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AGGREGATION AND THE STAGGERING OF PRICE CHANGES

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Aggregation and the Staggering of Price Changes*

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Abstract

Temporal distribution of individual price changes is of crucial importance for business cycle theory and for the microfoundations of price adjustment. *While it is routinely assumed that price changes are staggered over time, both theory and evidence are ambiguous.* We use a large Belgian data set to analyze whether price changes are staggered or synchronized. We find that the more aggregated are the data, the closer is the distribution to perfect staggering. The results hold both for aggregation across products, and across locations. They are consistent with an economy in which idiosyncratic shocks are the main cause of price changes.

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1 Introduction

A common explanation of the effect of money on real variables is that the aggregate price level is sticky and responds slowly to changes in monetary policy. This stickiness is the consequence of price behaviour of individual price setters. In general, aggregate stickiness depends both on the frequency of price changes and on their distribution across price setters. The more frequent are price changes, the less sticky is the aggregate price level. The distribution affects the persistence of the effects of monetary shocks. When price changes are synchronized, the effects of the shocks last only for as long as prices remain fixed. When price changes are staggered, even temporary shocks can have long-lasting effects.[1]

Empirical studies of price stickiness have been a very active area of research recently as richer and more comprehensive data sets became available. Researchers gained access to data underlying the construction of CPI in many countries (for example Bils and Klenow, 2004 and Dhyne *et al.*, 2006), and to scanner and "scraped" online data (Cavallo, 2010, Abe and Tonogi, 2010, *The Billion Prices Project*). These empirical studies, summarized in Dhyne *et al.* (2006), Álvarez *et al.* (2006), Klenow and Malin (2011) and Nakamura and Steinsson (2013) provide wealth of information on the frequency of price changes, its differences across price types and heterogeneity across firms and sectors.

Less work has been done on the distribution of price changes across price setters. Research focused on the synchronization of price changes either at the very disaggregated level (single goods, stores or even isles), or at the aggregate level. The goal of this paper is to fill this gap.

We establish a new empirical fact: The more aggregated are the data, the more staggered are price changes. This result holds for all levels of product aggregation as well as for spatial aggregation. In addition, price changes are not perfectly staggered even at

[1] Staggering is necessary, but not sufficient for long-lasting effects of temporary shocks. Caplin and Spulber (1987) provide an specific example of an economy in which temporary shocks have no effects even when price changes are uniformly staggered. Also, in Golosov and Lucas (2007) price changes are staggered but real effects of nominal shocks are not long-lasting.

the level of the entire sample. They are never perfectly synchronized either, and are close to perfect synchronization for only a few product categories.

The data set consist of monthly price reports collected for the computation of the Belgian CPI that have been made available to the National Bank of Belgium by the Ministry of Economic Affairs. They cover 65% of Belgian CPI and include over nine million price observations and over a million and a half price changes.

To analyze aggregation in the product space we use the COICOP (Classification of Individual Consumption by Purpose) groupings – an international four-digit classification of consumption expenditures. We consider four levels of aggregation: product categories (for example "rice"), four-digit COICOP groups (for example “Breads and cereals”, which includes the "rice” product category), two-digit COICOP groups (for example "Food and nonalcoholic beverages", which includes the "Breads and cereals" group) and the entire sample. For spatial aggregation we compare the distribution of price changes across stores in Belgium with the distribution in the three largest cities: Brussels, Antwerp and Liege.

Our findings complement existing empirical work that documents the distribution of price changes. At the disaggregate level the results are mixed. Lack of synchronization is reported by Lach and Tsiddon (1992) for two categories of food products (wines and meats) in Israel, Tommasi (1993) for food prices within stores in Argentina and by Kashyap (1995) for similar goods across US mail order stores. Synchronization within, and staggering across stores is reported by Lach and Tsiddon (1996), using the same Israeli data set, Ratfai (2003) for meat products in Hungary, Loy and Weiss (2004) for food products in Germany and Chakrabarti and Scholnick (2007) for books sold on-line. Fisher and Konieczny (2000) find evidence of synchronization of price changes among Canadian newspapers owned by the same company, but no evidence of synchronization by independent newspapers. More recently, Midrigan (2011) reports prices in a US grocery chain are more synchronized within than across stores. Cavallo (2012) finds, using very frequent (daily) supermarket data from four Latin-American countries, that price changes of similar goods within store are synchronized. Chaumont et al (2011) reports that synchronization of price changes across stores varies greatly between grocery

chains in Chile. Bhattarai and Schoenle (2012) report stronger synchronization within firms than within industries in US producer price data. Neiman (2010) compares intra-firm with arm's length transactions in US exports and finds that price changes are less synchronized for intra-firm transactions. Schoenle (2010) reports price changes of foreign editions of the *Economist* are not synchronized with price changes of the UK edition. At the aggregate level, Dhyne *et al*. (2006) provide measures of synchronization of price changes in various euro area countries. Their results point out to the fact that the size of the economy and therefore the level of aggregation seem to affect the degree of synchronization in price changes. Klenow and Kryvtsov (2008), Gagnon (2009), Wulfsberg (2010) and Klenow and Malin (2010) analyze the variations in the proportion of price changes over time. The variation is limited (for example in Klenow and Malin between 14% and 21% per month), indicating little synchronization at the aggregate level.

The plan of the paper is as follows. The data are described in the next section. In section 3 we check whether price changes are perfectly staggered or perfectly synchronized. We describe our approach and analyze the relationship between staggering and aggregation over products as well as over locations in section 4. The last section concludes.

2 The Data Set

The data set consists of monthly price reports used by the Belgian Federal Public Services for the computation of the Belgian CPI. The period covered starts in January 1996 and ends in December 2003.[2] We describe the data briefly here; for more details see Aucremanne and Dhyne (2004).

The data set is very extensive. It consists of disaggregated, store level monthly price information for goods and services that constitute around 65% of Belgian CPI. The remaining 35% of CPI are products followed centrally by the Federal Public Services

[2] These data have been used previously by Aucremanne and Dhyne (2004, 2005) and by Cornille (2003). The original database covers the 1989-2003 period. During this period three different definitions of the Belgian CPI were used. In order to keep a homogeneous sample of product categories over time, we restricted the analysis to the observation period of the last price index definition.

(such as housing rents, electricity, gas, telecommunications and insurance) and product categories that are not followed throughout the year (such as seasonal fruits and vegetables, winter and summer fees in a tennis club, etc.). In all, we have 9,078,180 price reports and 1,521,617 price changes for 368 product categories in 65 Belgian cities.

Each price report includes the information on: the date of the report, the store and city code, the product category, packaging and some additional, but fragmentary, information about the product (for instance, the brand). The price used is the price per unit so that promotions in quantities (e.g. 2 units for the price of 1) are treated similarly to price promotions. The price reported refers to the price of one specific product sold in a given outlet and belonging to a given product category (e.g. the price of a can of soda X for the product category Cola soda). However, within a product category, the products surveyed may be different across stores (Coca Cola in store A, Pepsi in store B etc). The information on the brand of the good or service within a product category is incomplete and is often unreliable and so we chose not to use it; hence some of the price changes may be due to product replacement.

The data include sale prices, except for end-of-season sales. Under Belgian regulations, in product categories where end-of-season sales are permitted (mostly clothing, footwear and electronic goods) the retailer must display the pre-sale price and the percentage reduction. Our data contain the pre-sale prices only. French (Baudry *et al.*, 2007) and Austrian (Baumgarter *et al.*, 2005) evidence suggests that including such sales raises the aggregate frequency of price changes by about 3%.

The average frequency of price changes in our data is 15.3%; the average frequency of price increases is 8.8% and of price decreases is 6.5%.[3] It is similar to the frequency of price changes in other Euro-area countries (Dhyne *et al.*, 2006).

In Figure 1 we show the evolution of the average frequency of price changes, price increases and price decreases over the entire observation period, for our basket of 368 product categories. Prior to January 2001, the monthly probability of price changes varies between about 10% and 15%. It then increases to 22% in the first quarter of 2002 and

[3] Frequency data for product categories and COICOP groupings are in Appendix A.

slightly decreased afterwards. This temporary increase in the frequency of price changes has been partly attributed to the introduction of the Euro (Cornille, 2003).

3 Are Price Changes Perfectly Staggered or Perfectly Synchronized?

In this section we ask whether price changes are perfectly staggered or synchronized. We define *perfect staggering* as in Calvo (1983): when price changes are perfectly staggered, pricing decisions are independent of other firms and every firm has the same probability of price change each month, F.[4] Hence the proportion of firms changing price is a random Bernoulli variable with probability of success equal to F.[5] We define *perfect synchronization* as a situation when all firms change prices at the same dates so that the proportion of price changes is either zero or one.

It is evident from Figure 1 that price changes are neither perfectly staggered nor perfectly synchronized. Given the size of our sample (on the average there are over 100 000 observations a month) the proportion of price changes should be virtually constant. But it fluctuates a lot over time and is never near zero or one. A reader convinced by the picture can skip directly to section 4.

To assess whether price changes are perfectly staggered we use the χ^2 goodness of fit test. The test compares the actual number of price changes with the number of changes that would have taken place under perfect staggering. We calculate the latter by multiplying the number of prices observed both at time t and t-1 by the average frequency of price changes.

The χ^2 test rejects perfect staggering for the aggregate data. For product categories, it is rejected for price changes (respectively increases, decreases) for 357 (368, 357) of

[4] This distribution of price changes is often called uniform staggering.

[5] Note that this definition is different from that in Taylor (1980). He assumes that the proportion of adjusting firms is constant. This means price changes are not independent: a price change by one firm reduces the probability of adjustment by other firms.

the 368 product categories. In CPI weights they constitute 99% (100%, 97%) of our sample coverage.[6]

Perfect synchronization cannot be tested for directly as, in this case, the proportion of price changes at time *t* can take only two values. Therefore we use an indirect approach by showing that the data are even further from perfect synchronization than from perfect staggering.

First, note that for aggregate data the monthly proportion of price changes varies between 8.7% in November 1997 and 21.9% in March 2002. In every month it is within 6.6% of the perfectly staggered value of 15.3%. On the other hand, in every month the proportion is at least 8.7% away from zero and at least 78.1% away from one.

Second, for individual product categories we compare the "distance" from the perfect staggering and perfect synchronization cases by looking at squared deviations from the proportions that would obtain under the two assumptions.

For the case of perfect staggering, we compute :

$$RSS_i^1 = \sum_{t=1}^{T_i}(F_{it} - F_i)^2 \qquad (1)$$

where F_{it} is the average frequency of price changes for product group *i* in month *t*, F_i is the average frequency in the sample and T_i is the number of observations.[7]

For the case of perfect synchronization we construct, for each product category, a series of T_i numbers equal to zero or to one. The number of ones in the series is obtained by rounding $T_i \cdot F_i$ to the nearest integer. We arrange the zeroes and ones in the ascending order to obtain$F_{it}^{\{0,1\}}$. We arrange F_{it} in the ascending order to obtain F_{it}^{asc} and compute:

$$RSS_i^2 = \sum_{t=1}^{T_i}(F_{it}^{asc} - F_{it}^{\{0,1\}})^2 \qquad (2)$$

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[6] For price changes, the assumption of perfect price staggering is not rejected for fresh cod, sole, fillet of fish, skate wing, lettuce, leeks, cauliflower, software, roses, chrysanthemums and carnations. For price decreases, the assumption of perfect price staggering is not rejected for knitting wool, dry cleaning of a shirt, parking spot in a garage, cement, hanging fabric, domestic services, software, swimming pool fee, watch battery replacement, funeral services and passport stamp.

[7] In our data set, the maximum value of T_i is 95 as there are 8 years of data and we cannot determine price changes in January 1996.

We use RSS_i^1 and RSS_i^2 as measures of the "distance" from perfect staggering and perfect synchronization, respectively. The ordering procedure for the two series in (2) minimizes the value of RSS_i^2. We consider the data to be closer to perfect staggering if $RSS_i^1 < RSS_i^2$ and to perfect synchronization if $RSS_i^1 > RSS_i^2$.

To illustrate, consider a 10-month period. The numbers are given below:

T	1	2	3	4	5	6	7	8	9	10
F_{it}	0.16	0.22	0.20	0.14	0.18	0.26	0.24	0.10	0.30	0.20
F_{it}^{asc}	0.10	0.14	0.16	0.18	0.20	0.20	0.22	0.24	0.26	0.30
$F_{it}^{\{0,1\}}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00

In this example $RSS_i^1 = 0.0312$ and $RSS_i^2 = 1.3112$ and so the pattern of price changes is much closer to perfect staggering than to perfect synchronization.

The pattern of price changes in our data is closer to perfect staggering than to perfect synchronization. RSS_i^1 is smaller than RSS_i^2 for 352 out of 368 product categories.[8] These 352 products represent, in CPI weights, 91% of our sample coverage. Similar results are obtained for 2- and 4-digit COICOP groupings. We do not report them here since, as shown below, for these groupings price changes are less staggered than for aggregate data, and less synchronized than for product categories.

4 The effect of aggregation on the observed degree of staggering/synchronization of price changes

In the previous section we compared the distribution of price changes across firms to the two extreme, precisely defined cases: perfect staggering and perfect synchronization. We concluded that it was neither. Moving beyond these two cases is difficult as there is no clear definition of what it means for price changes to be (not perfectly) staggered or synchronized. Terms used in the literature are not precisely

[8] The 16 product categories for which perfect synchronization dominates perfect staggering are: special bread, whole wheat bread, standard and king-size cigarettes, water charge, butane, propane, single room in an hospital, LPGA, Eurosuper RON95, Superplus RON98, construction game (Lego), school lunch, school boarding fees, public health insurance premium and passport stamp.

defined. For example, Lach and Tsiddon (1996) write that "price changes [are] staggered across stores" and "the timing of price changes [...] within the same store is highly synchronized" (p. 1175). Bhattarai and Schoenle (2012) write that there is "substantial synchronization [...] within firms across products" (p. 1). Cavallo (2010) argues that "there is strong daily price synchronization within narrow categories" (p. 1). Klenow and Malin (2011) write that "the timing of price changes is little synchronized across sellers" (p. 1). In Dhyne *et al.* (2006) fact 6 on price adjustment is: "Price changes are not synchronized across products, even within the same country" (p. 182). Midrigan (2011) simply writes that "price changes within the store are strongly synchronized" (p. 1160). None of these papers describes the metric used to establish whether price changes are synchronized/staggered.

