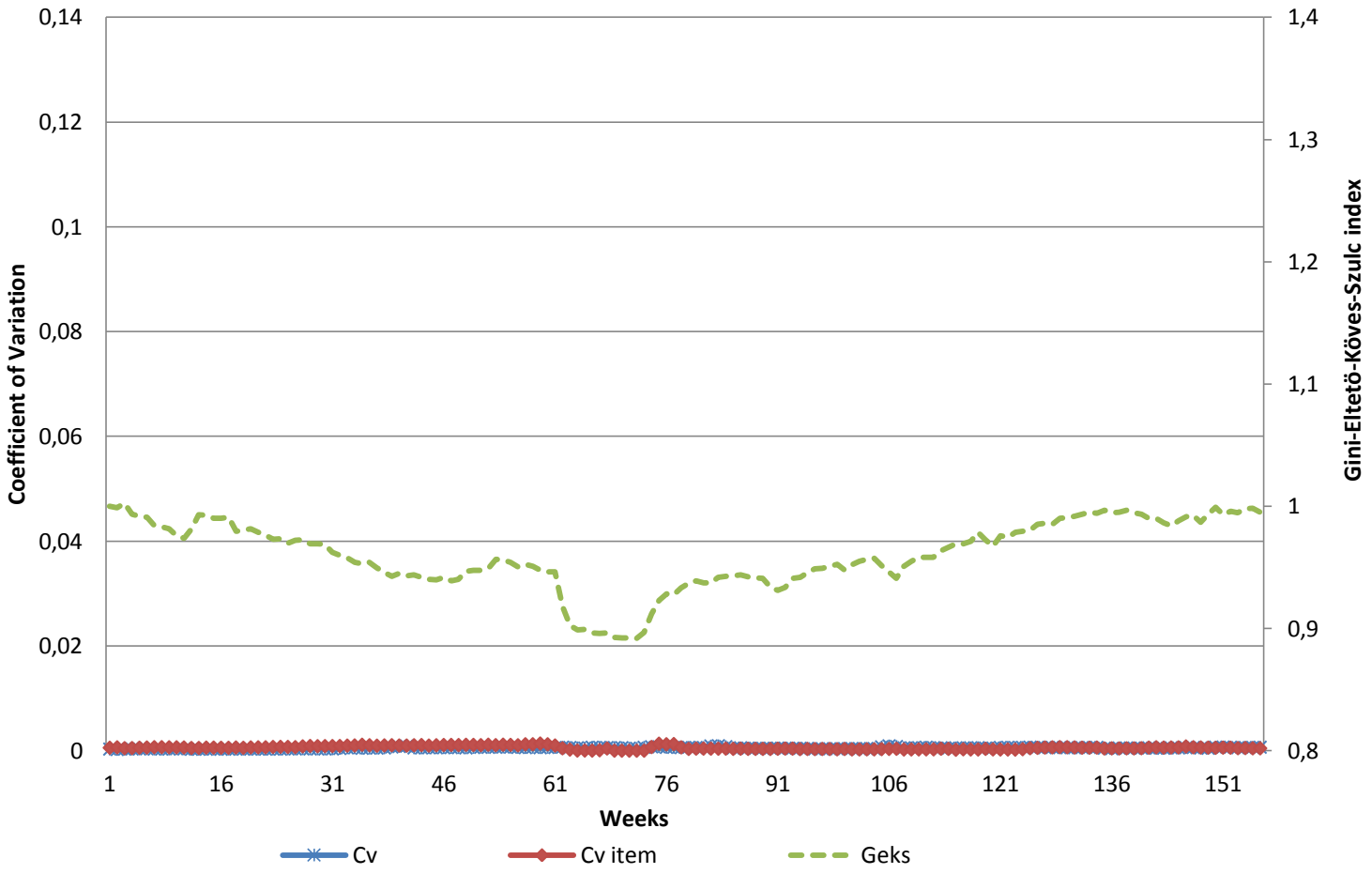
2) For each product we compute the Gini-Eltetö-Köves-Szulc (GEKS) price index. (Ivancic et al., 2011)

