Variance screens for detecting collusion: an application to two cartel cases in Italy

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Review of the literature

➲ Theoretical:

  ◾ Athey, Bagwell and Sanchirico (2004)

  ◾ Harrington and Chen (2004)

➲ Empirical:

  ◾ Connor (2004)

  ◾ Abrantes-Metz, Froeb, Geweke and Taylor (2005)

  ◾ Bolotova, Connor and Miller (2005)

Case I: Italian motor fuel market cartel

➲ 2000: Italian Competition Authority ("AGCM") found that all major oil companies in Italy created a cartel, implemented through so-called "brand agreements" between the companies and their distribution networks

➲ Retail price is set by service stations, but the companies recommend a retail price to their network members.

➲ The companies set up a mechanism to determine the purchasing price for service stations based on decreasing discounts as the quantity sold increased,
➡ strong disincentive for the stations to diverge from the recommended price levels

The data

➲ Weekly prices (net of taxes) for gasoline and diesel fuel, for the EU-15 member states, from 1998 to 2005, collected by the European Commission

➲ Price series not stationary ➡ price levels turned into differences of logs (≈ percentage changes), whose series are stationary

➲ This allows a straight comparison of the variances, without having to weight them by the mean of the series

Results

➲ Italy's standard deviations are the lowest both for gasoline and diesel fuel markets (both in the whole sample 1998-2005, and in separated subsamples 1998-99 and 2000-05)

➲ Standard deviations computed separately for each year from 1998 to 2005 show that prices volatility in Italy was the lowest, the second-last or the third-last in every year for both markets, except in 2005.

➲ Italy average prices for 2002-04 were the second-highest among Euro-area markets: only The Netherlands for gasoline and Ireland for diesel fuel have average prices higher than Italian ones.

Comments

➔ According to the analysis Italian motor fuel markets could have been the scene of a cartel among major oil companies.

➔ AGCM investigation confirmed it for the years until 1999; the conspiracy scenario seems nevertheless likely also for the period after the investigation

➔ Are there alternative reasons for these price patterns?

   ▪ higher share of retail price in Italy attributable to tax elements
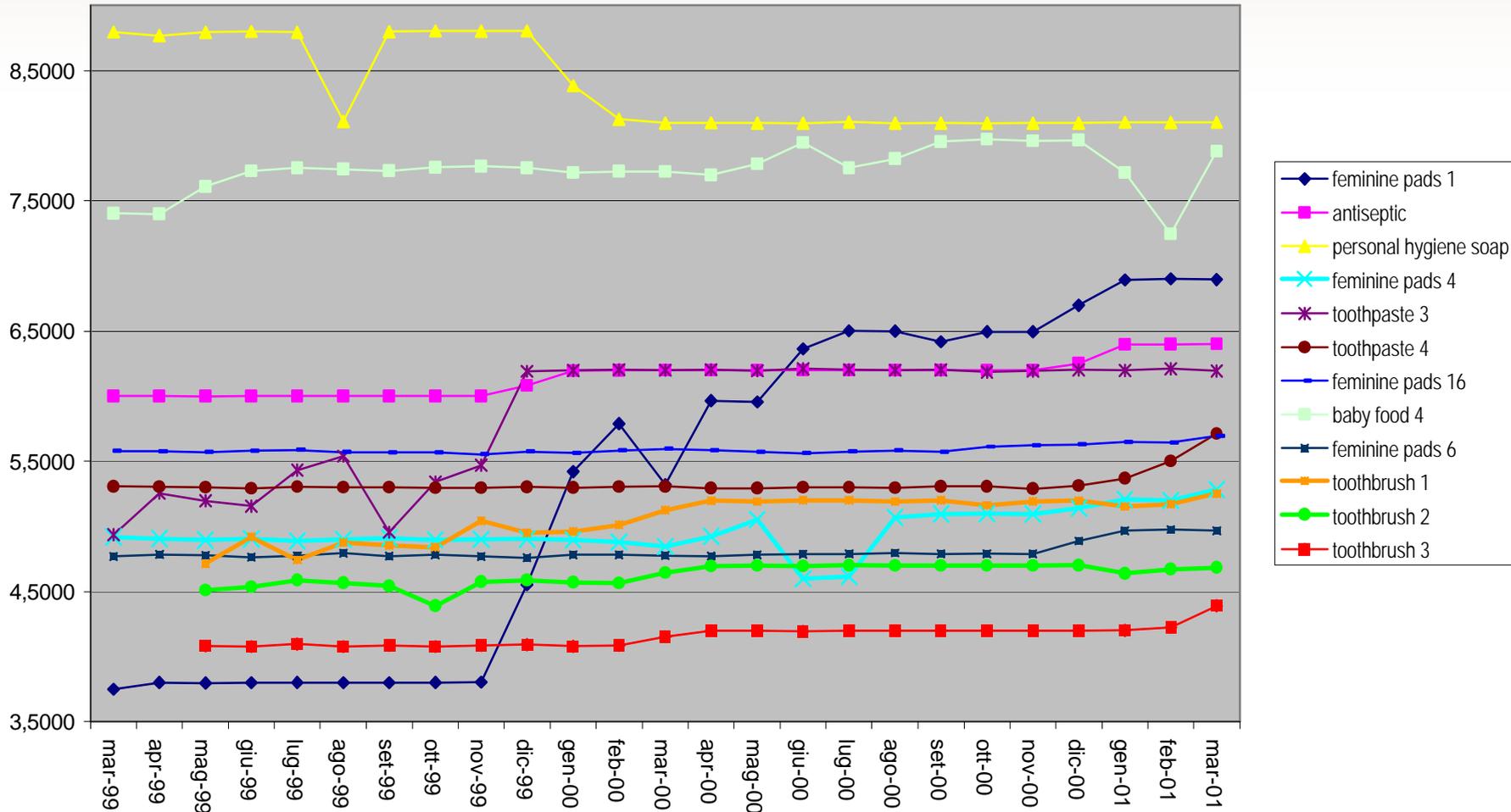
   ▪ higher distribution network costs in Italy

