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a regional analysis

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RETAIL SECTOR CONCENTRATION AND PRICE DYNAMICS IN THE EURO AREA: A REGIONAL ANALYSIS

by Emanuela Ciapanna* and Concetta Rondinelli**

Abstract

We conduct a regional analysis of the relationship between market concentration and price dynamics in the grocery retail sector, focusing on a sample of five categories of goods belonging to the 12 COICOP aggregation and on a panel of countries that includes Germany, Spain, Finland, Italy, Austria and Portugal. Using a unique census-type dataset on retailers, we construct Herfindahl-Hirschman indices of concentration at the buying group, parent company and individual shop level for a sample of 118,540 large grocery stores and we study the association between these measures and regional price changes. Our results point to a positive association between retail market concentration and price growth in food and beverages, alcohol and tobacco and miscellaneous goods in the time span 2003-2010 at the buying, parental group and store level for the pooled sample of countries. The relation reverses sign for clothing and footwear and household equipment. This evidence is robust to different specifications of concentration indices.

JEL Classification: L1, L4, L8, E31.

Keywords: market concentration, price dynamics, buying group, parent company, regional Herfindahl-Hirschman indices.

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Introduction¹

The distributive trades sector provides an ‘intermediation’ service between upstream (e.g. producers) and downstream economic agents (e.g. consumers). Therefore, it influences the functioning of the market economy as a whole and is especially relevant to monetary policy because of its crucial role in price formation. From a monetary policy point of view, increasing the degree of competition in the distributive trades sector may have effects not only on price levels, via a reduction of mark-ups, but also on price dynamics, through higher price flexibility. Structural features of the compartment, such as the role of buying groups² and the relative bargaining power between producers and retailers, are of great importance to consumers and price determination. In addition, they may also affect the measurement of consumer prices.

In this paper, we conduct a regional analysis of the relationship between the degree of retail market concentration and price dynamics for five categories of goods, selected for their availability on retail shelves, classified according to the 12 COICOP aggregation (1. food and non-alcoholic beverages; 2. alcoholic beverages, tobacco and narcotics; 3. clothing and footwear; 5. furnishings, household equipment and routine household maintenance; 12. miscellaneous goods). Data are available for Germany, Spain, Finland, Italy, Austria and Portugal.³

By assembling a unique census-type dataset on large-scale retailers (Nielsen structural data), we construct Herfindahl-Hirschman indices (HHI) of concentration at the buying group, parent company and individual store level, considering both the regional and local market (5 km radius) definition. We investigate the relationship between these measures of concentration and patterns in price changes at a regional level.

The original contribution of this study lies in the analysis of the relationship between competition and price changes at the local level, using cross-country micro data. Our result points to an overall positive and statistically significant relationship between retail market concentration and price growth for the pooled sample of countries, using the regional and local concentration measures for food and beverages, alcohol and tobacco and miscellaneous goods and services. Instead, price changes are negatively affected by the degree of concentration for clothing and footwear and furnishings, and household equipment and maintenance.

¹ The bulk of this research project was done while the authors were involved in the drafting of the Eurosystem Structural Issues Report, published in the ECB Occasional Paper Series, September 2011. We are grateful to Robert Anderton, Aidan Meyler, Patrick Sevestre and Philip Vermeulen for valuable comments. We are also indebted to Eugenio Gaiotti, Andrea Brandolini and Roberto Sabbatini. All errors are our own. The views expressed in this article are those of the authors and do not necessarily reflect those of the Bank of Italy.

² A buying group is an organisation of retailers that combines the bargaining power of its members in order to be able to purchase goods at a more advantageous rate than might be achieved through individual negotiation. Buying groups are important because, by combining the bargaining power of their individual members, they can achieve a very large scale and potentially alter the balance of power in negotiations between retailers and suppliers. Their existence also implies that measures of competition based on company level data may overstate the true level of competition and understate their bargaining power relative to suppliers.

³ CPI regional data were not available for the other EA countries.

It is important to note that the Nielsen structural data used for the concentration indices refer to the year 2010, while we look at price changes between 2003 and 2010. Although it would clearly be preferable to have data about the retail trade market structure over the same time span, one can reasonably expect that the differences in these structures across regions and countries dominate their evolution over time so that the retail trade market structure in 2010 remains informative about price changes over the whole period. However, the very fact of having regional Consumer Price Index (CPI) data - instead of price levels - makes the link with the concentration measures and the interpretation of the results less immediate.

Indeed, most of the industrial organisation literature looks at the well-established relation between competition and price levels (see for instance Clarke and Davis, 1982; Hausman and Sidak, 2007), finding that a more competitive market structure implies lower prices and enhances consumer welfare (Dobson and Waterson, 1997, 1999; Chen, 2003; Barros et al., 2006; Villas-Boas, 2009). In the macroeconomic theoretical literature, many papers have investigated the association between the frequency of price adjustments and the degree of monopoly power, showing a positive relation between the absence of price changes and monopoly power and, conversely, between frequent price changes and strong competition. Based on price level records collected to compute the Italian CPI, merged with retail trade data released by Nielsen for the years 2003-2008, Ciapanna and Colonna (2011) have assessed the effect of concentration on price levels in the Italian retail market. They find that concentration and prices tend to co-move in the same direction when looking at the parental group and at the store level, whereas they tend to be negatively related at the buying group level. The approach used below is similar to that adopted in Ciapanna and Colonna (2011) but, due to data availability, on the one hand, the paper focuses on price dynamics rather than price levels, on the other hand, the analysis is conducted on a panel of countries, representing over 60 per cent of the euro-area GDP. Very few contributions have analysed the relation between the degree of product market concentration and inflation (see for instance, Scitovsky, 1978; Benabou, 1992). In this literature, a more competitive economy is expected to adjust more quickly to unanticipated shocks, reducing, for instance, the response of inflation after a supply shock. Przybila and Roma, (2005) find that the extent of product market competition, as proxied by the level of mark-up, is an important driver of inflation for a panel of EU countries.

The outline of the paper is the following: in Section 1 we document some stylised facts on the distributive trades sector, in Section 2 we provide a description of the dataset, in Section 3 we present the mathematical methods employed to construct the concentration indices. The econometric analysis and results are discussed in Section 4; Section 5 concludes and proposes possible extensions.