This ambiguity is perhaps not surprising, since assessing intermediate cases is difficult. To illustrate the problem, consider a simple family of price change distributions in which each price is changed in every other period as in Taylor (1980). Let $A_i = \{i\%, (100-i)\%\}$ denote a series in which i% of prices are changed in odd periods and (100-i)% in even periods. Perfect synchronization is A_0={0%, 100%} or A_{100}={100%,0%}, perfect staggering is A_{50} = {50%, 50%}. But it is unclear what the terms "synchronized" and "staggered" mean. Using the sum-of-squares measure from the previous section the distribution is closer to perfect staggering for $25 < i < 75$. It is closer to perfect synchronization for $i < 25$ or $i > 75$, and is equidistant for i=25 or i=75. But it is doubtful all researchers would consider A_{24} = {24%, 76%} to be a synchronized series or A_{30}={30%, 70%} to be a staggered series. Even in this simple example unanimity is unlikely. Terms like strongly, highly or little synchronized would create even less agreement.

Given the ambiguous terminology we avoid describing a series as staggered or synchronized but instead focus on comparing the degree of synchronization for pairs of series. The series differ by the level of data aggregation in product space and in geographic space. We use two approaches: the Fisher-Konieczny index (henceforth called

the F-K index) supplemented with a nonparametric test, and random effect probit regressions[9].

The F-K index, introduced in Fisher and Konieczny (2000) has been adopted as a measure of synchronization by the Inflation Persistence Network (IPN), an ECB-organized project which analysed price behaviour in 10 Euro-area countries using individual price data. Other researchers followed and the value of the index is routinely computed as an indicator of price synchronization. Its popularity is due to the fact that it summarizes the synchronization of price changes with a single number.

The F-K index is based on the comparison of the standard deviation of the monthly proportion of price changes to the values under the two extremes of perfect staggering and perfect synchronization (so it is close in spirit to the Lach and Tsiddon, 1992, approach). When price changes are perfectly staggered, the standard deviation of the proportion is zero if the number of firms is infinite.[10] When changes are perfectly synchronized the standard deviation is $\sqrt{F_i(1-F_i)}$, which is the highest possible standard deviation of the proportion in a population where the average probability of price changes is F_i.

The F-K index is defined as the ratio of the actual standard deviation of the proportion of price changes in the data to the value under perfect synchronization:

$$FK_i = \sqrt{\frac{\frac{1}{T_i}\sum_{t=1}^{T_i}(F_{it}-F_i)^2}{F_i(1-F_i)}} \tag{3}$$

where T_i is the number of observations. In the above definition we divide the sum in the numerator by T_i, to ensure that the value of the index is between 0 (when price changes

[9] With the probit regressions, the analysis is conducted at the product-store level, using product-store specific random effects to capture the heterogeneity in the frequency of price changes that may be observed within a product category.

[10] We discuss the value of the index under perfect staggering for finite samples below. For expositional simplicity the discussion will proceed as if the sample was infinite, with the effect of a finite sample size mentioned whenever necessary.

are perfectly staggered and the sample is very large) and 1 (when price changes are perfectly synchronized).[11]

Several authors attach significance to the value of the index. For example Baumgartner *et al.* (2005) consider the average value of the index in their data (0.42) to be an intermediate level of synchronization and the value for food products (0.21) to be very low. But, as discussed above, the absolute value of the index is difficult to interpret. It is not a structural measure and there is no particular reason to define it as a ratio of standard deviations: a ratio of any measure of dispersion like variance, sum of absolute differences etc. will do as well. Hence we treat the F-K index as an ordinal, rather than a cardinal, measure and use it only in pairwise comparisons.

Dias *et al.* (2005) provide a useful interpretation of the F-K index. They define a *price leader* as a price change trajectory followed by more than one firm. They consider an economy in which there are two types of firms with the same probability of price changes. Type 1 firms stagger price changes perfectly (i.e. change prices independently) while Type 2 firms have perfectly synchronized price changes (i.e. there is a single price leader followed by all Type 2 firms). Assuming that the frequency of price changes is homogeneous across price setters within a product category, Dias *et al.* (2005) show that the F-K index can be interpreted as a method of moments estimator of the share of Type 2 firms in the economy. Therefore, under these assumptions, a F-K index of *x*% means that *x*% of the firms set their price together while (100-*x*)% of the firms change their prices in a perfectly staggered fashion.

The Dias *et al.* interpretation can be extended to the case of many price leaders who change prices independently. The F-K index is then a function of the fractions of firms that follow each price leader. If there are *J* price leaders in the economy, it is equal to:

$$FK_i = \sqrt{\sum_{j=1}^{J} \alpha_{ij}^2} \tag{4}$$

[11] The expression in the numerator is a sample standard deviation so, technically, it should be divided by $T_i - 1$. If the sample formula were used, the value of the index would be in the interval $\left[0; \sqrt{T_i/(T_i - 1)}\right]$.

where α_{ij} is the share of outlets selling an item belonging to product category *i* that follows the price leader *j* . The proof of equation (4) is in Appendix B.

From equation (4), the F-K index can be interpreted as a Herfindhal index. A low value of the F-K index can be therefore associated with either a large share of staggered price setters or with the existence of many price leaders of relatively equal strength in the economy.

Equation (4) provides a lower bound for the FK index in finite population. Indeed, one can consider the case of perfect staggering as a situation when there are as many price leaders as firms in the economy. For a finite population of size *N*, equation (4) becomes

$$FK_i = \sqrt{\sum_{j=1}^{N} \left(\frac{1}{N}\right)^2} = \sqrt{\frac{1}{N}} \tag{5}$$

Figure 2 provides, for a population of 100 firms, an illustration of the link between the F-K index and the number of price leaders and their "market share". The F-K index associated with perfect staggering is equal to 0.1. The different curves characterize an economy with 1, 2, 5, 10 and 50 equally important price leaders who change prices independently (i.e. with 1, 2, 5, 10 and 50 independent price trajectories, each followed by the same number of firms).[12] The horizontal axis represents the share of all the followers in the economy. In an economy with one price leader, a share of followers of 50% means that, in our population of 100 firms, 50 firms change their price together and 50 firms adjust their prices independently. With 10 equally important price leaders, a share of followers of 50% means there are 10 independent price change trajectories, each followed by 5 firms, with the remaining 50 firms changing their prices independently.

The computation of the F-K index is implicitly based on the assumption that the average frequency of price changes is constant over time. As can be seen from Figure 1, the frequency of price changes computed at the aggregated level has increased over the observation period. In order to control for the effects of changes in the frequency of price

[12] Figure 2 illustrates a discrete problem (with 100 firms),.For simplicity we draw the curves as smooth lines, ignoring the requirement that the share of followers can only be equal to a whole number divided by 100.

changes, we use several detrended series of monthly frequencies of price changes to compute the F-K index and compare them to our baseline values. We apply the HP filter to the series of the estimated monthly frequencies at the categorical level to remove the common trend in pricing behavior.

We control for linear, quadratic, or Hodrick-Prescott trends in the monthly frequencies of price changes, and for the potential relationship between the frequency of price changes and trend inflation (estimated using the Hodrick-Prescott filter). The correlation coefficients between the detrended and baseline values are all above 99.5%. This indicates that the trend in the proportion of price changes has little effect on the distribution of the F-K index across product categories. Therefore our baseline estimates are used in the analysis that follows.

In Figure 3 we plot the cumulative (by CPI weights) distribution of the value of the F-K index for price changes, price increases and price decreases.[13] The weights have been re-scaled so that they sum to one in our sample. For price changes, the median value of the F-K index is 0.20. The value for the 75th percentile is 0.28. It exceeds 0.5 for only 25 of the 368 product categories in the sample (slightly below 15% of our sample coverage, in CPI weights). The results for price increases are similar. Price decreases are more staggered: the median value of the index is 0.14, the value for the 75th percentile is 0.21 and it exceeds 0.5 for 22 out of the 368 product categories (slightly above 10% of our sample coverage, in CPI weights).[14]

The low values of the F-K index are a further indication that the pattern of price changes is, if anything, further from perfect synchronization than perfect staggering. It is worth noting here that, for all 16 product categories for which $RSS_i^1 \geq RSS_i^2$, the F-K index exceeds 0.6.

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[13] While it is a common procedure to compute the F-K index for price changes, one interpretation of synchronization is that firms change their price simultaneously in the same direction. Therefore we also compute the index separately for price increases and for price decreases.

[14] Aucremanne and Dhyne (2004) compute the values of the F-K index for the January 1989- January 2001 period using the same data set. The results are similar, except for a larger proportion of product categories with a high value of the index. This is due to the fact that they include seasonal goods. Price changes for seasonal goods tend to be more synchronized than for other goods.

Using the Dias *et al.* (2005) interpretation, the median value of the F-K index in our data equal to 20% means that 20% firms synchronize their price changes while 80% of firms stagger them. It could also represent an economy with 25 price leaders who change prices independently and are each followed by 4% of firms.

The values for individual product categories are given in Table A1 in Appendix A. As can be seen from Table A1, the value of the F-K index varies greatly across product categories. For price changes, the index varies from 0.10 (Brie) to 0.88 (single room in a hospital); for price increases from 0.09 (electric bulb) to 0.89 (single room in a hospital) and for price decreases from 0.07 (hamburger in a store) to 0.85 (hourly rate of a plumber).

This large variety of the F-K index is illustrated in Figure 4 which shows the proportion of price changes for the two extreme cases (Brie and hospital room) as well as for toffees, for which the index is close to the median in our sample (0.20).

The discussion so far did not take into account that sample size is finite. Simulation results, combined with equation (5), allow us to build confidence intervals for the F-K index for the null of perfect staggering at the 95% level for finite samples. The null can be rejected for an F-K index above 0.36 for a sample of 10 firms, 0.12 for a sample of 100 firms, 0.07 for a sample of 250 firms and 0.05 for a sample of 500 firms. In the Belgian CPI basket, the average number of price trajectories for a given product category is 259. Only 5% of the product categories (6% in CPI weights) have fewer than 100 price trajectories.

Using these critical values we reject perfect staggering for 357 out of 368 product categories. The results are identical to those obtained using the χ^2 test in the previous section: the 11 product categories for which we cannot reject perfect staggering are the same categories for which it is not rejected with the χ^2 test.

4.1 The effects of sectoral aggregation on staggering

In order to compare the pattern of price changes within and across industries, we first need to define industries and industry groupings. For this purpose we use the COICOP (Classification of Individual Consumption by Purpose) groupings – an

international four-digit classification of consumption expenditures. This approach allows us to avoid judgments and provides several levels of aggregation. The list of product categories and their COICOP classifications is in the Appendix A.

We consider four levels of aggregation. At the most disaggregated level we consider the 368 product categories included in our sample (for example "rice"). There are 71 COICOP four-digit groups (for example “Breads and cereals”, which includes the "rice” product category). There are 11 COICOP two-digit groups (for example "Food and non-alcoholic beverages", which includes the "Breads and cereals" group). The last level of aggregation is our sample, which covers 65% of the CPI.

We use the F-K index to illustrate the effect of aggregation on synchronization of price changes and random effect probit regressions for a more formal test. For each level of aggregation, we compute the F-K index, weighting the product categories/groups according to their weight in the CPI basket. Figure 5 shows the cumulative distribution of the index (the values of the index are in Appendix A). The cumulative distribution of the F-K index at the product category level is entirely to the left of (i.e. it stochastically dominates) of the distribution at the COICOP four-digit level, which in turn is to the left of the distribution at the COICOP two-digit level. The value of the index at the sample level (0.075) is lower than the value at the two-digit level for 10 out of 11 industry groupings, which constitute 72% of our sample by CPI weight, and at the four-digit level for 68 out of 71 industry groupings, which constitute 94% of our sample by CPI weight.

Figure 5 indicates that the more aggregated the data, the smaller the values of the F-K index, suggesting aggregation increases the staggering of price changes. However, this could simply be the result of the fact that, as data are aggregated, sample size used to compute the F-K index increases. As indicated by equation (5), an increase in the sample size leads to a decrease in the value of the F-K index, especially for low levels of synchronization. Therefore we compute "sample-size" controlled values of the F-K index for each of the COICOP 4 - COICOP 2 grouping, and for the total basket by bootstrapping. Out of each grouping we randomly select 1000 samples. The number of price trajectories in these random samples is set to 300, which is close to the average number of price trajectories observed at the product category level. For each random

sample, we compute the F-K index. Averaging the F-K index over the 1000 samples gives the bootstrapped estimate of the F-K index for the corresponding grouping. As the sample size of the random samples is broadly equal to the sample size at the product category level, the comparison of the F-K index computed for a given product category (for example "rice") with the bootstrapped F-K index for the relevant grouping (for example "Breads and cereals") should only reflect the aggregation effect and not be strongly influenced by differences in the sample size.

Figure 6a shows scatter plots of the bootstrapped F-K index computed at the product category level against the F-K index computed at the COICOP 4 digit level ; Figure 6b shows scatter plots of the bootstrapped F-K index computed at the COICOP 4 digit level against the F-K index computed at the COICOP 2 digit level. Most of the points are below the diagonal, suggesting that, after controlling for sample size, the values of the F-K index are lower for the more aggregated data.

To assess the effect of aggregation on the staggering of price changes we compare "sample-size" controlled values of the F-K index at two adjacent levels of aggregation: product categories to the COICOP 4 groups in which they are contained, COICOP 4 digit to COICOP 2 digit groups in which they are contained and COICOP 2 to the entire sample. We use the Wilcoxon Signed Rank test. This non parametric test compares paired samples to verify the hypothesis that the values in the paired observations are equal: H_0 : $FK_{ji} = FK_i$ where the subscript ji denotes a subcategory of i. Under H_0 the Wilcoxon Signed Rank is approximately normally distributed for sample sizes above 20; for smaller samples, the exact distribution is non-standard and ad-hoc tables have to be used.

The Wilcoxon Signed Rank statistics are in Table 1. Given the evidence in Figure 6, these are computed for a one sided test. The H_0 hypothesis is rejected at the 1% level for all comparisons. As data are aggregated, the values of the F-K index fall indicating price changes become more staggered.