Case II: personal care and baby food products in pharmacies

- 2002: Italian Competition Authority fines national, regional and provincial professional associations of pharmacies and pharmacists
- Documents proving attempts to fix prices of personal care and baby food products sold both in pharmacies and supermarkets
- Creation of price lists, advises to apply producers' list prices
- Stronger collusive behaviour in Northwestern Italy (Piedmont and Liguria), Lombardy and Emilia Romagna

Data

➲ AGCM bought from Nielsen time series of volume and value sales of the *two* most representative brands of selected personal care and baby food products sold both in pharmacies and in supermarkets, in 8 Italian macroregions (Northwest, Lombardy, Northeast, Emilia Romagna, Centre, Lazio Centre South, South)

➲ Sample: 45 product items, 25 months (march '99 -march 01), 8 macroregions, 2 channels

➲ 1 antiseptic, 6 deodorants, 4 toothpastes, 5 toothbrushes, 16 feminine sanitary pads, 1 personal hygiene soap, 7 baby cereals, 5 baby food product items

➲ Average national price for products considered were higher in pharmacies, notwithstanding decreasing market shares

**Sample of typical pharmacies' series
(Emilia Romagna, thousands of italian liras)**

Legend:
- feminine pads 1
- antiseptic
- personal hygiene soap
- feminine pads 4
- toothpaste 3
- toothpaste 4
- feminine pads 16
- baby food 4
- feminine pads 6
- toothbrush 1
- toothbrush 2
- toothbrush 3

Analysis setup

➲ Many series showed one almost flat segment, some were "staircase-like" (almost flat segments separated by jumps) ⟶ computing variances over the entire sample would not allow to catch possibly collusive behaviour ⟶ compute variances over subsamples

➲ 6-month long subsamples

➲ Non-stationarity ⟶ work on differences of logs, making series (almost) stationary and directly comparable (prices are in different units)