1. Some stylised facts about the structure of the distributive trades sector

According to the NACE Rev. 1.1 classification, the distributive trades sector (G) covers three broad areas: motor vehicles (G50), wholesale trade (G51) and retail trade (G52) and accounts for approximately 30 per cent of firms in the non-financial business sector in the euro area⁴, ranging from a minimum of 23 per cent in Finland to a maximum of 34.5 per cent in Portugal⁵ (Eurostat Structural Business Statistics, SBS, 2007). This variation partly represents differences in average firm size across countries and sectors (firms are on average smaller in Mediterranean countries and larger in Northern countries). In terms of labour market characteristics, the distributive trades sector accounts for a high percentage of the self-employed (about 30 per cent of the total employment) and part-time workers, as well as young and female workers. On average, a large portion of low-skilled, low-productivity, and consequently low paid labour workers are employed in this sector, which also accounts for a significant proportion of new jobs created over the last 15 years. During the period we analyse, large firms have generated much of the growth in turnover and employment witnessed by this historically fragmented sector, reflecting its gradual consolidation.

About 60 per cent of the distributive trade firms belong to the retail sub-sector, which is also the most analysed in the economic and business literature (Euromonitor International, 2000-2010; Pricewaterhouse Coopers, 2000). According to Euromonitor data, the total number of grocery stores in the euro area is about 850,000: both Italy and Spain have more stores than Germany despite their smaller populations. As to the sales area, Germany (40 million sqm) has the largest of in the euro area (150 million sqm). This inverse correlation captures a striking divide in European grocery: Southern European countries (Spain, Italy, and Portugal) tend to have more traditional smaller grocery retailers than most Northern and Central ones included in our sample (Germany and Finland).

2. Data Description

The econometric analysis is based on a unique dataset, constructed by merging the structural Nielsen data with the regional consumer price index (CPI) provided by the National Statistical Institutes for Germany, Spain, Finland, Italy, Austria and Portugal and the Eurostat regional data.

⁴ The non-financial business sector comprises of the total economy excluding agriculture and fishing, financial intermediation services, and public services sectors. Thus, it includes mining and quarrying, manufacturing, utilities, construction, distributive trades, hotels and restaurants, transport, storage and communication, and real estate, renting and business activities.

⁵ The shares for the other countries considered in this study are 26.2 per cent in Germany, 30.1 in Spain, 31.8 in Italy and 27.9 in Austria.

2.1 Nielsen structural data

The structural data consists of census-type data on non-specialised large grocery retailers⁶ released by ACNielsen for nine euro-area countries (Germany, Spain, Finland, France, Greece, Italy, the Netherlands, Austria and Portugal) and provided by the Belgian Central Bank for Belgium.⁷ The reference period is July 2010. The data provide a picture of the grocery retail sector updated at the first semester of 2010. The unit of observation is the store, for a total of 114,815 observations (118,540 including Belgian shops; see Table 1). Detailed information at the store level is provided in the dataset: name, address, banner name, outlet type, sales area in square metres, number of counters, turnover share. Moreover, the dataset is endowed with information about whether each store belongs to a parental company and/or to a buying group.⁸

To construct a dataset harmonized across countries some data management was required. The outlet type definition was not the same for all countries.⁹ The harmonization criterion chosen was based on the sales surface range applicable to most of the countries:

- superettes (100-400 sqm),
- supermarkets (400-2500 sqm),
- hypermarkets (2500 and over).

Malls (SB-Warenhaus in Germany, Grand Magasin in France, for example) were excluded from the final dataset for overlapping and comparability reasons. For discounts a dummy variable was present in most of the Nielsen datasets. Where it was not specified, NCB task force members were asked to construct the dummy, or a criterion based on the banner name (whenever possible) was used.

As to the geographical dimension, many countries were provided with a more aggregated detail (NUTS2 in Table 1).¹⁰ The geographical detail is not an issue when considering the Nielsen dataset by itself, as the address of the single store is available. The problem arises when we merge the very detailed store level information with the regional (NUTS2) CPI data (see Section 3). In this sense, we needed to transpose the former to the latter (broader) aggregation, as in Spain and Finland for example. For other countries, like Italy, provided with both NUTS2 and NUTS3 dimension, the regional analysis was based on NUTS2, as the Eurostat additional explanatory variables (labour cost

⁶ NACE G5211 sub-sector, non-specialised stores with food beverages or tobacco predominating. Small traditional as well as specialized stores are not included.

⁷ Data for Belgium relate to 2008.

⁸ For Greece, buying groups were imputed from an external data source provided by the NCB SIR task force member.

⁹ See <http://www.insee.fr/fr/methodes/default.asp?page=definitions/hypermarche.htm> and <http://www.insee.fr/fr/methodes/default.asp?page=definitions/supermarche.htm> as an example.

¹⁰ NUTS denotes Nomenclature of Units for Territorial Statistics. There are three hierarchies, with 97 NUTS1 regions, 271 NUTS2 regions and 1,303 NUTS3 regions in the European Union. In principal, NUTS2 regions should have a population in the range 800,000 to 3 million, and NUTS3 regions in the range 150,000 to 800,000. However, as countries often use existing administrative zones, this is only an indication rather than a precise guide.

index, real GDP growth rate) were available at this level only, despite a very detailed regional CPI at the NUTS3. For some other countries, such as Belgium and Greece, the NUTS2 aggregation has been retrieved through the zip codes.

In order to provide the final dataset with a parent company and a buying group for each country some assumptions were made. Where not provided in the original dataset, we assumed that the buying group for the hard discounters at the national level coincided with the global banner name. We also allowed the parent company to provide some insight regarding the buying group when missing.

Finally, for very few countries (Austria, Germany, France and Italy) a measure of the turnover share was available.

2.2 Regional CPI data

We include in the dataset sectoral CPI data at the regional level from six euro-area countries (Germany (DE), Finland (FI), Italy (IT), Austria and Portugal (PT) and Spain (ES)), 69 regions (NUTS2), covering about 65 per cent of the euro area in terms of GDP. For each region we have 12 product categories, corresponding to the 12 COICOP classification: 1. food and non-alcoholic beverages; 2. alcoholic beverages, tobacco and narcotics; 3. clothing and footwear; 4. housing, water, electricity, gas and other fuels; 5. furnishings, household equipment and routine household maintenance; 6. health; 7. transport; 8. communication; 9. recreation and culture; 10. education; 11. restaurants and hotels; 12. miscellaneous goods. We rule out all the categories including mainly services or energy goods, while keeping those products plausibly sold in the outlets classified under NACE 5211. Therefore, the sectors we are interested in are:

1. food and non-alcoholic beverages (food);
2. alcoholic beverages, tobacco and narcotics (alco);
3. clothing and footwear (clot);
5. furnishings, household equipment and routine household maintenance (furn);
12. miscellaneous goods (other).

Overall, the dataset includes 240 series, spanning the period 2003 to 2010 at annual frequency.