3) We compute measures of price dispertion:

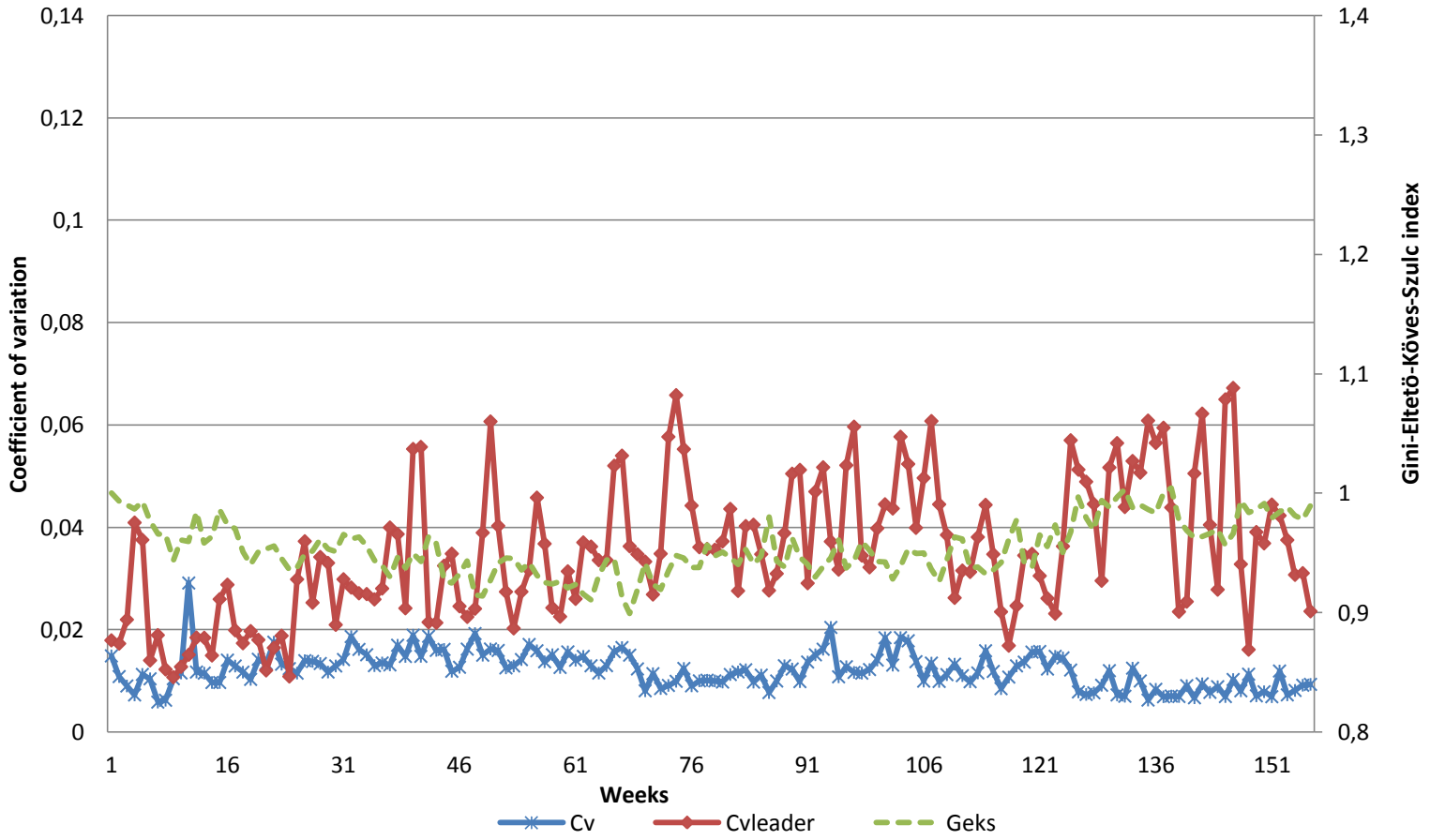
$$C_{it} = \frac{1}{\overline{P}} \sqrt{\sum_{j} \left(P_{jit} - \overline{P}\right)^2 / (n_{it} - 1)}$$