An alternative way of assessing the effect of aggregation on the staggering of price changes is to estimate probit equations. The dependent variable equals 1 if we observe the change in price in outlet i for product category j at time t. The independent variables are the proportions of price changes at time t at different aggregation levels, *excluding* the

relevant grouping which contains product category *j*. We also control for the accumulated product specific and aggregate inflation since the last price change as these variables have strong effect on the probability of price changes (see, for example, Aucremanne and Dhyne, 2005). The estimated equation is:

$$Prob\left[\Delta p_{\mathrm{ijt}} \neq 0\right] = \Phi\left[\alpha_i + \beta_1 \Pi_{\mathrm{1ijt}} + \beta_2 \Pi_{\mathrm{2ijt}} + \beta_3 \mathrm{S}_{\mathrm{1ijt}} + \beta_4 \mathrm{S}_{\mathrm{2ijt}} + \beta_5 \mathrm{S}_{\mathrm{3ijt}} + \beta_6 \mathrm{S}_{\mathrm{4ijt}}\right] \quad (6)$$

where Δp_{ijt} denotes the price change in outlet *i* for product category j at time *t,* Π_{1ijt} and Π_{2ijt} are the product category *j* and aggregate accumulated inflation since the last price change, respectively, $\mathrm{S}_{\mathrm{1ijt}}$ is the proportion of price changes at *t* for other products in product category *j*, $\mathrm{S}_{\mathrm{2ijt}}$ is the proportion of price changes in other product categories in the COICOP 4 digit grouping containing *j*, $\mathrm{S}_{\mathrm{3ijt}}$ is the proportion of price changes in other COICOP4 digit groupings of the COICOP 2 digit grouping containing *j* and $\mathrm{S}_{\mathrm{4ijt}}$ is the proportion of price changes in other COICOP 2 digit groupings. We also add product-store specific random effects to capture the heterogeneity in the frequency of price changes that may be observed within a product category.

We also estimate a similar equation for price increases and price decreases separately. In those cases, the sectoral cumulated inflation is divided into sectoral cumulated positive inflation and sectoral cumulated negative inflation.

In the probit regressions, the increase in synchronization of price changes as data become less aggregated means that the probability of price change is affected more by price changes of the more similar (in COICOP classification) products. This implies that, at the sample mean,

$$\left.\frac{\partial Prob}{\partial \mathrm{S}_1}\right|_{\bar{X}} > \left.\frac{\partial Prob}{\partial \mathrm{S}_2}\right|_{\bar{X}} > \left.\frac{\partial Prob}{\partial \mathrm{S}_3}\right|_{\bar{X}} > \left.\frac{\partial Prob}{\partial \mathrm{S}_4}\right|_{\bar{X}} \quad (7)$$

We estimate equation (6) for the 368 product categories. The results are consistent with the nonparametric results. Based on our point estimates, the marginal effect with respect to S_1 is the largest marginal effect for 69% (63%, 52%) of product categories for the price changes (price increases, price decreases) probit equations. For the product categories where it is not the largest marginal effect, we find that the largest is the

marginal effect with respect to S_2 in 90%, (78%, 69%) of the cases while the marginal effect with respect to S_4 is the largest coefficient only in 2.6% (4.5%, 2.8%) of the cases.

In Figure 7 we show the cumulative distribution of marginal effects in the probit equation at sample means. The cumulative distribution for S_1 is mostly to the right of the distribution for S_2, which is to the right of the distributions for S_3 and for S_4, indicating the marginal effect falls as more aggregated data are considered.

We conclude that the results of the two methods present a consistent picture. As the level of sectoral aggregation increases, price changes become more staggered.

4.2 The effect of geographic aggregation on staggering

In this subsection we consider the effect of aggregation in geographical space on the synchronization pattern of price changes. Our data set provides enough information to compute the F-K index separately for the three largest Belgian cities: Brussels, Antwerp and Liège. Figure 8 compares the cumulative distribution of the F-K index computed at the product category level for Belgium and for each of the three cities. The distribution on the national level is entirely to the right of the city-based distributions, indicating that geographic aggregation raises the degree of staggering in the data.

However, as discussed above, the comparison in Figure 8 may be the artifact of the differences in sample size. The Belgian sample consists of more than 9,000,000 observations, or an average of around 300 outlets per month per product category. The samples at the city level consist of around 300,000 observations, or on average of only 10 outlets per month per product category. To control for the sample size effect, we therefore re-compute the bootstrapped estimates of F-K index for each product category of the Belgian sample. The bootstrapped estimates are the average of 1000 replications of the computation of the F-K index using samples randomly selected out of the Belgian sample. The number of price trajectories included in the randomly selected samples for a given product category is given by the number of price trajectories for that product category in the Brussels sample. Scatter plots of the F-K index estimates for the three cities against the bootstrapped estimates for Belgium are presented in Figure 9. The values are mostly located below the 45 degree line, indicating that price changes seem to

be more synchronized at the city level compared to the national level, even when controlling for sample size.

Using the bootstrapped value of the F-K index for the Belgian sample we have conducted the Wilcoxon Sign Rank test to compare the distribution of the F-K index in the three main Belgian cities with the distribution of the bootstrapped F-K index in the Belgian sample. The results are in Table 2. The values of the F-K index for price changes as well as for price increases and decreases are significantly higher for Belgium compared to any of their paired values in one of the three main cities, at any standard significance level. As in the case of aggregation in the product space, price changes become more staggered as data are aggregated in the geographic space.

5 Conclusions

Price changes in Belgium are neither perfectly staggered nor perfectly synchronized. Using nonparametric and parametric tests we find that (a) the more disaggregated are the data in industrial or geographic space, the more synchronized are price changes; (b) price changes are not perfectly staggered at any level of aggregation and (c) price changes are not perfectly synchronized at the aggregation levels in our data.

It is difficult to explain the pattern of staggering/synchronization of price changes in our data with existing theoretical models, as their implications are mostly restricted to disaggregated data. Strategic complementarity in price adjustment (Blanchard and Fischer, 1989, Sheshinski and Weiss, 1992, Bhaskar, 2002) imply synchronization of price changes at the firm level since a firm's optimal price is positively affected by prices charged by other firms. Information-based theories (Ball and Cecchetti, 1988, Gorodnichenko, 2009) combine strategic complementarities with incomplete information. Shocks affecting the optimal price can be inferred by observing prices of other firms, creating incentive for staggering. In both cases the implications are at a disaggregated level (firms and industries in Bhaskar, and firms and neighbourhoods in Ball and Cecchetti). Strategic and informational considerations are not likely to explain why price changes in very broad sectors (COICOP 2, e.g. "breads and cereals") are more staggered

than in broad sectors (COICOP 4, e.g. Food and non-alcoholic beverages) or why price changes in Belgium are more staggered than in the three largest cities.[15]

The results suggest an economy as proposed by Ball and Cecchetti (1988), Ball and Romer (1989) and Golosov and Lucas (2007) which stress the role of common and idiosyncratic shocks in price changes. The timing of price changes is the consequence of shocks to the desired price. At each level of aggregation (in product or in geographic space) there are common shocks to all subcomponents as well as idiosyncratic shocks affecting only individual subcomponents.

To see this, consider, without loss of generality, a multilevel economy at two adjacent levels of aggregation, for example a two-digit industry and its three-digit subcomponents. A shock at the industry level (i.e. a shock that equally affects all its subcomponents) tends to synchronize price changes equally at both levels of aggregation. On the other hand, shocks at the subcomponent level synchronize price changes for subcomponents but not at the industry level.[16] A similar mechanism operates for geographic aggregation. This implies (a). As long as there are economy-wide (in product or geographic space) shocks, they prevent perfect staggering at the level of the entire economy and also in less aggregated data; hence (b). Implication (c) follows since all the data we use are aggregated to some extent. For example product category data consist of prices of a given type of products in many stores; idiosyncratic shocks affecting a subset of the stores prevent perfect synchronization at the product category level.

What do our results imply for the ability of staggered price changes to explain the persistent effect of money on real variables? We believe the implications are negative, for two reasons. First, in the Golosov-Lucas type economy, in which shocks are the main reason for price changes, the price level can be flexible even if prices are adjusted infrequently. Second, as staggering of price changes affects the response of prices to

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[15] Similarly, increasing returns in price setting (Sheshinski and Weiss, 1992 and Midrigan, 2011) or strategic interactions between firms and customers (Bénabou, 1989, where a firm producing a storable good randomize the timing of price changes to deter storage) cannot explain why the effect shows up in highly aggregated data.

[16] In an extreme example, consider an industry consisting of 12 equal-size sectors. Each sector is subject to a shock once a year, in a different month from other sectors. If the idiosyncratic shocks are so large that all firms in the affected sector change price, the outcome is perfect synchronization within sectors and perfect staggering within the industry.

nominal shocks mainly through strategic interactions among price setters which operate at the disaggregated level, the relevant degree of staggering is significantly smaller than in the economy-level data.

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Table 1

Testing for the effects of product aggregation: Wilcoxon Signed Rank Statistics

Level of aggregation		Price changes	Price increases	Price decreases
Less aggregated	More aggregated			
All product categories	COICOP 4-digit	10.25	9.90	6.00
COICOP 4-digit	COICOP 2-digit	5.80	4.55	4.42
COICOP 2-digit	Total basket	2.85	2.93	2.93

Note : All statistics are significant at the 5% level (critical value =1.96)

Table 2

Testing for the effects of geographic aggregation: Wilcoxon Signed Rank Statistics

Test results using	Price changes	Price increases	Price decreases
Brussels vs Belgium	13.17	12.12	11.66
Antwerp vs Belgium	15.28	14.81	13.09
Liège vs Belgium	6.67	5.91	4.05

Note : All statistics are significant at the 5% level (critical value =1.96)

Figure 1

Frequency of Price Changes, 01/1996 – 12/2003

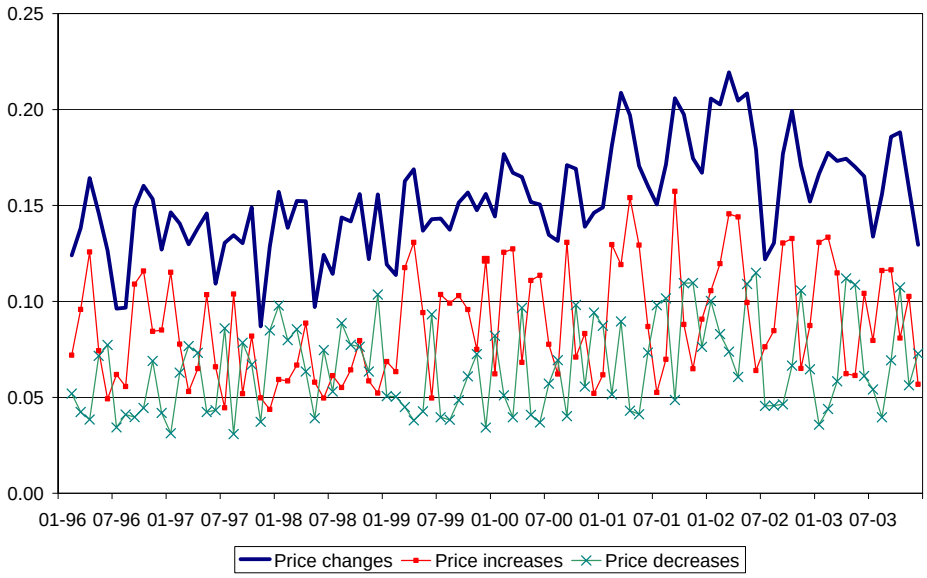
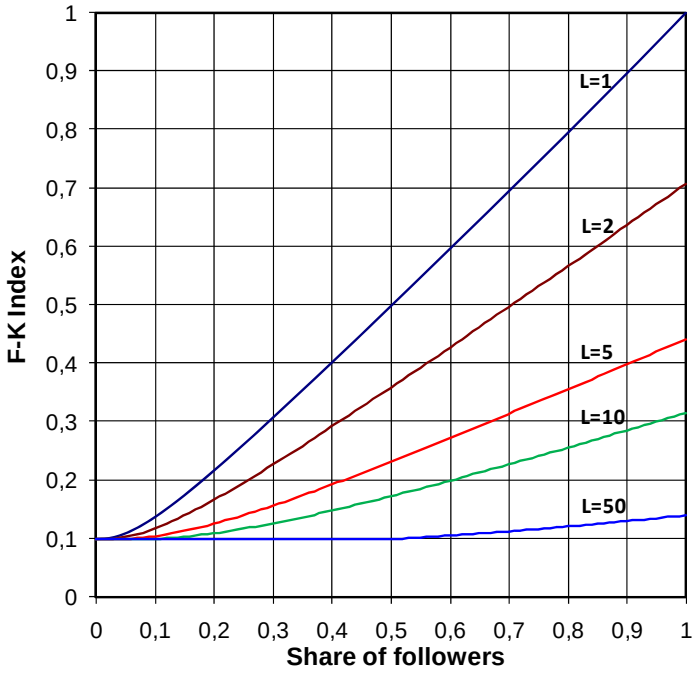


Figure 2

F-K index in a finite population (n=100) with 1, 2, 5, 10 and 50 equal price leaders



Note : The share of followers represents the sum of the market shares of all price leaders in the population. The share of one particular price leader is given by the share of followers divided by L.