The rate of price change in a given region i and sector j at time t denoted by π_{ijt} is computed as the year-on-year percentage change in the respective sectoral price index, cpi_{ijt} ,

$$\pi_{ijt} = (cpi_{ijt} - cpi_{ijt-1}) / cpi_{ijt-1} \quad (1)$$

In the empirical model, we include some control variables from the Eurostat regional dataset (NUTS2). These are the regional density (population/km²) and a measure of the evolution of labour costs. For the latter we selected labour compensation, regional GDP (both in nominal terms and in

PPS) and real value added growth. These three variables were all highly correlated with each other, so we decided to keep labour cost, as we believe it is a more precise proxy of expenditure capacity.¹¹

3. Methods

3.1 Concentration measures

The concept of industry concentration and the construction of indices measuring concentration has been widely analysed in the economic literature. The two elements that characterize these measures are: number of firms and equality/inequality of market shares.

Whenever such indicators are used, it is implicitly assumed that the degree of competition of a market structure is higher, the lower is the share of demand served by each firm. The most common concentration measures are the concentration ratios, which are employed to detect changes in the distribution of market shares due to entry/exit of firms or M&As. The general form, common to all concentration measures is:

$$CI = \sum_{i=1}^n s_i w_i \quad (2)$$

where s_i is firm i market share, w_i is the corresponding weight attributed to the market share i and n is the number of firms operating in the market. The most popular synthetic indices used in investigations by antitrust authorities are:

1. *k-firm Concentration Ratio*

$$CR_k = \sum_{i=1}^k s_i w_i \quad (3)$$

where

$$w_i = \begin{cases} 1 & \forall i = 1, \dots, k \\ 0 & \forall i = k + 1, \dots, n \end{cases} \quad (4)$$

is the sum of the k largest firms' market shares, which are given equal weight. There exists a bi-univocal correspondence between CR_k and the points of the concentration curve (discrete measure): CR_k is a mapping taking values in $[0,1]$; $CR_k \rightarrow 0$ if $s_i \rightarrow \frac{1}{n} \forall i, n \rightarrow \infty$ and $k = o(n)$.

2. *Herfindahl-Hirschman Index (HHI)*:

¹¹ The results are left unchanged the other two measures are considered.

$$HHI = \sum_{i=1}^n s_i^2 \quad (5)$$

where

$$w_i = s_i \quad \forall i = 1, \dots, n$$

$$i-1 < i < i+1$$

so the weights are increasing in firm size and all the n firms are considered.

$\frac{1}{n} \leq HHI \leq 1$, where the minimum is attained in the case of perfect competition, whereas the

maximum implies a monopolistic market structure.

The k -firm Concentration Ratio suffers some limitations due to the arbitrariness in the choice of k and the bias induced by excluding the other $n-k$ firms. On the other hand, HHI is the most popular measure; it represents the reference market power index in the antitrust authority guidelines when evaluating M&As.¹² In what follows, we use HHI as our concentration measure.

3.2 Construction of concentration measures

To evaluate the degree of concentration in the retail sector in the main euro area countries (Austria (AT), Belgium (BE), Finland (FI), France (FR), Germany (DE), Greece (GR), Italy (IT), the Netherlands (NL), Portugal (PT), Spain (ES)), we compute the HHI using the Nielsen structural data for 2010 described in Section 2.1. Concentration is evaluated both at the buying group level, and in the final market, among parent companies and stores.

We first compute the indices at the national level, in order to provide a broad picture of how concentrated the retail market is, looking at the whole country. However, measures of concentration computed at the national level may be inaccurate or, at least, should be complemented by local level indices, particularly when they are used to proxy market power. Different studies have pointed out the relevance of measuring local level competition in the distributive trades sector, because consumers may get information and compare relative prices for a restricted set of stores according to a vicinity criterion (see, for instance, Baugnet et al., 2009). In this respect, HHI at the national level is a poor indicator of actual (absence of) competition, as it would be the same as assuming that all the stores in a country compete with each other. On the other hand, an HHI calculated at local level may also present some shortcomings as high concentration levels may just reflect small market size. In this respect, the association between the optimal number of competitors and the market size, measured by population (or population density), may be led by a spurious correlation.

¹² In particular, in the US, a post-merger scenario characterized by an $HHI \leq 0.18$ and an increase in the same index of less than 0.02 is considered immune from the risk of abuse of market power. Whenever these limits are exceeded, an investigation can be initiated.

The definition of the relevant local market is subject to discussion (see, for example, Cotterill, 2007; Perdiguero and Borrel, 2008). Here, we follow a similar approach to that in Baugnet et al. (2009), checking the robustness of our results to alternative definitions. In particular, we will define a *regional market* as the set of stores belonging to the same region (NUTS2 classification) and a *local market* for each store as the set of competitors in a 5 and 10 kilometre radius.¹³

3.2.1 National level Herfindahl-Hirschman Index

The geographical reference is the whole country, which also represents the reference market in this case. Market shares are constructed based on sales area (square metres), aggregated by buying and parental groups.¹⁴ To calculate the HHI, we sum the total square metres of all outlets belonging to the same buying (respectively parental) group and divide the result by the sum of all square metres sales in the country. Finally, we multiply this measure by 100 to recover the index.

Table 2 shows that the Finnish and Austrian retail sectors are the most concentrated at the buying group level, while Italy and France are the most fragmented.

In particular, Finland and Austria both have the first two buying groups with a market share in the range of 30-50 per cent (see Table 3). In Finland, the largest buying group, including only the largest parent company in the country, represents a share of 45.9 per cent, the highest in the sample; more than one third of the remaining market share belongs to the second buying group, including the second parent company and other independent retailers. The first and second Austrian buying groups account for a market share above one third, the former including many discounters as members, while the latter being represented by its own banner retailers. The Italian market structure shows a much more fragmented landscape; the biggest buying group is the only one representing more than 20 per cent, whereas the ones from the third to the sixth have a share of about 10 per cent. A relatively fragmented market structure is typical of Portugal as well: the first buying group holds a 25 per cent share, while the second has 21.4 per cent. The other countries occupy an intermediate position in the buying group level concentration ranking. In particular, Germany, Belgium and the Netherlands have only one buying group with a market share of about one third; while in France and Spain the first buying group holds a share of 25 and 28 per cent, respectively.

The market structure at the parent company level provides a broader classification among countries: Finland and Germany have the most concentrated retail sector, and together with Belgium well above the euro-area average; Italy and Austria show a low degree of concentration

¹³ Previously, we computed geographical coordinates (longitude and latitude) using the precise address available in the dataset. Bulkgeocoder.com was used for these purposes.