➲ analysis carried out over standard deviations computed on subsamples of six subsequent differences of logs of prices.
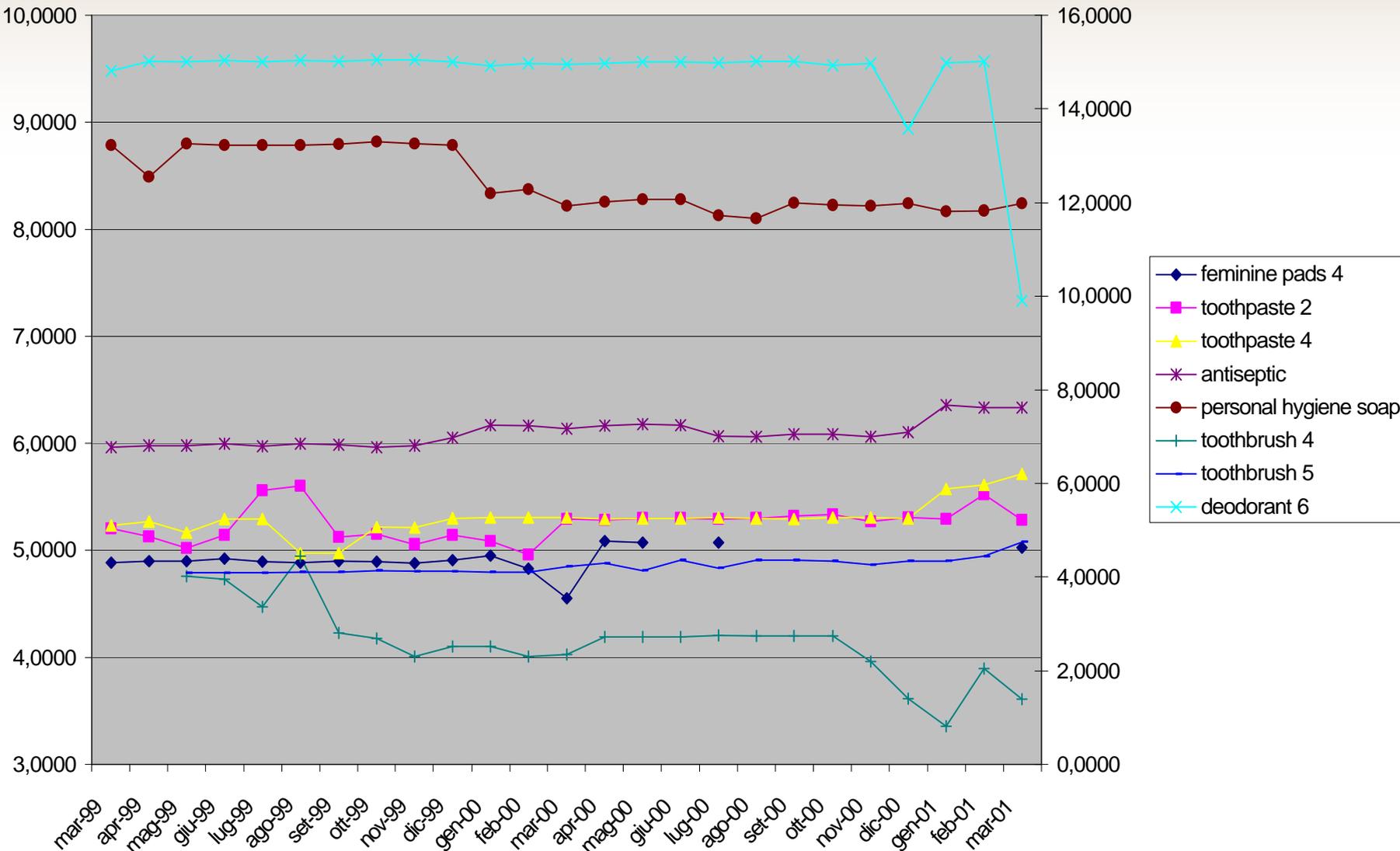
Supermarkets as a benchmark

- Use supermarkets as a benchmark: lower average prices, different institutional arragement make them more competitive

- Average standard deviation is (slightly) greater for supermarkets ⟹ is there a problem ? **NO**

- pharmacies' standard deviations *(i)* have a lower minimum *(ii)* 2,7% of them are below minimum supermarkets' st.dev. *(iii)* about 30% of them are below the first quartile of supermarkets' st.dev.

- The benchmark has discriminatory power

Benchmark 1: lowest standard deviation in supermarkets subsamples

- ➲ For each product item and each region, the minimum standard deviation of subsamples of differences of logs of pharmacies prices was computed.
- ➲ If such a minimum was lower than the benchmark, the series was classified as "collusive"
- ➲ 47 "collusive" series, mostly belonging to Emilia Romagna and Lombardy (23,4% each) , none to Northeast
- ➲ broadly consistent with AGCM findings, but stronger evidence for Northwest expected.
- ➲ However, visual inspection revealed that several series showing typically "collusive" patterns were not selected.

Noth East - series not caught by absmin threshold (price levels, thousands of liras)

Legend:
- feminine pads 4
- toothpaste 2
- toothpaste 4
- antiseptic
- personal hygiene soap
- toothbrush 4
- toothbrush 5
- deodorant 6

Benchmark 2: minimum product standard deviation

➲ 45 benchmarks: the minimum standard deviation of subsamples of differences of logs of supermarket prices for each product

➲ 117 "collusive" series, mostly belonging to Emilia Romagna (>50% of series dubbed "collusive"), Lombardy (>50%) and Northwest (42%)

➲ Greater consistency with AGCM findings

➲ In addition, Centre and South are signalled as macroregions deserving deeper investigation

➲ A few "collusive" series maybe not caught, very few "non collusive" caught

Methodological remarks /1

➲ *significant standard deviations may occur even if there is collusion,* in particular when a series is characterized by strong stability over two periods separated by a jump

➲ *small standard deviations may be due not to collusion, but to menu costs or other elements*: antiseptic and personal hygiene soap product items display strongly collusive patterns, but they account for 2% of category sales in pharmacies; listed prices could have worked for them as a transaction costs reducing device, instead of a focal point for collusion

In the motor fuel case, high share of taxes may have reduced price volatility compared to other countries

Methodological remarks /2

➲ *what kind of collusion is screened ?*

➢ low variance of aggregate price implies that neither price nor quantities are changing very much ➡ *collusion to stabilize market shares (and relative prices)*

➡ **MOTOR FUEL**

➢ flat sections in aggregate data imply that prices are not only constant, but also equal (as only in this case quantity variations do not affect average price) ➡ *collusion is over the same price for everybody* ➡ **PHARMACIES**

➲ *aggregation matters ?* aggregation of a large number of series may reduce variance of the aggregate series, biasing the analysis