Figure 3

Distribution of the F-K Index in Belgian CPI

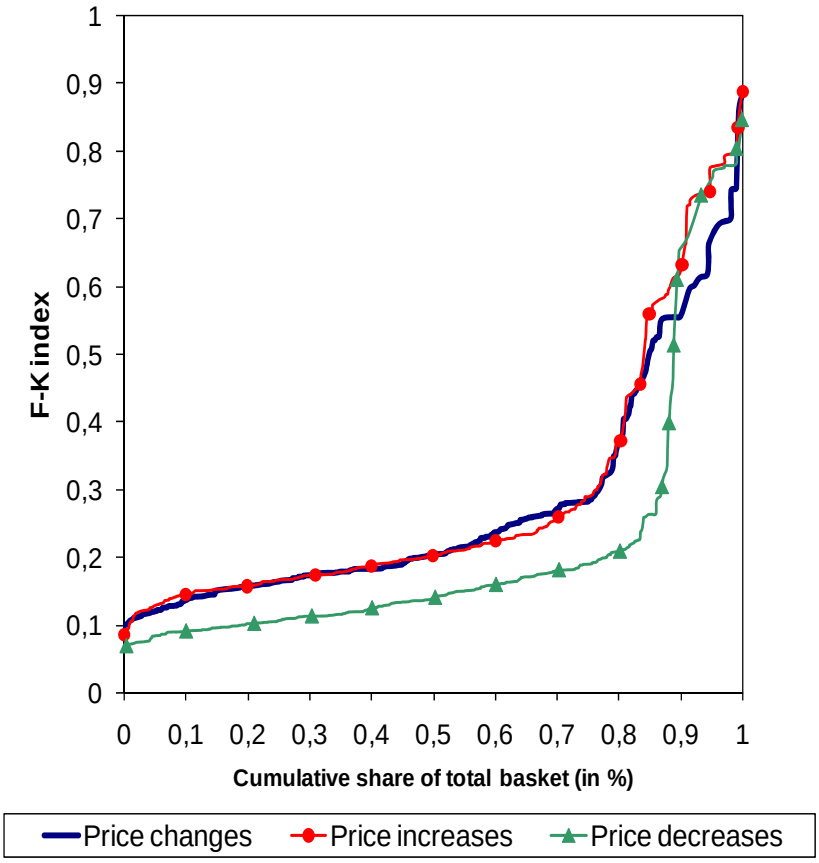


Figure 4

Frequency of price changes for selected product categories

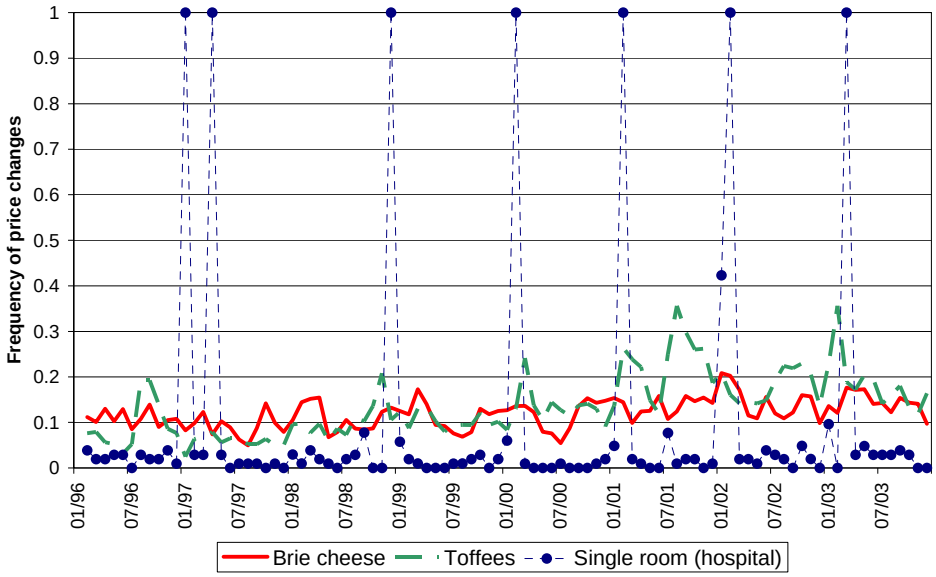


Figure 5

Distribution of the F-K Index by Aggregation Level

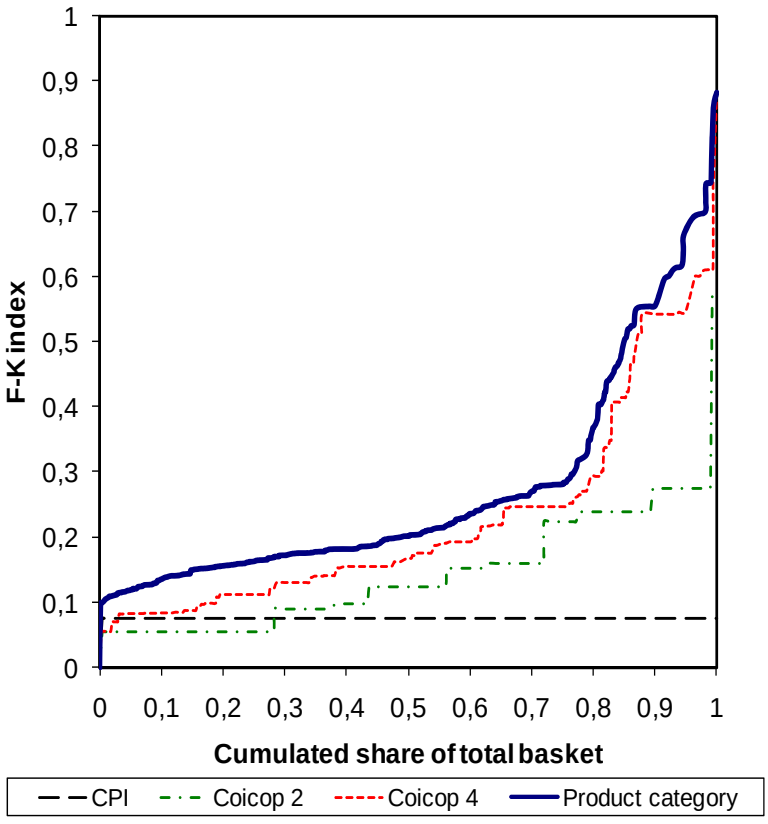
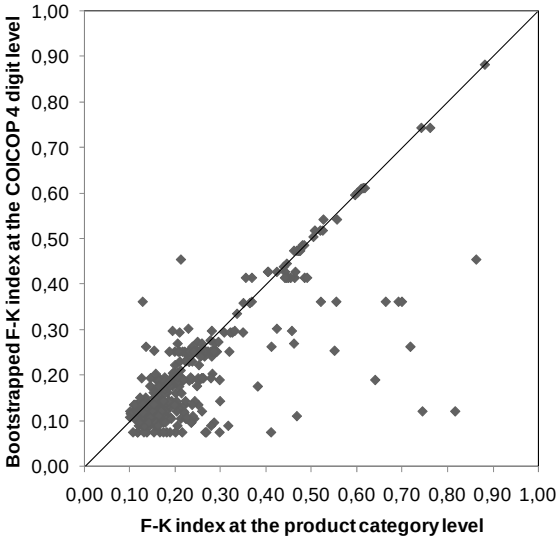


Figure 6

Scatter plots of the (bootstrapped) F-K index of price changes by aggregation level

a. COICOP 4 versus Product category



b. COICOP 2 versus COICOP 4

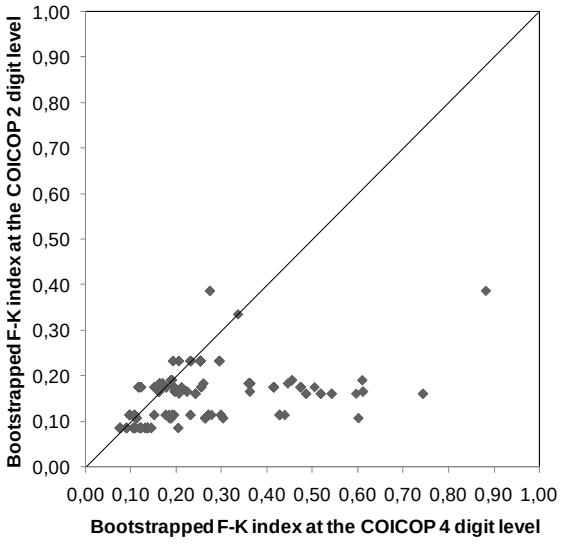


Figure 7

Cumulative distribution of the marginal effects of the probit equation at the sample means

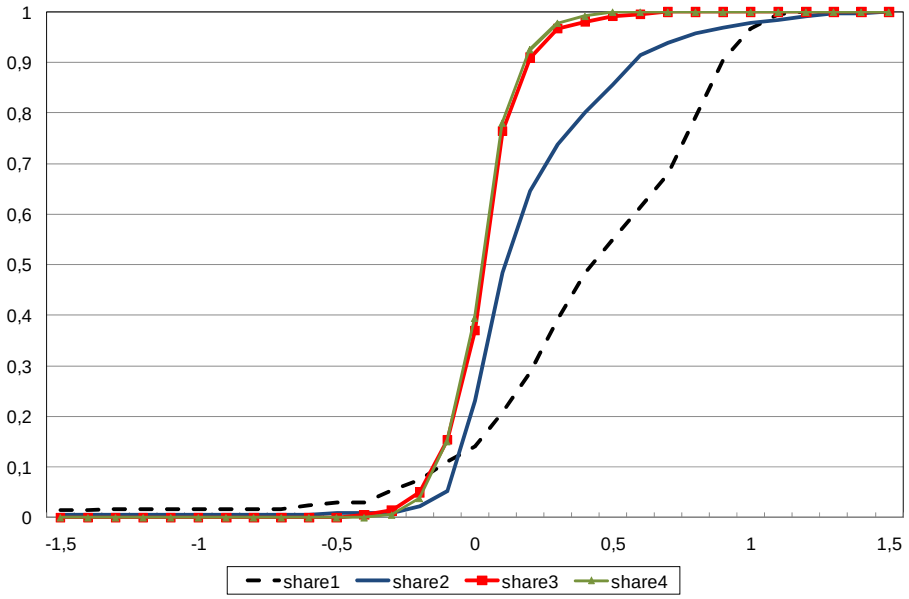
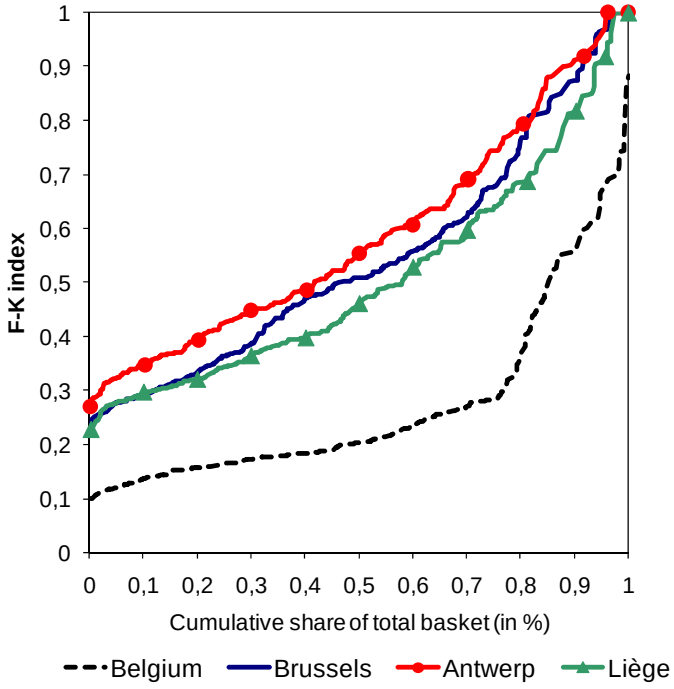


Figure 8

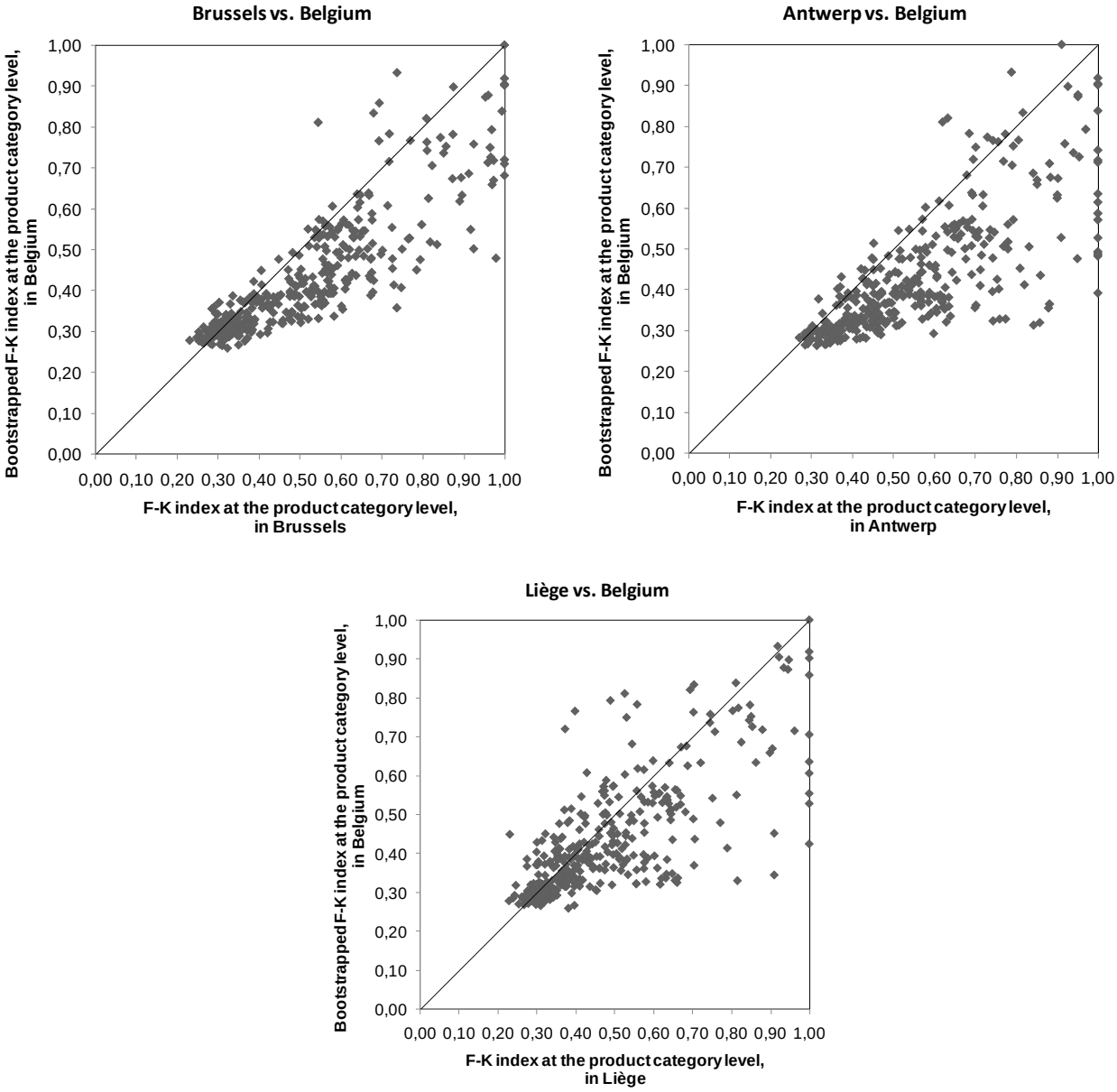
Distribution of the F-K index – Belgium versus 3 main Belgian cities



Note: Belgian CPI weights are used at the local level.

Figure 9

Scatter plots of the F-K index: Belgium versus 3 main Belgian cities



Appendix A: Adjustment frequency and F-K index for product categories.

Description of the table:

Freq: the average frequency of price changes (increases, decreases).

F-K index: the value of the Fisher-Konieczny index.