¹⁴ Counters and turnover shares are other possible criteria that can be employed to construct market shares. However, we use square metres, because sales area data are available for all the countries in the dataset. Whenever possible, we computed the same measure based on the three indicators and find a correlation larger than 0.9. Thus, we conclude that square meters are a good synthetic indicator for market shares.

(see Table 2). In further detail, about 70 per cent of the Finnish market share belongs to the first two largest parent companies (40 and 34 per cent respectively; Table 4). In Germany, more than one third of the retail sector is accounted for by the first parental group, about one fourth by the second one. The Italian market structure appears more fragmented, as the first two parent companies hold a 20 per cent share only, about 10 per cent each. An interesting picture emerges from the Austrian retail sector, much concentrated at the buying group level and very fragmented at the parent company level, where the first group accounts for more than 15 per cent of the market share, while the second and third for about 10 per cent each. There is one main parent company with a market share of about 20 per cent in Greece, Belgium and Spain. In Portugal the first two companies cover a market share of about 40 per cent, while in France there are about fifty parental groups and the first two largest hold about 30 per cent of the market.

3.2.2 Regional level Herfindahl-Hirschman Index

The methodology we employed to compute the *regional* level HHI indices resembles the one described in Section 3.2.1, with the difference that now the reference market is the region (NUTS2) and not the whole country. The market share is constructed accordingly, taking as denominator the sum of the sales floor (square metres) in the region and as the numerator the same sales area further disaggregated by buying group, parental group or simply by shop.

As reported in Table 5, in Finland, the most concentrated country at the buying and parental group level, among the mainland, Itä-Suomi is the least competitive region.¹⁵ Vorarlberg shows the highest concentration for Austrian buying groups and the Tirol for both the parent companies and shops; the German retail market structure, at both levels, is very concentrated in Sachsen-Anhalt. In Italy the Lombardia region tends to be the most competitive in the country with respect to all three of the measures considered. Excluding Corsica, in France, the Ile-de-France buying groups are the most concentrated, whereas for parent companies and shops it is Pays-de-la-Loire. Spanish concentration is high in Extremadura at the buying group level and in Pais Vasco for parent companies and shops. The Belgian “province du Brabant Wallon” and the Greek “Anatoliki Makedonia Thraki” show the highest level of concentration in the country. Noord-Holland, the isles that includes also Amsterdam, is more concentrated compared with Drenthe, the least concentrated Dutch region. Lisboa shows a high level of concentration in Portugal at the shop level.

¹⁵ All the islands in the sample (Ahvenanmaa (FI), Corsica (FR), Ionia Nisia (GR), Voreio Aigaio (GR), Notio Aigaio (GR)) can be considered outliers, as the mean number of shops is smaller compared with the average for the country they belong to. Ionia Nisia, Notio Aigaio and Voreio Aigaio have 24, 30, 19 shops, compared with 300, the Greek mean number of stores per region.

3.2.3 Local level Herfindahl-Hirschman Index

To retrieve the 5 km and 10 km radius bilateral distances between stores, we computed geographical coordinates (longitude and latitude) using the store address (street name and zip code) available in the Nielsen structural dataset (see Table 6). We used the same address information to define a local market for each store to account for all potential competitors inside different distance radii. Then to match the CPI data aggregation, a regional average at the NUTS2 detail was calculated.

These concentration measures were computed at the store level and therefore they might not be an accurate measure of concentration whenever the stores belong to the same parent company (as they do not effectively compete with each other). Since this information is also available in the Nielsen dataset, we can compute similar measures of concentration, aggregating market shares of those stores belonging to the same parental group. We also retrieve the same measure at the buying group level to account for shops belonging to the same buyer consortium.

The definition of the relevant local market may vary across store types. In particular, it is likely that the relevant local market for a hypermarket is larger than the one for a small superette. To assess this issue, we computed HHI regional averages using different local markets depending on the store size. So, for hypermarkets (above 2500 sqm) we take the HHI computed at the 10 km radius local market and for supermarkets and superettes the individual HHI is taken from the 5 km radius local market.

The regional ranking does not vary according to this alternative measure, so, in the model, we kept the 5 km measure for convenience of exposition. The latter was used in the robustness check of the model presented in Section 4.

4. Empirical model and results

We model the year-on-year percentage change in the sectoral price index as follows:

$$\pi_{ijt} = \beta_0 + \beta_1 X_{it} + \beta_2 Du_{year} + \beta_3 Du_{country} + \beta_4 DuCOICOP_i^* HHIB_i + \beta_5 DuCOICOP_i^* HHIP_i + \beta_6 DuCOICOP_i^* HHIS_i + \varepsilon_{ijt} \quad (6)$$

where the indices i , j and t respectively indicate the region, the COICOP category and the year.

Our main variable of interest is the Herfindahl Hirschman index – which is available for 2010 only – computed at three different levels of the trade sector:

- 1) for buying groups ($HHIB$),
- 2) for parental groups ($HHIP$) and
- 3) for stores ($HHIS$).

Moreover, two versions of these indices have been considered: the first one measures the concentration at the regional level (Section 3.2.2), while the second one provides a more local measure of concentration as it is the average of sub-indices computed for narrow zones, defined as the set of stores operating within a 5 (or 10) km radius (Section 3.2.3).

In order to take into account possible differences across product categories, the concentration indices have been interacted with product dummies (for the five COICOP categories of interest). The model also includes country fixed effects ($Du_{country}$) and year dummies (Du_{year}). The latter aims to capture the common component in price changes in a given year (commodity prices, exchange rate, global economic cycle, monetary stance, etc.). X_{it} is a vector of other explanatory variables having a regional and a time varying component, specifically the regional population density and a measure of the evolution of local labour costs. The errors are clustered by region.