Using AveragePrices (CV) or considering a unique item (CV-item)

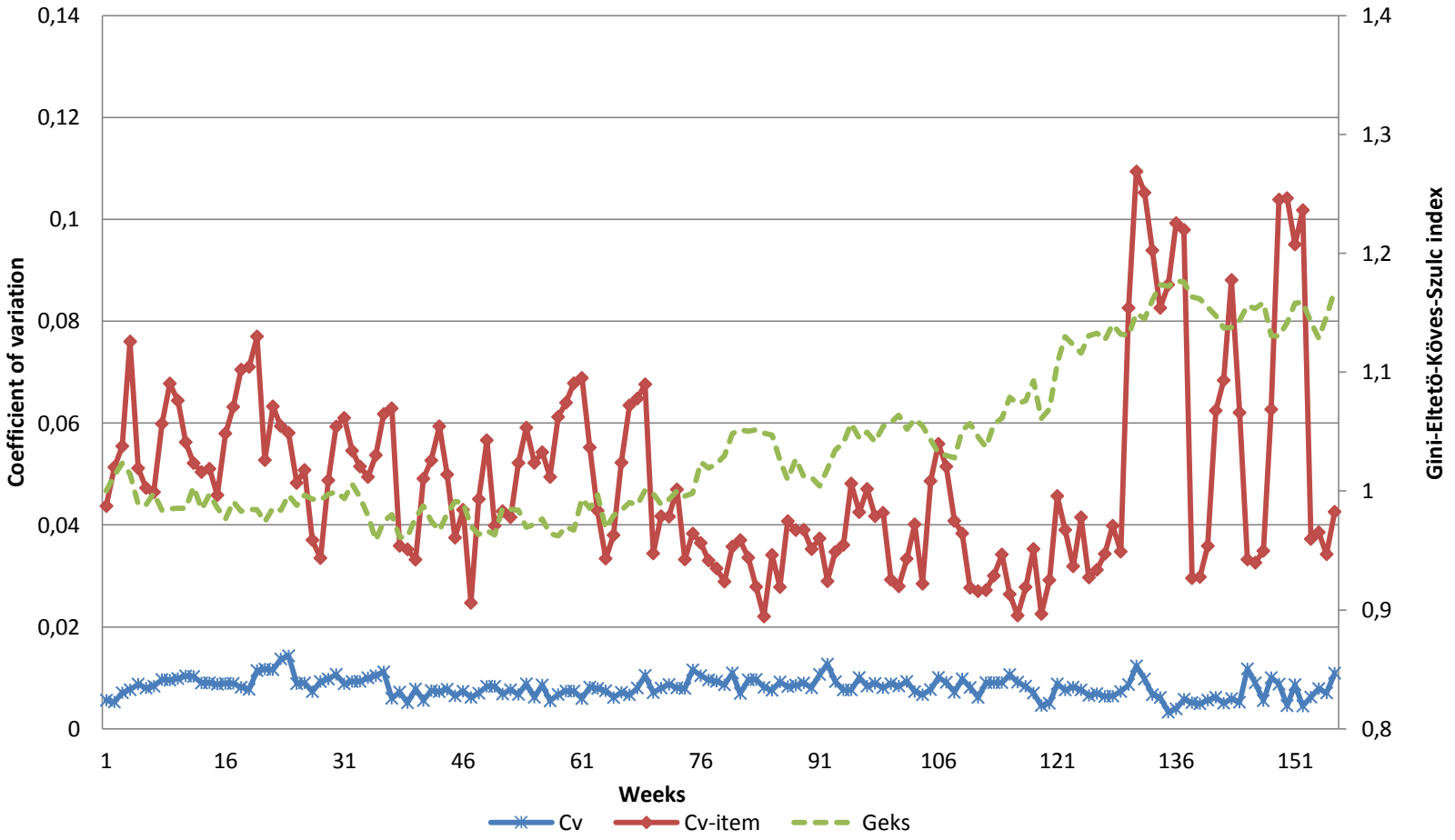
3. METHODOLOGY : High Quality Refrigerated Milk