S1 : Marginal effect of S1 at the sample mean (probit equation (6))

S2 : Marginal effect of S2 at the sample mean (probit equation (6))

S3 : Marginal effect of S3 at the sample mean (probit equation (6))

S4 : Marginal effect of S4 at the sample mean (probit equation (6))

Product category	COICOP	Price changes						Price increases		Price decreases	
		Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Food and non-alcoholic beverages	**01.0.0.0**	**20.4**	**5.5**					**11.3**	**6.3**	**9.1**	**4**
Breads and cereals	*01.1.1.0*	*8.8*	*13.1*					*5.5*	*14.9*	*3.4*	*5.7*
Rice	01.1.1.1	17.3	12.4	0.87	-0.03	0.07	0.07	8.8	11.2	8.5	10.7
Baking flour	01.1.1.2	13.6	14.8	0.90	-0.01	0.05	0.03	7	15.4	6.6	12.6
Spaghetti	01.1.1.3	20.5	17.5	0.85	0.03	-0.16	0.07	10.5	20	10.1	16.4
Bread roll	01.1.1.4	2.6	17.8	0.44	-0.06	-0.05	0.09	2.3	17.7	0.4	8.9
Raisin bread	01.1.1.4	3.7	25.8	0.34	0.12	0.03	0.21	2.9	21.4	0.8	21.5
Special bread	01.1.1.4	2.3	81.7	0.02	0.06	0.00	0.02	2.2	83.5	0.1	9.5
Whole wheat bread	01.1.1.4	2.6	74.5	0.05	0.01	0.00	0.02	2.4	77.8	0.2	7.2
Biscuits	01.1.1.5	19.9	21.8	0.83	-0.07	0.12	-0.04	12	24.8	7.9	16.4
Speculoos	01.1.1.5	15.7	20.2	0.78	-0.03	0.09	0.04	9.6	22.1	6.1	13.6
Coffee cake	01.1.1.5	4	16.9	0.47	0.06	-0.02	0.06	3.5	16.8	0.5	9.5
Éclair	01.1.1.5	4.3	17.7	0.47	-0.02	0.03	0.09	3.6	18	0.7	7.9
Carré glace	01.1.1.5	4.6	16.8	0.52	0.00	0.08	0.03	3.8	16.6	0.8	8.8
Swiss cake	01.1.1.5	3.5	16.3	0.44	0.01	0.03	0.08	2.9	15.6	0.6	8.3
Belgian waffle	01.1.1.5	9.6	11.9	0.76	-0.09	0.16	-0.05	5.2	10.4	4.3	13.9
Rice pudding	01.1.1.5	5.5	16.9	0.55	-0.02	0.12	0.03	4.3	16.8	1.2	8.5
Cornflakes	01.1.1.6	18.2	15.6	0.88	-0.05	0.10	0.00	9.7	19.6	8.6	14.9
Fresh pizza	01.1.1.6	10.1	16.4	0.75	0.01	0.25	-0.13	5.1	15.7	5	16.3
Instant cream	01.1.1.6	15.2	16.8	0.83	-0.08	0.03	-0.10	8.4	18.7	6.7	16.1
Meat	*01.1.2.0*	*12.7*	*11.2*					*7.7*	*13.2*	*5*	*5*
Meat, cooking quality	01.1.2.1	8.4	14.3	0.80	0.09	-0.20	-0.03	5.6	15.7	2.9	9.5
Meat for carbonnade	01.1.2.1	13.6	14.1	0.91	0.04	-0.27	0.00	8.2	15.2	5.4	10.4
Roast beef	01.1.2.1	13.4	15.3	0.81	0.13	-0.03	0.03	8.1	18.2	5.3	9.3
Beefsteak	01.1.2.1	12.5	14.1	0.74	0.12	-0.19	0.11	7.6	15	4.9	9.8
Sirloin	01.1.2.1	15.8	15.9	0.86	0.15	-0.17	0.04	9.6	19.3	6.2	10.4
Roast veal	01.1.2.2	11	13	0.80	0.11	-0.10	-0.10	7.5	14.1	3.6	10.2
Pork chop (filet)	01.1.2.3	18	25	1.00	-0.29	-0.20	0.04	10.4	32.2	7.7	20.3
Pork rib	01.1.2.3	18.4	23.6	0.96	-0.22	-0.16	0.06	10.7	30.7	7.6	19.1
Roast ham	01.1.2.3	17.3	22	0.94	-0.21	-0.16	0.01	9.9	29.8	7.4	15.9
Leg of lamb	01.1.2.4	15.9	15.4	0.82	0.15	-0.26	0.10	9.3	17	6.6	10.4
Chicken, roasting	01.1.2.5	15	11.6	0.83	0.15	-0.31	-0.02	8.7	14.6	6.3	8.4
Turkey fillet	01.1.2.5	15.5	11	0.49	0.32	-0.42	0.07	8.8	12.9	6.7	7.5
Rabbit	01.1.2.6	24.5	13.7	1.01	0.07	-0.18	0.02	13.6	18.2	10.9	12.4
Boiled ham	01.1.2.7	15.1	15.6	0.64	0.27	-0.28	0.02	9.3	19.3	5.8	7.6
Pork and beef sausage	01.1.2.7	9.6	17.4	0.61	0.07	0.00	0.03	6.4	19.3	3.3	7.5
Bacon	01.1.2.7	11.3	18.5	0.68	0.04	-0.23	0.01	7.4	22.1	3.8	10.2
Ham	01.1.2.7	12.5	16	0.74	0.08	-0.15	0.01	7.6	19.5	4.9	8.6
Ham sausage	01.1.2.7	9.5	15.4	0.70	0.06	0.04	-0.03	6	17.5	3.5	8
Country paté	01.1.2.7	9.4	12.8	0.55	0.11	-0.13	0.00	6	14.3	3.3	7
Black pudding	01.1.2.7	9.5	14.4	0.75	-0.06	-0.18	0.06	6.2	15.5	3.3	7.4
Steak tartare	01.1.2.8	12.6	12.4	0.73	0.14	-0.07	-0.11	7.7	14.6	5	9.8
Ground meat	01.1.2.8	13.5	18.8	0.68	0.14	-0.19	0.01	8.4	22.7	5.1	10.3
Frankfurters	01.1.2.8	16.9	20.1	0.88	0.04	-0.14	-0.12	9.5	22.5	7.5	16
Sausage	01.1.2.8	12.3	19.7	0.62	0.19	-0.20	0.02	7.7	24.4	4.5	9.2
Meat salad	01.1.2.8	6.9	11.2	0.40	0.22	-0.04	-0.03	4.5	12	2.4	8.9
Hamburger	01.1.2.8	9	10.8	0.63	0.17	-0.20	-0.06	5.7	12.8	3.3	6.8
Fish and seafood	*01.1.3.0*	*40.1*	*5.6*					*21.4*	*9.5*	*18.7*	*9.1*
Fresh cod	01.1.3.1	72.1	11.8	0.69	0.58	0.01	0.18	38.8	20.9	33.3	22.4

Product category	COICOP	Price changes						Price increases		Price decreases	
		Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Sole	01.1.3.1	76.1	15.7	0.94	0.26	0.03	0.22	39.4	30.6	36.7	30.3
Fillet of fish	01.1.3.1	73.6	12.6	0.79	0.20	0.13	0.20	38.7	28.9	34.9	29.8
Plaice	01.1.3.1	61	14.2	0.54	0.86	0.12	-0.05	32.7	20.2	28.3	20.6
Skate (wing)	01.1.3.1	68.5	15.4	0.89	0.37	-0.05	0.07	35.6	22.6	32.9	21.7
Rainbow trout	01.1.3.1	35.6	15.7	0.75	0.56	-0.04	0.09	18.8	16.7	16.8	13.4
Pink salmon	01.1.3.1	46.9	12.9	0.92	0.34	-0.21	0.08	24	15.4	22.9	11.4
Shrimp	01.1.3.1	48.4	27.8	1.03	0.01	0.22	0.04	25.5	37.9	22.8	36.4
Prawns	01.1.3.1	24.8	13.1	0.81	0.13	-0.12	0.13	13.9	14.5	10.9	10.7
Cod filet (frozen)	01.1.3.2	9.9	31.6	0.62	0.05	0.31	0.08	6.3	34.6	3.6	17.5
Fishcakes	01.1.3.2	13.9	20.4	-	-	-	-	8	24.2	6	13.3
Smoked salmon	01.1.3.3	17.5	13	0.84	0.02	-0.11	0.04	8.7	11.8	8.7	12.1
Tinned tuna	01.1.3.4	19	14.1	0.80	-0.09	0.05	-0.05	10.5	17.1	8.5	11
Tinned sardines	01.1.3.4	9.5	16.1	0.72	-0.01	0.18	0.09	5.7	15.7	3.8	15.9
Milk, cheese and eggs	*01.1.4.0*	*14.7*	*8.3*					*8.3*	*8.7*	*6.4*	*7.2*
Pasteurized milk	01.1.4.1	11.5	16.9	0.63	0.06	-0.18	0.04	6.8	18.9	4.6	11.8
Low-fat yoghurt	01.1.4.1	14.9	18.8	0.83	0.13	-0.23	0.11	8.7	20.6	6.2	13.5
Partially-skimmed milk	01.1.4.1	13.2	17.6	0.66	0.15	-0.15	-0.02	7.6	19.7	5.6	14.2
Whipped cream	01.1.4.1	10.7	11.6	0.73	0.01	0.09	0.03	6.4	12.6	4.4	9.9
Full-fat fruit yoghurt	01.1.4.1	14.5	16.5	0.81	0.18	-0.02	0.07	7.9	15.2	6.5	13.3
Cheese (Edam type)	01.1.4.2	11.1	12.7	0.71	-0.17	-0.12	0.03	7.2	15	3.9	9.2
Cheese (Gouda type)	01.1.4.2	15.6	12	0.52	0.22	-0.07	-0.06	8.8	12.1	6.8	9.7
Emmentaler	01.1.4.2	13.3	11.6	0.68	0.04	0.02	-0.05	7.7	11.2	5.6	11.2
Low-fat white cheese	01.1.4.2	17.5	14.2	0.87	0.07	-0.18	-0.03	8.4	15.2	9.1	17.9
Brie	01.1.4.2	12	9.9	0.70	0.17	-0.07	0.13	6.2	9.3	5.8	8.9
Camembert	01.1.4.2	19.3	14	0.84	0.03	0.04	0.05	9.4	13.1	9.9	12.5
Processed Gruyere	01.1.4.2	14.6	15.5	0.81	-0.04	0.15	-0.09	8.3	17.4	6.4	10.9
Eggs	01.1.4.3	29	18.2	1.18	-0.14	-0.08	0.09	16.6	24.2	12.4	22.3
Oils and fats	*01.1.5.0*	*17.8*	*9.7*					*9.9*	*12.4*	*7.9*	*7.4*
Butter	01.1.5.1	13.8	14.3	0.66	0.12	-0.06	-0.01	8.1	16.6	5.7	10.3
Margarine (standard)	01.1.5.2	20.7	18.9	0.96	-0.09	-0.22	-0.02	11.2	22.4	9.5	17.1
Margarine (super)	01.1.5.2	18.1	21	0.98	-0.11	0.03	0.00	10.3	23.9	7.8	16.1
Diet margarine	01.1.5.2	22.6	17.1	0.96	0.09	-0.17	-0.12	11.8	20	10.8	15.5
Minarine	01.1.5.2	21.4	15.5	1.02	0.03	-0.15	-0.11	11.3	19.7	10.1	10.3
Corn oil	01.1.5.3	20.7	15.3	0.99	0.07	-0.29	-0.02	11.7	17.1	9.1	17.2
Groundnut oil	01.1.5.3	19.4	15.5	0.93	0.02	-0.17	0.01	10.3	19	9.1	13.3
Fruits	*01.1.6.0*	*50.6*	*8.5*					*27.1*	*12.4*	*23.5*	*13.5*
Oranges	01.1.6.1	61.6	18.2	1.00	-0.05	0.09	0.06	32.9	27	28.7	26.3
Bananas	01.1.6.1	58.1	22.4	1.07	-0.17	0.23	0.22	30.7	32.2	27.4	25.9
Apples, Golden, imported	01.1.6.1	54.9	21.1	0.93	0.26	0.06	0.06	29.9	24.3	25.1	31.3
Apples, Granny Smith	01.1.6.1	56.1	22.2	1.07	0.00	0.11	0.00	30.8	30.4	25.4	31.7
Lemons	01.1.6.1	50	15	1.05	-0.16	0.64	0.25	26	15.7	24	14.7
White grapefruit	01.1.6.1	58.7	14.1	1.02	-0.11	0.24	0.14	30.8	20.3	27.9	20.8
Apples, Jonagold type	01.1.6.1	63.5	24.1	0.95	0.00	0.32	0.14	34.3	29.9	29.2	33.3
Kiwis	01.1.6.1	53.1	19	1.05	-0.14	0.31	0.14	28.5	23	24.5	20.8
Tinned pineapple slices	01.1.6.3	15	11.9	0.80	0.03	0.10	-0.01	8.8	14	6.2	10
Tinned apricot halves	01.1.6.3	11.6	11	0.76	0.06	0.08	-0.04	6.7	13.6	4.9	9.9
Vegetables	*01.1.7.0*	*49*	*8.4*					*24.6*	*11.5*	*24.4*	*13.8*
Lettuce	01.1.7.1	99.1	11.6	0.16	0.00	0.03	0.02	49.7	65.5	49.4	65.5
Greenhouse tomatoes	01.1.7.1	88.9	20	0.65	0.00	0.04	0.12	45.2	57.5	43.7	58.1