The model above, comprising the three measures of concentration ($HHIB$, $HHIP$ and $HHIS$), allows us to assess the respective impact of these different aspects of trade sector concentration. Unfortunately, as far as the *regional analysis* is concerned, $HHIC$ and $HHIB$ appear to be strongly correlated, with a correlation coefficient of about 0.8, reflecting an almost one-to-one mapping of the parental groups to the buying groups for many countries (see also Section 3.2.1). Most countries in the sample show a very high correlation between the two measures so that a collinearity problem arises in considering $HHIB$ and $HHIP$ together, which does not allow a proper assessment of their respective impact. The correlation between $HHIB$ and $HHIS$ on one side, and $HHIP$ and $HHIS$ on the other side is instead very weak (0.3 and 0.2, respectively). Therefore, the model estimated in the empirical analysis becomes:

$$\pi_{ijt} = \beta_0 + \beta_1 X_{it} + \beta_2 Du_{year} + \beta_3 Du_{country} + \beta_4 Du_{COICOP_i} * HHIB_i + \beta_5 Du_{COICOP_i} * HHIS_i + \varepsilon_{ijt} \quad (7)$$

The main results of the regression, based on the indices computed according to the regional aggregation criterion, are summarized in Table 7. When considering the HHI at the buying group level, the coefficient is positive and statistically significant at 10 per cent for food and beverages and at 1 per cent for alcohol and tobacco and for miscellaneous goods and services. It is negative and statistically significant for clothing and footwear and furnishings and household equipment and maintenance (column 2 in Table 7). The interpretation of these findings is that a higher degree of market concentration at the buying group level (many retailers joining together in large purchasing consortia), although increasing each retailer's bargaining power towards producers, does not seem to have been always associated with more moderate price dynamics (countervailing power hypothesis, see, for instance, Galbraith, 1952; Chen, 2003; Ciapanna and Colonna, 2011; Mills,

2011). Thus, we do not observe a welfare-enhancing effect for consumers for these product categories. There are various plausible economic explanations of this result. On the one hand, it could reflect collusive behaviour between a dominant producer and its counterpart buying group; alternatively, it could be driven by a relatively low demand elasticity for local products in those regions where we observe higher buying group concentration. In this case, independently of the producer's bargaining power (and even in a perfectly competitive upstream market) there is no incentive for the retailer to share its surplus with the consumer, and the intermediary would practice surplus extraction from both sides (buyer power hypothesis; see, for instance, von Ungern-Sternberg, 1996; Dobson and Waterson, 1997). This does not seem to happen for clothes and footwear and for furnishings, household equipment and maintenance, where the negative coefficient indicates a more effective pass-through. In these sectors, the convergence towards a higher concentration at the buying group level has been associated with negative price dynamics and the countervailing hypothesis seems to be satisfied.

The relation between the concentration index computed at the store level and price dynamics is confirmed to be positive and statistically significant for alcohol and tobacco and for miscellaneous goods and services (at 5 per cent and 10 per cent statistical confidence, respectively; column 4 in Table 7). Instead, it loses significance for the first COICOP category, probably reflecting the dominating effect of the buying group concentration measure. The *HHIS* is negatively related to price changes for COICOP categories 3 and 5. Also, in this case the sign is reversed for clothing and footwear and furnishings, household equipment and maintenance. Note that the reason for this discrepancy at the store level may be imputed to the fact that these are residual products, only sold in hypermarkets and (in a few cases) in larger supermarkets, so that the correlation could be spurious. Another possible explanation is a composition effect: clothes and footwear sold in non-specialized retailers are generally lower quality products compared with their substitutes sold in specialized stores. A higher concentration at the store level may have stimulated higher consumption of these low price-low quality products, so that we observe a parallel negative trend of price change due to the composition effect in consumers' expenditure. A full assessment of this issue would require further investigation, which is beyond the scope of this study.

4.1 Robustness check

Our results are robust when we consider model (7) substituting the Herfindahl-Hirschman Index at the buying group level with the one at the parent company, while keeping the store concentration measure.¹⁶

¹⁶ This is expected, given the correlation between the HHIB and HHIG previously pointed out.

We repeat the analysis using the *HHI* constructed at the *local* level (5 km and 10 km radius). In this case, the correlation among *HHIB*, *HHIP* and *HHIS* rises to 0.9; therefore the three indices are observationally equivalent and model (6) reduces to:

$$\pi_{ijt} = \beta_0 + \beta_1 X_{it} + \beta_2 Du_{year} + \beta_3 Du_{country} + \beta_4 Du_{COICOP_i} * HHIS_t + \varepsilon_{ijt} \quad (8)$$

The main results of the regression based on the indices computed at the local level are summarized in Table 8. The coefficient associated with the *HHI* is positive and statistically significant at the 10 per cent level for food and beverages and at 1 per cent for alcohol and tobacco and for miscellaneous goods and services. It is negative and statistically significant for clothing and footwear and furnishings, household equipment and maintenance. Given the high correlation among the three levels, it is indifferent to consider the index at the buying group, at the parent company or at the shop level. For the same reason, the intensity of the *HHIS* coefficients provided in Table 8 can be compared with column 4 in Table 7 only.

We conduct several further robustness checks of the model. We include different measures of wealth in the vector of controls (regional GDP, growth rate of real value added, etc.). We also repeat the analysis on a country by country basis, investigating the specific dynamics of the two “extreme” countries in the sample: Finland (the most concentrated) and Portugal (the least concentrated). When controlling for individual market structure characteristics and excluding the outliers the main results of the pooled analysis are left unchanged.

5. Concluding remarks and possible extensions

The relationship between market structure and price levels and dynamics has fostered two economic strands of literature. On one side the industrial organization contributions find that a more competitive market structure implies lower prices and enhances consumer welfare. On the other side, the macroeconomic theory strand analyses the relationship between the frequency of price adjustments and the degree of monopoly power and finds a positive relation between the absence of price changes and monopoly power and, conversely, between a high frequency of price changes and the degree of competition.

We investigated the relationship between market structure (in terms of equilibrium concentration outcomes) and price dynamics in six euro-area countries. The analysis has looked at the buying group, parent company and individual store level concentration for five major categories of grocery products in the 12 COICOP aggregation. By using a unique database containing both regional year-on-year percentage price changes and concentration measures, we show that these price changes are positively affected by the degree of concentration for food and beverages, alcohol

and tobacco and miscellaneous goods and services, while the relation reverses its sign for clothing and footwear, furnishings, and household equipment and maintenance. The estimation method takes into account cross-country differences in the retail market structure and is conducted using the regional as well as the local HHI.

A very important policy implication of the findings of this paper seems to be that there are important non-monetary determinants of price levels and short-run dynamics, which are not under direct control of the monetary authorities, but depend on how specific markets work (and on how far they are from the ideal benchmark of perfect competition). In a broader context, the study appears to suggest that, at least in the short run, appropriate competition-enhancing policies may facilitate the challenges posed to the monetary authorities in preserving price stability.

A possible extension of the analysis could be to test for the impact of competition on inflation volatility. Another interesting issue could be the use of detailed price levels in conjunction with structural Nielsen data which varies over time to assess the effect of concentration of price levels (as in Ciapanna and Colonna, 2011 and Viviano et al., 2011).