3. METHODOLOGY : Mozzarella Cheese



3. METHODOLOGY : Butter



4. MODEL SPECIFICATION

For each of the six products, we estimate the following model:

$$GEKS_t = \beta_0 + \beta_1 X_t + \beta_2 Y_t + \varepsilon_t$$

Where:

X_t could be either CV or CV-item

Y_t control variables which may affect price dynamics (unemployment rate, Oil spot price)

We control for serial correlation using the Cochrane–Orcutt procedure:

$$GEKS_t - \rho\, GEKS_{t-1} = \beta_0(1 - \rho) + \beta_1(X_t - X_{t-1}) + e_t$$

Where $\varepsilon_t = \rho\, \varepsilon_{t-1} + e_t$

5. RESULTS

	High Quality Milk		Microfiltered Milk		Semi-skim Milk	
VARIABLES	(1)	(2)	(1)	(2)	(1)	(2)
Cv-item	10.20***	10.02***	-3.19**	-3.07**	-0.90***	-0.89***
	(2.707)	(2.710)	(1.572)	(1.547)	(0.276)	(0.277)
Time trend	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Brent spot price		0.00		-0.00		-0.00
		(0.000)		(0.000)		(0.000)
Unemployment rate		-0.00		0.01***		-0.00
		(0.003)		(0.004)		(0.003)
Constant	0.84***	0.86***	0.85***	0.78***	0.87***	0.89***
	(0.045)	(0.055)	(0.028)	(0.040)	(0.037)	(0.046)
Durbin-Watson statistic (original)	0.0304	0.1113	0.0499	0.0558	0.146	0.137
Durbin-Watson statistic (transformed)	1.6906	1.7019	2.1836	2.1716	1.848	1.888
Observations	155	155	155	155	155	155
R-squared	0.12	0.13	0.20	0.24	0.12	0.13

5. RESULTS

	Mozzarella		Spreadable cheese		Butter	
VARIABLES	(1)	(2)	(1)	(2)	(1)	(2)
Cv-item	-0.16*	-0.16*	-0.44***	-0.44***	0.13*	0.16**
	(0.097)	(0.099)	(0.094)	(0.094)	(0.072)	(0.073)
Time trend	0.00**	0.00*	0.00***	0.00*	0.00***	0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Brent spot price		-0.00		0.00		0.00*
		(0.000)		(0.001)		(0.000)
Unemployment rate		-0.01		-0.02		-0.02*
		(0.008)		(0.015)		(0.009)
Constant	0.94***	1.01***	0.96***	1.10***	0.91***	1.01***
	(0.010)	(0.067)	(0.020)	(0.127)	(0.026)	(0.077)
Durbin-Watson statistic (original)	0.4209	0.4940	0.5462	0.5971	0.2097	0.2902
Durbin-Watson statistic (transformed)	2.1224	2.1255	2.1304	2.1268	2.0032	1.9835
Observations	155	155	155	155	155	155
R-squared	0.05	0.06	0.18	0.20	0.21	0.22

6. CONCLUSIONS

Price Dispersion, when measured with average prices, does not have any effect on prices;

Using an unique item Price dispersion, our analysis shows prevalently a negative effect on prices, with the exception for high Quality and Butter segments.

Moreover, as noted by Caglayan et al (2008), we are still missing a unified theoretical framework allowing researchers to derive a proper empirical specification for this type of analysis.