Product category	COICOP	Price changes						Price increases		Price decreases	
		Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Leeks	01.1.7.1	98.2	11.6	0.25	0.01	0.04	-0.01	45.8	58.7	52.3	58.7
Carrots	01.1.7.1	56.7	26.8	1.00	-0.05	0.31	0.02	30	39.1	26.8	39
Onions	01.1.7.1	46.2	29.7	1.07	-0.04	0.15	0.11	24.1	36.6	22.1	39
White mushrooms	01.1.7.1	26.7	16.5	0.77	-0.08	-0.04	0.25	14.1	15.6	12.7	12.7
Cauliflower	01.1.7.1	99.6	10.6	0.09	0.00	0.03	0.00	49.5	49.3	50.1	49.3
Paprika pepper	01.1.7.1	85.2	18.7	0.74	0.05	0.07	0.05	44.9	52.3	40.2	53
White beans with tomato sauce	01.1.7.3	12.1	15.2	0.90	-0.03	-0.06	0.06	6.7	14.5	5.4	13.2
Tinned tomatoes, peeled	01.1.7.3	11.3	17.3	0.84	0.02	0.10	0.06	7	17.8	4.3	14.6
Tinned peas	01.1.7.3	11.5	13	0.84	0.05	-0.20	-0.03	6.7	14.4	4.8	11.8
Vegetables for soup, frozen	01.1.7.4	7.7	13.6	0.71	-0.10	-0.01	-0.01	4.5	14.4	3.2	10.8
Spinach, frozen	01.1.7.4	9	26.5	0.65	-0.11	-0.05	0.20	5.4	26.4	3.7	16.3
Potatoes	01.1.7.5	60.4	41.1	0.87	0.62	-0.33	0.00	26.6	48.3	33.8	45.6
French fries. frozen	01.1.7.5	12.5	18	0.77	-0.03	0.06	0.16	6.9	19.1	5.6	16.1
Potato chips	01.1.7.5	15.9	21.4	0.85	-0.06	0.03	0.21	8.3	16.6	7.6	16.1
Sugar, jam, honey, chocolate and confectionery	*01.1.8.0*	*16.7*	*14.1*					*9.3*	*14.4*	*7.4*	*10.4*
Sugar	01.1.8.1	7.9	29.8	0.52	-0.08	-0.20	0.16	5.3	33.4	2.6	18.8
Crystallized sugar	01.1.8.1	6.8	18.6	0.51	0.04	0.23	-0.09	4	21.7	2.8	11.9
Four fruit jam	01.1.8.2	16.7	13.6	0.79	-0.01	0.01	-0.04	9	13.1	7.8	13.4
Milk chocolate	01.1.8.3	21.7	24.2	0.77	-0.04	0.07	0.07	11.7	26.9	10	17.1
Dark chocolate	01.1.8.3	27.5	19.1	0.96	-0.21	0.27	-0.15	14.4	23.3	13.1	18.2
Toffees	01.1.8.3	13.6	20.2	0.58	0.23	0.22	0.03	8.4	21	5.3	12.7
Ice cream	01.1.8.3	14.7	22.2	0.80	0.12	-0.09	0.07	8	23.2	6.7	18.1
Nut chocolate paste	01.1.8.3	13.7	18.3	0.80	0.04	0.12	0.08	7.5	16.5	6.2	13.7
Candy bar	01.1.8.3	11.6	17.3	0.76	-0.06	0.19	0.10	7.1	19.6	4.5	12.7
Other food products	*01.1.9.0*	*20.2*	*10.8*					*11*	*11.5*	*9.2*	*9.7*
Mustard	01.1.9.0	13.7	17.6	0.82	-0.03	-0.17	0.08	7.7	19.2	6	15.2
Tomato soup	01.1.9.0	22.1	15.2	0.96	0.06	-0.08	0.04	12.3	16.5	9.9	15.1
Mayonnaise	01.1.9.0	22	12.7	0.93	-0.04	-0.01	-0.05	11.7	14	10.3	15.6
Coffee, tea and cocoa	*01.2.1.0*	*28.3*	*26.3*					*13.7*	*32.9*	*14.7*	*27.1*
Coffee, beans or ground	01.2.1.0	29.4	28.1	0.94	0.04	0.20	0.09	14.3	34.7	15.2	29
Instant coffee	01.2.1.0	16.5	15.6	0.89	0.00	-0.05	0.11	7	18.2	9.5	17.8
Mineral water, soft drinks, fruit and vegetable juice	*01.2.2.0*	*13.4*	*8.8*					*7.7*	*9*	*5.7*	*5.9*
Mineral water	01.2.2.1	7.9	15	0.69	-0.11	0.06	0.02	4.5	13.8	3.4	11.5
Still water	01.2.2.1	15	15.1	0.62	0.07	0.03	0.05	8.5	15.6	6.5	12.9
Fruit juice	01.2.2.2	16.2	10.5	0.79	-0.03	-0.12	0.01	8.6	12.1	7.5	10.3
Lemon tea	01.2.2.2	15.3	11.7	0.84	-0.06	-0.04	-0.01	8.5	12.9	6.8	10.4
White soda	01.2.2.2	7	12.8	0.85	0.00	-0.06	-0.04	4.4	13.6	2.6	9.3
Cola soda	01.2.2.2	15.2	21.9	0.78	0.02	-0.21	0.03	9.9	26.1	5.2	11.3
Alcoholic beverages and tobacco	**02.0.0.0**	**14**	**22.4**					**9.9**	**25.7**	**4**	**6.2**
Beer	*02.1.1.0*	*16.5*	*19.8*					*9.6*	*23.3*	*6.8*	*11.6*
Table beer	02.1.1.0	14.6	25.1	0.75	-0.03	-0.02	0.21	9.6	28.1	5	14.6
Lager	02.1.1.0	16.6	19.9	0.76	0.00	0.04	0.00	9.6	23.3	6.9	11.9
Wine	*02.1.2.0*	*13.8*	*14.1*					*8.3*	*17*	*5.5*	*8.2*
Red wine	02.1.2.0	7.4	20	0.59	-0.02	0.02	0.15	5.1	23.3	2.3	13.7
Port	02.1.2.0	22.6	15.7	0.85	-0.08	0.01	0.03	12.7	20.1	9.9	13.3
Vermouth	02.1.2.0	23.6	21.3	0.99	-0.03	0.01	0.06	13.4	26.6	10.2	19.8
Beaujolais Village, most recent vintage	02.1.2.0	11.2	16.5	0.68	-0.02	0.01	0.06	7	18.5	4.2	13.5

Product category	COICOP	Price changes						Price increases		Price decreases	
		Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Val de Loire wine, Muscadet	02.1.2.0	13	17.6	0.72	0.05	0.00	0.03	7.9	19.1	5.1	13.3
Spirits	*02.1.3.0*	*20.9*	*18.8*					*11.9*	*20.9*	*9.1*	*18.3*
Whisky	02.1.3.0	22.9	17.6	0.82	0.07	0.01	0.03	12	20.8	10.9	18.4
Liqueur	02.1.3.0	21.6	23.3	-	-	-	-	13	25.1	8.6	24.9
Gin (64 proof minimum)	02.1.3.0	17	20.5	0.84	-0.06	-0.04	0.03	9.7	24.5	7.3	17.4
Cigarettes	*02.2.1.0*	*11.7*	*61.1*					*11.6*	*61.1*	*0.1*	*14.1*
Standard cigarettes	02.2.1.0	11.6	61.8	0.14	0.00	0.10	-0.06	11.5	61.8	0	7.4
King-size cigarettes	02.2.1.0	11.9	61.4	0.23	0.00	0.08	-0.21	11.8	61.2	0.1	26.3
Other tobacco products	*02.2.2.0*	*9.9*	*42.4*					*9.7*	*42.5*	*0.2*	*8.5*
Cigarillos	02.2.2.0	8.2	36.8	0.38	0.02	0.02	0.03	7.9	37.5	0.4	19.2
Tobacco	02.2.2.0	10.5	52	0.22	-0.03	0.07	0.02	10.4	52.2	0.1	7.1
Clothing and footwear	**03.0.0.0**	**3.8**	**24**					**2.6**	**19**	**1.2**	**14.7**
Clothing materials	*03.1.1.0*	*3*	*23*					*2.5*	*22.1*	*0.4*	*11.6*
Dress fabric	03.1.1.0	3	23	-	-	-	-	2.5	22.1	0.4	11.6
Garments	*03.1.2.0*	*3.7*	*24.7*					*2.4*	*19*	*1.3*	*15.9*
Swimsuit	03.1.2.1	2.5	22.8	0.23	0.12	0.01	0.10	1.7	20.2	0.9	13.1
Men's jogging suit	03.1.2.1	3.4	21.5	0.17	0.28	0.03	-0.15	2.2	16.8	1.1	14.9
Women's jogging suit	03.1.2.1	3.5	20.9	0.18	0.30	0.00	-0.11	2.3	16.5	1.2	15
Wool suit	03.1.2.2	3.9	29.1	0.02	0.50	0.06	-0.16	2.6	22	1.4	21.1
Women's coat	03.1.2.2	4.1	31.8	0.35	0.07	0.10	-0.29	2.4	25.2	1.7	21.1
Men's pullover	03.1.2.2	4.1	28	-0.09	0.60	0.06	-0.09	2.5	20.2	1.6	20.7
Women's pullover	03.1.2.2	4	26	0.21	0.31	0.04	-0.11	2.7	19.6	1.3	19
Men's jacket	03.1.2.2	4.6	28.2	0.15	0.39	0.01	-0.02	3.2	22.5	1.4	19.2
Children's jacket (age six)	03.1.2.2	3.4	25.5	0.39	0.14	-0.01	-0.13	1.8	19.8	1.6	18.8
Women's suit	03.1.2.2	4.6	28.1	0.26	0.28	0.03	-0.15	2.7	21.6	1.8	18.9
Women's raincoat	03.1.2.2	4.1	26.9	0.06	0.46	0.01	-0.10	2.5	20.9	1.6	19.1
Girls' skirt (age six)	03.1.2.2	3.2	24.1	-0.10	0.43	0.14	-0.05	1.8	19.8	1.4	15.6
Boys' pants (age six)	03.1.2.2	3.5	27.1	-0.25	0.71	0.05	0.01	2	21.1	1.5	17.7
Childrens' sweater (age six)	03.1.2.2	3.8	27.2	0.27	0.23	0.06	-0.16	2.3	22.4	1.5	17.1
Wool suit, min. 30% wool	03.1.2.2	3.9	29	-0.16	0.68	0.01	-0.09	2.5	21.5	1.4	21
Wool blazer, min. 30% wool	03.1.2.2	4.3	28	-0.26	0.80	0.12	-0.19	2.9	21.5	1.4	19.9
Pants, casual, velvet	03.1.2.2	3.6	28.9	0.29	0.17	0.07	-0.25	2.3	22.6	1.4	18.9
Jeans, size 50	03.1.2.2	3.6	26.4	-0.14	0.53	0.15	-0.06	2.3	20.6	1.3	17
Dress pants, min. 30% wool	03.1.2.2	3.6	28.1	-0.15	0.63	0.05	0.02	2.3	21.8	1.4	18.7
Raincoat, min. 30% wool	03.1.2.2	3.4	26.6	-0.15	0.55	0.02	-0.02	2.2	21.7	1.2	17.2
Long-sleeved dress	03.1.2.2	2.8	25	0.12	0.29	-0.01	-0.17	1.6	19.5	1.1	17
Short-sleeved dress	03.1.2.2	2.8	27.7	0.29	0.01	0.05	0.03	1.6	21.6	1.3	18.3
Skirt, min. 30% wool	03.1.2.2	4	28	-0.62	1.41	-0.16	-0.09	2.4	21.5	1.6	19.5
Pants, min. 30% wool	03.1.2.2	4.2	28.4	-0.05	0.67	0.04	-0.20	2.6	22.8	1.6	18.1
Jeans, size 38-40	03.1.2.2	3.6	25.6	-0.50	1.00	0.02	-0.07	2.5	20.9	1.1	15.8
Men's leather jacket	03.1.2.2	3.8	26.2	0.17	0.36	0.08	-0.18	2.1	20.9	1.7	18.3
Women's leather jacket	03.1.2.2	3.5	25.4	-0.05	0.49	0.08	-0.16	1.9	20.3	1.6	17.1
Men's anorak	03.1.2.2	3.6	27.9	0.26	0.23	0.00	-0.21	2.3	23.3	1.3	16.9
Women's anorak	03.1.2.2	3.7	28.4	0.30	0.18	0.03	-0.19	2.1	21.8	1.5	20
Men's shirt	03.1.2.3	3.6	26.3	-0.11	0.51	0.21	-0.17	2.6	22.4	1	15.1
Women's shirt	03.1.2.3	4.1	26.4	0.14	0.39	0.05	-0.11	2.7	20.3	1.4	18.1
Men's socks	03.1.2.3	3	22	-0.34	0.33	0.40	-0.11	2.3	19	0.8	13.2
Men's T-shirt	03.1.2.3	2.7	24.4	0.22	0.11	0.00	0.05	1.7	19.7	1	15.7

Product category	COICOP	Price changes						Price increases		Price decreases	
		Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Women's T-shirt	03.1.2.3	2.7	25.6	0.12	0.21	0.03	0.03	1.7	20.8	1	16
Pajama, large	03.1.2.3	3.1	23.1	0.02	0.34	0.12	-0.06	2	17.3	1.1	17
Singlet, size 51	03.1.2.3	3.2	19.8	0.21	0.14	0.07	0.17	2.5	18.2	0.7	10.4
Underwear, size 51	03.1.2.3	3.3	20.6	0.15	0.18	0.11	0.15	2.6	18.3	0.7	12.3
Nightdress with sleeves	03.1.2.3	3.1	24.8	0.12	0.30	0.10	-0.02	2.1	18.9	1.1	17.3
Panties mini/midi-medium	03.1.2.3	3.7	24.2	0.32	0.10	0.12	-0.01	3.1	22.7	0.6	11.6
Lycra tights	03.1.2.3	3.2	18.6	0.46	0.15	0.00	-0.12	2.4	17.2	0.7	11.2
Under-wired bra	03.1.2.3	4	24	-	-	-	-	3.3	22	0.7	12.1
Infants' anorak (nine-month)	03.1.2.4	3.3	24.8	-0.36	0.65	0.20	-0.17	1.9	20.2	1.4	16.7
Other articles of clothing and clothing accessories	*03.1.3.0*	*1.8*	*13.8*					*1.6*	*14.4*	*0.2*	*7.4*
Knitting wool	03.1.3.0	1.5	16.5	0.45	0.06	0.03	0.00	1.3	17.2	0.2	9.5
Zip fastener	03.1.3.0	2.5	23.6	0.27	0.10	0.02	0.01	2.3	24.5	0.2	12.3
Cleaning, repair and rental of clothing	*03.1.4.0*	*3.7*	*19.1*					*3.5*	*18.4*	*0.2*	*7.6*
Dry cleaning, shirt	03.1.4.0	3.2	19.4	-0.24	0.50	-0.01	0.15	3	18.8	0.2	8.3
Dry cleaning, suit	03.1.4.0	4.1	19.7	-0.62	1.15	-0.04	0.13	4	18.8	0.2	10.6
Dry cleaning, raincoat	03.1.4.0	3.5	19.6	-0.15	0.55	0.01	-0.05	3.3	19	0.3	9.6
Shoes and other footwear	*03.2.1.0*	*4.4*	*29.4*					*3.3*	*26.2*	*1*	*14.9*
Tennis shoes	03.2.1.1	3.1	20.9	0.28	0.01	0.23	-0.07	2.1	17.9	1	12.8
Men's shoes	03.2.1.2	4.5	30.7	-0.03	0.53	0.12	-0.12	3.6	27.7	0.8	15.8
Women's shoes	03.2.1.3	4.9	32.5	-0.21	0.83	0.07	-0.03	3.8	29.1	1.1	17.7
Women's boots	03.2.1.3	3.5	34.9	0.23	0.02	0.18	-0.21	2.2	30.4	1.3	19.8
Boys' shoes	03.2.1.4	4.3	32.1	0.06	0.43	0.06	-0.10	3.4	28.9	1	17.1
Repair and rental of footwear	*03.2.2.0*	*3.9*	*22.1*					*3.3*	*18.2*	*0.6*	*21.8*
Resoling of men's shoes	03.2.2.0	3.7	22.1	-2.10	2.29	-0.07	0.37	3.2	18	0.6	22.5
Resoling of women's shoes	03.2.2.0	4	22.3	-2.07	2.56	0.06	-0.09	3.4	18.6	0.6	21.6
Housing, water, gas and electricity	**04.0.0.0**	**25.1**	**15.3**					**14.7**	**27.3**	**10.4**	**30.1**
Other rentals	*04.1.2.0*	*3.3*	*20.5*					*3.3*	*20.5*	*0*	*10.1*
Parking spot in a garage	04.1.2.0	3.3	20.5	-	-	-	-	3.3	20.5	0	10.1
Materials for maintenance and repair of dwelling	*04.3.1.0*	*5.4*	*21.9*					*4.6*	*22.4*	*0.8*	*7.9*
Oil-based paint	04.3.1.0	6.3	28	0.36	0.12	-0.06	0.06	5.5	28.4	0.8	13.5
Cement	04.3.1.0	5.5	22.8	0.49	0.01	0.01	0.10	4.9	23.7	0.7	9.5
Water-based paint	04.3.1.0	6.4	26.4	0.42	0.08	-0.07	0.07	5.4	26.6	1	11.4
Glass, 4 mm	04.3.1.0	3.3	25.5	0.20	0.11	0.06	-0.07	2.7	26	0.6	15
Services for maintenance and repair of dwelling	*04.3.2.0*	*4.8*	*51.3*					*4*	*28.9*	*0.9*	*80.7*
Hourly wage, electrician	04.3.2.0	4.6	50.7	0.26	0.24	0.03	0.21	3.7	27.6	0.8	77.2
Hourly wage, plumber	04.3.2.0	4.9	52.5	-0.12	0.60	0.01	0.16	3.9	29.6	1	84.5
Hourly wage, painter	04.3.2.0	5.1	51.9	0.18	0.35	-0.01	0.12	4.3	31.8	0.8	80.6
Water supply	*04.4.3.0*	*5.2*	*59.6*					*4.2*	*45.6*	*1.1*	*67.7*
Water charge	04.4.3.0	5.2	59.6	-	-	-	-	4.2	45.6	1.1	67.7
Gas	*04.5.2.0*	*76.8*	*75*					*43.6*	*74.4*	*33.1*	*74.1*
Butane	04.5.2.2	75.7	74.2	0.71	0.12	0.06	0.01	42.1	80.8	33.6	79.8
Propane	04.5.2.2	77.2	76.2	0.60	0.16	0.07	0.11	44.4	79.4	32.9	80.3
Liquid fuels	*04.5.3.0*	*80.4*	*54.6*					*43.4*	*73*	*36.9*	*75.1*
Gasoline, 1000-2000 litres	04.5.3.0	80.8	52.6	0.17	0.47	0.13	0.19	43.8	72.1	37	74
Gasoline, 2000+ litres	04.5.3.0	80.2	55.6	0.34	0.40	0.08	0.00	43.3	73.5	36.9	75.6
		Price changes						Price increases		Price decreases	