Appendix Tables

Table 1: Description of the Nielsen structural dataset (July 2010)

	AT	BE	DE	ES	FI	FR	GR	IT	NL	PT
NUTS3				X	X		X	X		
NUTS2	X	X	X	X	X	X	X	X	X	X
Sales area	X		X	X	X	X	X	X	X	X
Counters			X			X		X		X
Turnover share	X		X			X		X		
Buying group	X	X	X	X	X	X	X	X	X	X
Parental group	X	X	X	X	X	X	X	X	X	X
Store	X	X	X	X	X	X	X	X	X	X
Obs	4,999	3,725	32,216	16,269	2,827	17,682	3,033	29,482	4,375	3,932

Notes: Belgian data released by National Central Bank. Buying group for Greece imputed from external datasource.

Table 2: HHI at the buying group and parent company level in the retail sector by country

Country	HHI - BG	Country	HHI - PG
IT	12.8	IT	5.8
FR	15.1	FR	7.9
PT	15.8	AT	8.2
ES	19.9	ES	9.5
GR	21.2	GR	11.0
NL	21.4	NL	12.1
BE	22.5	PT	13.2
DE	24.7	BE	19.0
AT	25.2	DE	21.6
FI	37.9	FI	31.0
EA avg	19.4	EA avg	12.6

Notes: BG denotes buying group; PG denotes
Source: Nielsen, Belgium National Bank, Eurosystem staff calculation

Table 3: Market share by country and buying group

Country	Buying group (BG)	market share	Country	Buying group (BG)	market share
AT	1st BG	34.4%	GR	8th BG	3.0%
	2nd BG	33.1%		9th BG	2.1%
	3rd BG	10.7%		10th BG	1.2%
	4th BG	7.0%		11th BG	1.1%
	5th BG	5.8%		12th BG	1.1%
	6th BG	4.7%		13th BG	0.7%
	7th BG	3.9%		14th BG	0.3%
	8th BG	0.4%		15th BG	0.1%
BE	1st BG	35.6%	IT	1st BG	21.6%
	2nd BG	21.7%		2nd BG	18.0%
	3rd BG	16.9%		3rd BG	11.2%
	4th BG	10.5%		4th BG	11.2%
	5th BG	9.1%		5th BG	11.0%
	6th BG	6.3%		6th BG	8.2%
DE	1st BG	36.3%		7th BG	4.1%
	2nd BG	26.7%		8th BG	3.5%
	3rd BG	13.7%		9th BG	2.7%
	4th BG	12.8%		10th BG	2.4%
	5th BG	9.6%		11th BG	2.2%
	6th BG	0.9%		12th BG	1.9%
	7th BG	0.1%		13th BG	1.7%
ES	1st BG	28.5%		14th BG	0.4%
	2nd BG	20.1%	NL	1st BG	31.8%
	3rd BG	19.3%		2nd BG	27.1%
	4th BG	17.9%		3rd BG	14.8%
	5th BG	7.4%		4th BG	8.0%
	6th BG	4.9%		5th BG	7.6%
	7th BG	2.0%		6th BG	6.8%
FI	1st BG	45.9%		7th BG	2.7%
	2nd BG	38.9%		8th BG	0.7%
	3rd BG	12.8%		9th BG	0.5%
	4th BG	2.4%	PT	1st BG	24.5%
FR	1st BG	25.5%		2nd BG	21.4%
	2nd BG	16.1%		3rd BG	13.4%
	3rd BG	13.8%		4th BG	11.0%
	4th BG	13.2%		5th BG	9.6%
	5th BG	9.7%		6th BG	9.0%
	6th BG	9.5%		7th BG	6.0%
	7th BG	5.3%		8th BG	2.5%
	8th BG	3.9%		9th BG	1.1%
	9th BG	2.8%		10th BG	0.9%
	10th BG	0.4%		11th BG	0.3%
	11th BG	0.0%		12th BG	0.2%
GR	1st BG	38.9%			
	2nd BG	16.0%			
	3rd BG	14.4%			
	4th BG	7.7%			
	5th BG	5.8%			
	6th BG	4.3%			
	7th BG	3.3%			

Source : ECB calculation from Nielsen structural data 2010

Table 4: Market share by country and parental group

Country	Parental Group (PG)	market share	Country	Parental Group (PG)	market share	Country	Parental Group (PG)	market share
AT	1st PG	14.9%	FR	1st PG	15.7%	NL	1st PG	27.1%
	2nd PG	11.1%		2nd PG	12.0%		2nd PG	11.2%
	3rd PG	10.7%		3rd PG	9.9%		3rd PG	10.1%
	4th PG	8.4%		4th PG	8.6%		4th PG	8.0%
	5th PG	8.4%		5th PG	8.6%		5th PG	7.6%
	6th PG	6.5%		6th PG	8.3%		6th PG	6.8%
	7th PG	6.5%		7th PG	5.1%		7th PG	4.7%
	8th PG	5.8%		8th PG	4.2%		8th PG	3.6%
	9th PG	5.0%		9th PG	3.9%		9th PG	3.6%
	10th PG	5.0%		10th PG	3.3%		10th PG	2.7%
	11th PG	4.7%		11th PG	3.1%		11th PG	2.4%
	12th PG	4.0%		12th PG	2.8%		12th PG	1.9%
	13th PG	3.9%		13th PG	2.7%		13th PG	1.7%
	14th PG	1.0%		14th PG	2.6%		14th PG	1.6%
	15th PG	0.9%		15th PG	2.5%		15th PG	1.5%
	16th PG	0.9%		16th PG	1.1%		16th PG	1.1%
	17th PG	0.6%		17th PG	1.1%		17th PG	1.0%
	18th PG	0.6%		18th PG	0.7%		18th PG	0.9%
	19th-21st PG	1.2%		19th PG	0.6%		19th PG	0.9%
BE	1st PG	31.7%	20th PG-47th PG	3.0%	20th PG	0.7%		
	2nd PG	19.3%	GR	1st PG	25.8%	21th PG-22th PG	0.9%	
	3rd PG	15.0%		2nd PG	9.6%	PT	1st PG	20.7%
	4th PG	9.3%		3rd PG	8.8%		2nd PG	17.7%
	5th PG	8.1%		4th PG	8.3%		3rd PG	11.3%
	6th PG	5.6%		5th PG	7.8%		4th PG	9.3%
DE	1st PG	33.0%		6th PG	6.7%		5th PG	8.1%
	2nd PG	23.5%		7th PG	5.1%		6th PG	7.6%
	3rd PG	14.5%		8th PG	4.0%		7th PG	2.1%
	4th PG	12.2%		9th PG	3.8%		8th PG	1.5%
	5th PG	1.6%		10th PG	2.9%		9th PG	1.4%
	6th PG	1.3%		11th PG	2.8%		10th PG	0.9%
	7th PG	0.8%		12th PG	2.2%		11th PG	0.8%
	8th PG	0.8%	13th PG	2.0%	12th PG-31th PG		3.5%	
ES	1st PG	21.6%	14th PG	2.0%	IT	1st PG	11.1%	
	2nd PG	13.9%	15th PG	1.4%		2nd PG	10.2%	
	3rd PG	13.3%	16th PG	0.8%		3rd PG	8.4%	
	4th PG	5.6%	17th PG	0.7%		4th PG	7.8%	
	5th PG	4.7%	18th PG	0.7%		5th PG	6.7%	
	6th PG	3.7%	19th PG-27th PG	1.7%		6th PG	5.3%	
	7th PG	3.6%	IT	1st PG		11.1%	7th PG	4.6%
	8th PG	2.4%		2nd PG		10.2%	8th PG	4.1%
	9th PG	2.1%		3rd PG		8.4%	9th PG	3.8%
	10th PG	1.5%		4th PG		7.8%	10th PG	3.5%
	11th PG	1.5%		5th PG		6.7%	11th PG	3.3%
	12th PG	1.4%		6th PG		5.3%	12th PG	3.0%
	13th PG	1.3%		7th PG		4.6%	13th PG	2.6%
	14th PG	1.3%		8th PG		4.1%	14th PG	2.5%
	15th PG	1.3%		9th PG		3.8%	15th PG	2.3%
	16th PG	1.2%		10th PG		3.5%	16th PG	2.1%
	17th PG	1.1%		11th PG		3.3%	17th PG	2.0%
	18th PG	1.0%		12th PG		3.0%	18th PG	1.8%
	19th PG	1.0%		13th PG		2.6%	19th PG	1.7%
	20th PG	0.8%		14th PG		2.5%	20th PG	1.7%
	21th PG	0.7%		15th PG		2.3%	21th PG	1.6%
	22th PG	0.6%		16th PG		2.1%	22th PG	0.9%
	23th PG	0.6%		17th PG		2.0%	23th PG	0.6%
	24th PG	0.6%		18th PG		1.8%	FI	1st PG
	25th PG	0.6%	19th PG	1.7%		2nd PG		33.9%
	26th-186th PG	11.2%	20th PG	1.7%		3rd PG	10.4%	
FI	1st PG	40.4%	21th PG	1.6%	4th PG	0.8%		
	2nd PG	33.9%	22th PG	0.9%				
	3rd PG	10.4%	23th PG	0.6%				
	4th PG	0.8%	24th PG-30th PG	1.4%				