Product category	COICOP	Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Solid fuels	*04.5.4.0*	*16.1*	*48.2*					*9.1*	*43.8*	*7*	*61*
Anthracite 12/22	04.5.4.0	16.1	48	-3.73	4.39	-0.01	-0.04	9.1	43.6	7	60.9
Anthracite 20/30	04.5.4.0	16	48.4	-4.67	5.36	0.06	-0.30	9	44.1	7	61.1
Furnishing and maintenance of housing	**05.0.0.0**	**5.2**	**12.4**					**3.4**	**12.2**	**1.8**	**6.9**
Furniture and furnishings	*05.1.1.0*	*3.1*	*19.3*					*2.2*	*16.7*	*0.9*	*10.9*
Living-room furniture set	05.1.1.0	3.1	26.1	0.01	0.71	0.13	-0.19	2.5	22	0.6	18
Wall cabinet, washroom	05.1.1.0	2.5	27.8	0.21	0.13	-0.07	0.01	1.3	25.3	1.1	20.7
Dining room oak furniture	05.1.1.1	3.2	24.9	-0.25	0.91	0.09	-0.26	2.7	22.7	0.5	14.3
Kitchen element, 200x50	05.1.1.1	2.7	21.4	-0.11	0.64	0.18	-0.06	2	18.5	0.7	14.6
Bed, slatted base	05.1.1.1	4.1	25.8	0.34	0.15	0.14	0.02	3.1	22.6	1.1	18.9
Modern bedroom furniture	05.1.1.1	3.8	25.8	0.08	0.61	-0.06	-0.02	3	23.3	0.8	14.9
Fluorescent light bulb	05.1.1.2	2.9	12.5	0.33	0.07	0.03	-0.11	1.7	12.5	1.2	9.9
Halogen desk lamp	05.1.1.2	2.8	14.4	0.03	0.25	0.02	0.12	1.3	14.4	1.5	11.4
Carpets and other floor coverings	*05.1.2.0*	*4.1*	*21.1*					*3.3*	*19.6*	*0.8*	*12.5*
PVC covering	05.1.2.0	4.1	21.1	0.50	-0.23	0.09	-0.01	3.3	19.6	0.8	12.5
Household textiles	*05.2.1.0*	*3.4*	*16.3*					*2.6*	*14.6*	*0.8*	*7.8*
PU soft mattress	05.2.1.0	4	24.7	0.42	0.09	0.19	-0.05	3.1	23.4	0.9	13
Synthetic quilt	05.2.1.0	3.3	17.9	-0.14	0.79	-0.11	0.05	2.2	15.4	1.1	11.6
Quilt sheets	05.2.1.0	3.2	18.5	0.01	0.61	-0.06	0.07	2.4	16	0.9	10.8
Bed sheet	05.2.1.0	3.1	18.2	0.22	0.37	-0.08	0.01	2.1	15.2	1	12.1
Towel	05.2.1.0	2.6	14.4	0.42	0.17	-0.11	0.04	1.9	13.5	0.8	9.8
Hanging fabric	05.2.1.0	4	19.3	0.18	0.59	-0.13	-0.08	3.5	18.4	0.5	9
Bathroom set	05.2.1.0	3.7	16.3	0.17	0.47	-0.04	-0.03	2.7	14.4	1	10.3
Curtain fabric	05.2.1.0	3.1	18.7	0.26	0.19	0.01	0.09	2.5	18.4	0.6	9
Major household appliances, electric and other	*05.3.1.0*	*5.9*	*40.8*					*3.5*	*49.6*	*2.4*	*13.6*
Oil heater	05.3.1.1	5.6	36.8	0.40	-0.01	0.08	-0.04	4.6	35.4	1	25.7
Gas cooker	05.3.1.1	4.9	48.5	0.22	0.23	0.21	0.03	3.3	57.2	1.6	13.2
Electric cooker	05.3.1.1	5.5	46.3	0.06	0.45	0.27	-0.06	3.2	58.4	2.3	14.7
Natural gas heater	05.3.1.1	5.7	35.5	0.46	-0.01	0.07	-0.05	4.9	33.2	0.8	23.7
Electric radiator	05.3.1.1	4.8	49	0.03	0.41	0.21	-0.02	3.1	59.5	1.7	13.9
Duo thermal fridge	05.3.1.2	6	44.9	0.13	0.54	0.20	-0.11	3.5	56	2.6	15.6
Tumble dryer	05.3.1.2	5.9	45.4	0.10	0.53	0.12	0.09	3.4	56.1	2.5	15.3
Microwave oven	05.3.1.2	6.2	44.4	0.41	0.28	0.16	-0.06	3.1	58.8	3.1	15.9
Upright freezer, 250-300 L	05.3.1.2	6.1	44.6	0.42	0.25	0.25	-0.20	3.7	54.8	2.4	14.9
Electric washing machine	05.3.1.2	6.4	44.1	-	-	-	-	3.4	56.6	3	15.8
Small household appliances, electric	*05.3.2.0*	*5.5*	*46.5*					*3.3*	*57.6*	*2.2*	*13.4*
Electric fryer	05.3.2.0	5.3	47	-0.11	0.72	0.13	-0.07	3.5	55.8	1.9	15
Food processor	05.3.2.0	5.4	47.2	-0.39	0.97	0.29	-0.01	3.2	58.5	2.2	13.5
Electric coffee machine	05.3.2.0	5.4	47.2	-0.24	0.88	0.00	0.09	3.2	58.1	2.2	16
Cylinder vacuum cleaner	05.3.2.0	5.7	46.1	0.35	0.33	0.05	0.01	3.2	58.8	2.5	15
Steam iron, 1200 W	05.3.2.0	5.5	46.8	-0.64	1.12	0.43	-0.03	3.5	55.8	2	14.7
Toaster, 800 W	05.3.2.0	5.2	47.5	-0.31	0.72	0.27	0.13	3.1	59	2.1	13.6
Repair of household appliances	*05.3.3.0*	*4.9*	*50.4*					*3.9*	*26.2*	*1*	*76.2*
Repair of central heating	05.3.3.0	4.9	50.4	0.55	-0.14	0.06	0.04	3.9	26.2	1	76.2
Glassware, tableware and household utensils	*05.4.1.0*	*3.4*	*12*					*2.4*	*11*	*1*	*6.6*
Stainless steel pan	05.4.1.0	3.6	15.3	0.32	0.56	0.01	-0.03	2.8	15.1	0.9	8.9
				Price changes				Price increases		Price decreases	

Product category	COICOP	Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Cup and saucer	05.4.1.0	3	13.4	-0.15	0.91	0.07	-0.09	2.2	13	0.8	9.2
Glass cooking dish, 2 L	05.4.1.0	3.4	16.2	0.15	0.54	0.17	-0.16	2.4	16.1	1	10.5
Plastic garbage can, 12 L	05.4.1.0	3	12.1	0.16	0.34	-0.02	0.21	2.2	11.7	0.8	8.6
Frying pan	05.4.1.0	4.4	15.7	0.35	0.48	0.08	0.06	3	14.3	1.4	10.1
Major tools and equipment	*05.5.1.0*	*4.6*	*15.9*					*2.6*	*14.2*	*2*	*11.1*
Electric drill	05.5.1.0	4.6	15.9	-	-	-	-	2.6	14.2	2	11.1
Small tools and miscellaneous accessories	*05.5.2.0*	*3.9*	*9.2*					*2.2*	*7.4*	*1.8*	*7*
Electric bulb	05.5.2.0	3.1	9.9	0.08	0.18	0.03	0.10	1.6	8.6	1.6	8.4
Hammer	05.5.2.0	3.4	12.1	0.11	0.47	0.17	-0.12	2.6	10.7	0.8	10.5
Dry battery	05.5.2.0	4.2	11.4	0.55	0.15	0.07	0.03	3.4	11.6	0.7	9
Energy efficient light bulb	05.5.2.0	5.4	13.6	0.38	0.47	0.05	0.07	1.6	10	3.8	12.8
Garden shears	05.5.2.0	3	15	0.38	0.20	-0.01	0.06	2	12.1	1	12.3
Non-durable household goods	*05.6.1.0*	*13*	*9.9*					*7.4*	*10.9*	*5.7*	*7.5*
Dish towel	05.6.1.0	4.3	10.1	0.60	0.09	0.03	0.02	2.6	9.4	1.7	8.3
Coffee filters	05.6.1.0	14.1	15.7	0.84	0.07	0.00	0.01	7.8	18.6	6.3	13.3
Phosphate-free liquid detergent	05.6.1.1	12.3	15.4	0.63	0.19	0.02	0.03	6.2	15.6	6.1	14.9
Liquid general purpose cleaner	05.6.1.1	11.5	15	0.82	0.05	-0.09	0.04	5.7	15	5.9	15.1
Liquid soap	05.6.1.1	14.6	12.5	0.73	0.08	-0.06	-0.08	7.7	13.2	6.9	10.4
Powder detergent	05.6.1.1	16.5	17.1	0.77	0.24	-0.08	-0.09	9.8	19.6	6.8	13.5
Wax polish	05.6.1.2	9	16.6	0.74	-0.03	0.12	0.01	5.5	14.9	3.5	14.2
Domestic and household services	*05.6.2.0*	*3.5*	*19.1*					*3.2*	*14*	*0.3*	*37.6*
Laundromat	05.6.2.1	2.6	23.3	0.17	0.01	0.00	0.34	2.1	21.2	0.5	14.2
Domestic service	05.6.2.2	3.5	15.3	0.42	0.00	0.06	0.08	3.5	15.2	0	9.1
Maintenance of central heating system	05.6.2.3	3.8	55.1	0.37	0.10	0.07	0.00	2.7	21.2	1.1	82.6
Health care expenses	**06.0.0.0**	**6.4**	**57.2**					**5.8**	**58.5**	**0.6**	**15.1**
Therapeutic appliances and equipment	*06.2.1.0*	*2.9*	*26.6*					*2*	*23.1*	*0.9*	*20.9*
Spherical glasses	06.2.1.0	3	29.4	-0.39	0.75	0.00	0.01	2.2	27.9	0.8	21.4
Torus glasses	06.2.1.0	2.8	24.8	-0.10	0.41	0.01	0.03	1.8	20.7	1	21.3
Hospital services	*06.4.1.0*	*9.5*	*88.2*					*9.2*	*88.7*	*0.3*	*19.7*
Single bedroom	06.4.1.0	9.5	88.2	0.37	0.08	0.03	0.02	9.2	88.7	0.3	19.7
Transport	**07.0.0.0**	**46**	**27.5**					**24.3**	**45.7**	**21.7**	**44.9**
Motorcycles	*07.1.2.0*	*6.1*	*44.5*					*4.6*	*38.3*	*1.5*	*28.4*
Lightweight motorcycle	07.1.2.0	6.1	44.5	0.33	-0.03	-0.05	0.24	4.6	38.3	1.5	28.4
Bicycles	*07.1.3.0*	*5.1*	*34.9*					*4*	*33.9*	*1.1*	*13.1*
Women's bicycle, city	07.1.3.0	5.1	35	0.26	0.15	-0.02	0.12	4	34.4	1.1	13.4
Children's bicycle, 24"	07.1.3.0	5	36.4	0.17	0.21	-0.06	0.17	4	35.1	1	15.3
Spare parts and accessories for personal transport equipment	*07.2.1.0*	*5.6*	*15.3*					*3.2*	*13.3*	*2.4*	*10.3*
Spark plug	07.2.1.0	3.8	15.3	0.28	0.19	-0.01	0.17	2.9	13.9	0.9	9.5
Car tire, 175/70/13	07.2.1.0	7.3	17.6	0.50	0.21	-0.02	0.08	3.4	16	3.9	14
Fuels and lubricants for personal transport equipment	*07.2.2.0*	*75.7*	*54.3*					*38.8*	*69.5*	*36.9*	*66.2*
Diesel for cars	07.2.2.1	78.4	55.5	0.69	-0.01	-0.11	0.26	40.1	74	38.3	73.4
LPGA	07.2.2.1	69	66.4	0.94	0.02	-0.05	0.43	37.5	77.4	31.6	77.9
Eurosuper (RON 95)	07.2.2.1	75.8	69.2	0.78	-0.02	0.00	0.24	38.5	78.2	37.4	77.6
Superplus (RON 98)	07.2.2.1	75.3	69.9	0.76	0.00	0.02	0.01	38.9	79.8	36.4	78.1
Engine oil	07.2.2.2	4.3	12.7	-0.16	-0.01	0.47	0.23	3.6	11.3	0.7	9.7
				Price changes				Price increases		Price decreases	