Source : ECB calculation from Nielsen structural data 2010

Notes : The residual market share for Belgium, Germany, Spain, France, Greece, Italy, Portugal and Finland is represented by independent parental groups

Table 5: HHI at the NUTS2 level by buying group, parental group and shop.

Country	NUTS2	Buying group	Parental group	Shop
IT	ABRUZZO	17.03	9.85	0.52
	BASILICATA	21.18	14.21	0.73
	CALABRIA	13.34	7.81	0.23
	CAMPANIA	18.33	9.54	0.15
	EMILIA-ROMAGNA	24.84	14.86	0.21
	FRIULI-VENEZIA GIULIA	22.29	11.95	0.39
	LAZIO	14.20	8.25	0.12
	LIGURIA	19.13	11.78	0.38
	LOMBARDIA	10.97	6.29	0.12
	MARCHE	17.76	12.49	0.35
	MOLISE	16.86	11.32	1.98
	PIEMONTE	12.33	8.79	0.19
	PUGLIA	15.06	8.65	0.16
	SARDEGNA	17.00	11.17	0.18
	SICILIA	16.20	7.35	0.11
	TOSCANA	23.27	15.72	0.28
	TRENTINO-ALTO ADIGE	30.70	16.65	0.27
	UMBRIA	19.24	13.73	0.41
	VALLE D'AOSTA	19.16	15.94	11.07
VENETO	14.18	9.56	0.12	
DE	BADEN-WÜRTTEMBERG	25.86	24.68	5.23
	BAYERN	28.66	23.82	4.35
	BERLIN	21.94	18.03	8.66
	BRANDENBURG	24.83	20.79	9.27
	BREMEN	26.42	24.73	9.12
	HAMBURG	27.91	24.92	8.75
	HESSEN	27.27	25.37	5.41
	MECKLENBURG-VORPOMMERN	24.56	18.40	7.79
	NIEDERSACHSEN	24.95	23.68	5.43
	NORDRHEIN-WESTFALEN	23.67	20.61	4.18
	RHEINLAND-PFALZ	23.09	20.80	5.39
	SAARLAND	22.26	21.86	8.86
	SACHSEN	27.22	25.85	9.29
	SACHSEN-ANHALT	32.06	28.07	7.98
	SCHLESWIG-HOLSTEIN	22.82	18.45	7.44
THÜRINGEN	26.31	23.98	4.49	
BE	PROVINCE D'ANVERS	24.89	20.38	6.86
	PROVINCE DE FLANDRE-OCCIDE	22.04	18.11	5.90
	PROVINCE DE FLANDRE-ORIENT	20.55	17.52	6.54
	PROVINCE DE HAINAUT	22.79	19.46	7.81
	PROVINCE DE LIMBOURG	24.12	19.45	6.35
	PROVINCE DE LIÈGE	23.48	19.98	7.13
	PROVINCE DE LUXEMBOURG	21.06	19.32	8.96
	PROVINCE DE NAMUR	22.52	19.56	7.42
	PROVINCE DU BRABANT FLAMA	24.97	22.16	9.30
	PROVINCE DU BRABANT WALLO	31.99	28.97	12.09
	RÉGION BRUXELLOISE	24.41	21.48	9.32

Country	NUTS2	Buying group	Parental group	Shop
FR	ALSACE	15.51	8.90	7.90
	AQUITAINE	16.88	11.50	8.89
	AUVERGNE	16.71	8.47	6.27
	BOURGOGNE	15.56	9.50	6.98
	BRETAGNE	18.08	12.58	9.14
	CENTRE	15.82	11.06	8.04
	CHAMPAGNE-ARDENNES	17.11	10.66	9.08
	CORSE	33.68	14.36	13.58
	FRANCHE-COMTÉ	13.04	8.33	6.09
	ILE-DE-FRANCE	21.33	10.68	8.48
	LANGUEDOC-ROUSSILLON	17.59	10.14	6.78
	LIMOUSIN	17.78	10.05	6.94
	LORRAINE	13.40	9.17	8.22
	MIDI-PYRÉNÉES	16.72	10.41	7.48
	NORD-PAS-DE-CALAIS	19.06	9.30	8.10
	NORMANDIE (BASSE-)	21.11	10.38	8.42
	NORMANDIE (HAUTE-)	19.42	10.72	9.00
	PAYS-DE-LA-LOIRE	19.95	14.57	11.38
	PICARDIE	16.27	10.70	8.83
	POITOU-CHARENTES	16.97	12.05	9.54
PROVENCE-CÔTE-AZUR	19.10	8.57	7.01	
RHÔNE-ALPES	19.22	8.47	6.67	
ES	ANDALUCÍA	23.04	11.84	7.69
	ARAGÓN	19.66	13.72	10.13
	ASTURIAS	24.47	15.18	8.94
	BALEARES	29.63	20.86	17.15
	CANTABRIA	29.81	15.99	11.77
	CASTILLA LA MANCHA	23.66	10.15	7.80
	CASTILLA Y LEÓN	22.14	10.98	7.14
	CATALUÑA	20.62	10.23	5.95
	COMUNIDAD VALENCIANA	24.56	13.80	12.13
	EXTREMADURA	31.59	17.83	10.53
	GALICIA	21.23	14.64	8.98
	MADRID	23.90	13.04	7.57
	MURCIA	22.42	12.80	10.42
	NAVARRA	26.30	22.28	11.27
	PAÍS VASCO	29.76	27.64	21.40
RIOJA	27.01	21.54	14.34	
NL	DRENTHE	18.31	11.79	6.08
	FLEVOLAND	18.65	18.90	8.52
	FRIESLAND (NL)	20.93	12.24	8.77
	GELDERLAND	21.04	12.41	6.16
	GRONINGEN	18.45	15.33	8.54
	LIMBURG (NL)	22.27	14.12	8.99
	NOORD-BRABANT	21.30	14.07	8.41
	NOORD-HOLLAND	30.34	15.26	10.48
	OVERIJSEL	22.36	11.96	7.01
	UTRECHT	23.01	14.38	8.44
	ZEELAND	27.01	14.51	6.67
	ZUID-HOLLAND	22.39	16.88	10.12
PT	ALENTEJO	17.13	14.50	9.38
	ALGARVE	16.81	13.95	8.36
	CENTRO	15.59	13.36	7.63
	LISBOA	16.22	13.49	9.70
	NORTE	17.11	14.73	7.70

Country	NUTS2	Buying group	Parental group	Shop
FI	AHVENANMAA	74.78	61.31	11.93
	ITÄ-SUOMI	41.95	35.40	0.76
	LÄNSI-SUOMI	38.02	29.49	0.68
	MUU ETELÄ-SUOMI	37.11	32.53	0.57
	POHJOIS-SUOMI	37.12	29.09	0.77
	UUSIMAAT	37.57	31.88	0.54
AT	BURGENLAND	26.52	8.64	6.59
	KÄRNTEN	32.20	10.50	7.44
	NIEDERÖSTERREICH	24.96	8.86	7.14
	OBERÖSTERREICH	27.17	9.53	6.07
	SALZBURG	29.19	8.86	6.63
	STEIERMARK	24.95	9.67	6.35
	TIROL	28.77	16.81	13.31
	VORARLBERG	37.51	11.63	7.89
	WIEN	30.08	13.01	12.80
GR	ANATOLIKI MAKEDONIA, THRAKI	34.54	21.23	17.10
	ATTIKI	22.84	14.30	9.09
	DYTIKI ELLADA	21.94	12.51	9.73
	DYTIKI MAKEDONIA	21.83	13.30	10.71
	IONIA NISIA	55.41	26.46	26.46
	IPEIROS	18.27	9.64	7.94
	KENTRIKI MAKEDONIA	24.00	15.46	14.17
	KRITI	31.29	17.82	15.73
	NOTIO AIGAIO	88.83	42.09	42.09
	PELOPONNISOS	22.57	13.02	7.12
	STEREA ELLADA	26.54	15.71	13.28
	THESSALIA	23.93	13.16	11.74
	VOREIO AIGAIO	50.00	28.60	28.60

Source : Our calculation from Nielsen structural data (2010)

Table 6: Overview of geo-coding results

	Building/ Address	Street	Post Code	City	N/A	Total
EA	75.6	14.2	9.1	0.8	0.2	100
BE	90	6.8	3.2	-	-	100
DE	98.3	1.6	0.1	0	-	100
GR	25.8	10.2	27.9	28.4	7.7	100
ES	62.5	22.1	15.3	0.1	-	100
FR	50.5	34.1	15.4	0	-	100
IT	74	16.7	9.2	0.1	-	100
NL	91.8	1.6	6.6	0	-	100
AT	96	0.2	3.8	0	-	100
PT	45	20.6	32.9	1.5	-	100
SI	68.6	23.9	7.5	0	-	100
SK	35.3	53.7	0.7	10.3	-	100
FI	88.1	8.4	3.5	0	-	100

Sources : bulkgeocoder.com

Table 7: Effect of regional level concentration on year-on-year sectoral price changes.

	Buying Group		Shop	
	Coef.	Std. Err.	Coef.	Std. Err.
HHI*food	0.007*	0.004	0.009	0.014
HHI*alco	0.054***	0.018	0.114**	0.045
HHI*clot	-0.027***	0.006	-0.046***	0.015
HHI*hous	-0.010*	0.006	-0.020*	0.013
HHI*other	0.016***	0.004	0.019*	0.010
Controls:				
Country dummies		yes		yes
Year dummies (2003-2010)		yes		yes
Local labour cost		yes		yes
Density		yes		yes
Obs.		7,072		7,072

Source : Our calculation from Nielsen data, CPI (national statistics) and Eurostat.

Notes: Dependent variable is the yearly change in the sectoral price index. HHI=Herfindahl-Hirschman Index. Standard errors clustered at the regional level. ***p<1%; **p<5%; *p<10%.

Table 8: Effect of local level (5 km) concentration on year-on-year sectoral price changes.

	Shop	
	Coef.	Std. Err.
HHI*food	0.006*	0.004
HHI*alco	0.099***	0.015
HHI*clot	-0.047***	0.007
HHI*hous	-0.020***	0.006
HHI*other	0.021***	0.003
Controls:		
Country dummies		yes
Year dummies (2003-2010)		yes
Local labour cost		yes
Density		yes
Obs.		7,072

Source : Our calculation from Nielsen data, CPI (national statistics) and Eurostat.

Notes: Dependent variable is the yearly change in the sectoral price index. HHI=Herfindahl-Hirschman Index. Standard errors clustered at the regional level. ***p<1%; **p<5%; *p<10%.

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