Product category	COICOP	Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Maintenance and repair of personal transport equipment	*07.2.3.0*	*4.8*	*17.6*					*4.5*	*16.7*	*0.2*	*10.4*
Car wash	07.2.3.0	2.8	16.8	0.30	0.00	0.00	0.25	2.6	16.5	0.2	12
Hourly wage for a garage mechanic	07.2.3.0	5	18.2	0.41	0.27	-0.02	-0.05	4.8	17.4	0.2	11.3
Wheel balancing	07.2.3.0	2.8	15.1	-0.39	0.52	0.02	0.30	2.1	14.1	0.8	10.2
Passenger transport by road	*07.3.2.0*	*2.4*	*25.9*					*2.3*	*24.9*	*0.2*	*13.6*
Taxi	07.3.2.2	2.4	25.9	0.23	0.06	0.03	0.01	2.3	24.9	0.2	13.6
Communications	**08.0.0.0**	**12.3**	**33.5**					**5**	**46.7**	**7.4**	**21.5**
Telephone and fax equipment	*08.1.2.0*	*12.3*	*33.5*					*5*	*46.7*	*7.4*	*21.5*
Fax machine	08.1.2.0	12.3	33.5	-	-	-	-	5	46.7	7.4	21.5
Leisure and culture	**09.0.0.0**	**10.3**	**9**					**5.3**	**11.5**	**5**	**6.3**
Equipment for the reception, recording and reproduction of sound and pictures	*09.1.1.0*	*7.1*	*41.5*					*2.5*	*65.2*	*4.6*	*16.6*
Compact hi-fi system	09.1.1.0	6.8	42.3	-0.23	1.04	0.14	-0.12	2.6	64	4.2	16.4
CD player	09.1.1.0	5.4	46.4	-0.39	0.77	0.28	-0.06	2.4	66.4	3	16.7
Radio cassette CD player	09.1.1.0	6.3	44.1	-0.52	1.17	0.08	0.11	2.4	66.2	3.8	16.8
Color TV, 70 cm	09.1.1.0	7.8	40.4	-0.30	1.23	0.11	-0.06	2.7	63.2	5.1	18
VCR, four-head	09.1.1.0	7.7	40.4	-0.36	1.24	-0.17	-0.04	2	71.8	5.7	18.3
Photographic and cinematographic equipment and optical instruments	*09.1.2.0*	*6*	*43.8*					*2.5*	*64.8*	*3.4*	*15.3*
Camera, zoom 35-70	09.1.2.0	6	43.8	0.50	-0.04	0.23	0.20	2.5	64.8	3.4	15.3
Information processing equipment	*09.1.3.0*	*15.6*	*27.1*					*5.8*	*40.5*	*9.8*	*17*
Calculator	09.1.3.0	6.4	45.7	0.54	-0.04	0.13	0.02	3.5	56.4	2.9	21.8
Inkjet printer	09.1.3.0	19	28	0.45	0.42	0.52	-0.12	6.1	43.9	12.9	20.3
LaserJet printer	09.1.3.0	13.9	33	0.35	0.48	0.31	-0.22	5.9	44	8	22.6
Software	09.1.3.0	8.7	19.3	0.15	-0.06	0.27	0.21	4.7	20.2	4	18.2
Other major durables for recreation and culture	*09.1.4.0*	*2.7*	*18.3*					*1.6*	*15.6*	*1.1*	*15.9*
Table tennis set	09.1.4.0	2.7	18.3	-	-	-	-	1.6	15.6	1.1	15.9
Games, toys and hobbies	*09.1.5.0*	*5.3*	*24.5*					*3.1*	*20.7*	*2.3*	*24*
Tennis balls	09.1.5.0	2.7	15.7	0.53	0.06	0.07	-0.10	1.3	12.4	1.4	12.7
Construction game (Lego)	09.1.5.0	6.4	64	0.37	0.20	0.12	0.02	3.3	59.9	3.1	65.3
Toy car	09.1.5.0	2.6	18.7	0.48	0.04	0.10	-0.04	1.9	16.5	0.8	10.6
Scrabble	09.1.5.0	7.9	29.7	0.56	0.11	-0.20	0.11	4.7	19.7	3.2	32.3
Football	09.1.5.0	2.5	18	0.35	0.08	0.11	-0.03	1.3	14.7	1.2	13.5
Computer game	09.1.5.0	8.2	21.8	0.33	0.00	0.00	0.04	4.3	17.8	3.9	21.1
Recording media	*09.1.6.0*	*10.1*	*8.2*					*4.7*	*7.3*	*5.4*	*7*
Compact disc	09.1.6.0	23.9	13.4	0.85	-0.06	-0.05	0.26	12.5	12.2	11.4	11.1
Chromium tape	09.1.6.0	4	11	0.07	0.20	0.14	0.13	1.1	9.2	2.9	9.6
Blank videotape	09.1.6.0	5.5	12.1	0.55	0.04	-0.01	0.12	2	10.5	3.5	11.1
Color film, 135-24	09.1.6.0	2.7	14.4	0.19	0.47	-0.03	0.00	1.6	13.1	1.1	10.2
Educational CD-ROM	09.1.6.0	9.5	22.5	0.51	0.02	0.11	0.17	4.3	20.4	5.1	20.7
Gardens, plants and flowers	*09.1.7.0*	*32*	*7*					*16.7*	*19.9*	*15.3*	*18.4*
Roses	09.1.7.1	69.7	15.8	0.63	-0.10	-0.10	0.37	35.9	40.5	33.8	43.4
Chrysanthemums	09.1.7.1	61.9	14.1	0.57	0.32	0.06	-0.07	31.7	38.3	30.2	39.8
Freesia	09.1.7.1	55.6	15.7	0.66	0.52	-0.15	0.14	28.5	26.7	27.1	25.8
Carnations, high quality	09.1.7.1	54.3	12	0.55	0.38	-0.37	0.30	27.8	23.1	26.5	22.3
Kalanchoe	09.1.7.2	12.2	12.4	0.34	-0.06	0.06	0.44	6.4	13.8	5.8	11.2
				Price changes				Price increases		Price decreases	

Product category	COICOP	Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Ficcus	09.1.7.2	4.9	17.2	0.52	0.25	0.05	-0.24	3.7	16.3	1.2	11.3
Azalea	09.1.7.2	15.2	23.4	0.97	-0.10	0.17	0.15	8.3	20	6.9	17
Dracaena	09.1.7.2	4	17.7	0.35	0.22	-0.05	-0.16	2.7	16.8	1.3	12.1
Cyclamen	09.1.7.2	14.8	23.4	0.84	0.00	0.11	-0.03	7.9	20	6.9	16.2
Flower bulbs	09.1.7.3	2.7	28.5	0.33	0.13	0.12	-0.12	1.9	26.5	0.8	17.4
Pets and related products	*09.1.8.0*	*15.3*	*13*					*7.4*	*14.2*	*7.8*	*12.9*
Dog food	09.1.8.0	14.6	16.6	0.75	0.12	-0.14	0.05	6.6	17	8	17.1
Cat food	09.1.8.0	15.9	15.6	0.80	0.06	-0.03	-0.10	8.2	17.3	7.7	14.9
Repair of audio-visual, photographic and information processing equipment	*09.1.9.0*	*3.2*	*19.4*					*3*	*19.1*	*0.2*	*10.6*
Hourly wage for electric technician	09.1.9.0	3.2	19.4	-	-	-	-	3	19.1	0.2	10.6
Recreational and sport services	*09.2.1.0*	*2*	*27.7*					*1.9*	*27.1*	*0.2*	*11.1*
Swimming pool fee	09.2.1.0	2	27.7	-	-	-	-	1.9	27.1	0.2	11.1
Cultural services	*09.2.2.0*	*3.3*	*25.3*					*2.5*	*25.1*	*0.9*	*14.1*
Annual cable subscription	09.2.2.0	3.9	38.1	0.27	0.16	-0.10	0.02	3.1	37.2	0.8	22.1
Videotape rental	09.2.2.0	1.6	20.8	0.19	0.07	0.03	0.09	1.1	21	0.5	14.6
Photo prints (10 x 15) (24)	09.2.2.0	3	17.8	0.40	-0.03	0.00	0.07	1.8	16.6	1.1	11.5
Books	*09.3.1.0*	*3.5*	*21.6*					*2.8*	*18.4*	*0.7*	*14.5*
Dictionary, French-Dutch, Dutch-French	09.3.1.0	3.4	28.6	0.38	0.25	-0.27	0.17	2.2	23.2	1.2	21.1
Novel	09.3.1.0	3.1	20.4	0.39	0.05	-0.02	-0.01	2.8	19	0.4	10.9
Dictionary	09.3.1.0	6.7	46.1	0.29	0.14	-0.17	0.10	3.1	32.3	3.6	51.2
Comic book	09.3.1.0	4.3	25.8	0.35	0.18	0.05	0.03	3.5	25.6	0.9	12.9
Stationery and drawing materials	*09.3.4.0*	*5.1*	*21.8*					*3.5*	*17.4*	*1.6*	*16.1*
Pen	09.3.4.0	4.2	20.9	0.20	0.25	0.16	-0.03	3.1	19	1.2	13.6
Loose-leaf notebook	09.3.4.0	5.6	23.7	0.51	0.03	0.10	0.04	3.8	18.7	1.8	18.8
Hotels, cafés and restaurants	**11.0.0.0**	**3.3**	**16**					**2.9**	**15**	**0.4**	**7.6**
Restaurants, cafés and similar establishments	*11.1.1.0*	*3.2*	*15.5*					*2.8*	*14.2*	*0.4*	*8.1*
Steak and french fries	11.1.1.1	3.4	17.6	0.02	0.53	0.03	0.00	3.1	16.3	0.4	9.6
Lunch	11.1.1.1	2.7	17.8	0.07	0.38	-0.04	0.00	2.3	16.6	0.4	11.2
Self-service meal	11.1.1.1	3	18.7	0.21	0.11	-0.01	0.14	2.4	17.3	0.6	17.5
Pepper steak	11.1.1.1	3.5	18.2	0.02	0.56	-0.01	0.02	3.1	17.7	0.3	9
Sole meunière	11.1.1.1	4.1	16	-0.06	0.69	0.01	-0.18	3.5	15	0.7	10.1
French fries	11.1.1.2	2.9	25.1	0.17	0.26	0.01	0.15	2.8	24	0.1	13.1
Hot dog	11.1.1.2	2.2	18.5	-0.04	0.33	0.00	0.12	2.1	17.4	0.1	12.3
French bread sandwich	11.1.1.2	2.3	16.3	0.25	0.15	0.01	0.11	2.1	15.5	0.2	9.9
Cheeseburger	11.1.1.2	2.7	23	0.18	0.33	0.03	-0.05	2.1	16.3	0.6	26.4
Glass of beer	11.1.1.3	3.3	21.5	0.25	0.15	0.01	0.06	3.2	20.9	0.1	9.1
Cola	11.1.1.3	3.1	19.9	0.03	0.36	0.02	0.07	2.9	18.2	0.2	12.5
Mineral water	11.1.1.3	3	19.7	0.00	0.38	0.01	0.10	2.9	18.2	0.1	12.4
Aperitif	11.1.1.3	2.9	19.9	0.00	0.45	0.00	0.09	2.8	18.7	0.2	10.4
Special beer	11.1.1.3	3.2	20.2	0.19	0.26	0.01	0.05	2.9	18.4	0.3	11.5
Espresso	11.1.1.3	2.9	19.6	-0.10	0.51	0.01	0.16	2.7	18.6	0.2	10.8
Canteens	*11.1.2.0*	*3.2*	*61*					*2.9*	*58.3*	*0.3*	*20.8*
School lunch	11.1.2.0	3.2	61	-	-	-	-	2.9	58.3	0.3	20.8
Accommodation services	*11.2.1.0*	*4.8*	*33.8*					*4.5*	*34*	*0.3*	*8.8*
School boarding fees	11.2.1.0	7.1	86.4	0.04	0.03	-0.03	0.04	7	85.5	0.1	14.9
Hotel room	11.2.1.0	3.7	21.1	0.26	-0.03	0.25	0.03	3.3	19.9	0.4	10.9
		Price changes						Price increases		Price decreases	

Product category	COICOP	Freq	F-K Index	S1	S2	S3	S4	Freq	F-K Index	Freq	F-K Index
Miscellaneous goods and services	**12.0.0.0**	**6.7**	**9.8**					**4.5**	**9.9**	**2.2**	**4.7**
Hairdressing salons and personal grooming establishments	*12.1.1.0*	*3.2*	*16.8*					*2.9*	*15.4*	*0.3*	*9.7*
Men's haircut	12.1.1.1	2.9	18.1	0.03	0.34	0.16	-0.09	2.6	16.7	0.3	10.8
Women's hairdressing	12.1.1.2	3.1	17.3	-0.10	0.49	0.17	-0.09	2.8	15.7	0.3	11.9
Permanent wave	12.1.1.2	3.6	16.5	-1.32	1.81	0.41	-0.24	3.3	15.8	0.3	9.1
Appliances, articles and products for personal care	*12.1.2.0*	*12.8*	*8.4*					*7.5*	*8.5*	*5.3*	*6.5*
Soap	12.1.2.1	12.8	12.7	0.80	0.03	0.08	-0.21	6.8	15	5.9	9.9
Toothpaste	12.1.2.1	16.1	13	0.84	0.12	-0.04	0.00	8.4	13.5	7.7	12.4
Eau de cologne	12.1.2.1	4.7	23.8	0.41	0.46	0.16	0.06	3.8	25	0.9	13.2
Aftershave	12.1.2.1	11.9	15.7	0.76	0.17	0.00	0.04	6.8	16	5.1	12.7
Face cream	12.1.2.1	8.9	16.2	0.59	0.16	0.13	0.13	6	15.3	2.9	10.2
Hair spray	12.1.2.1	15.7	14	0.84	0.09	0.03	-0.15	9	15.8	6.7	11.8
Nail polish	12.1.2.1	9.2	13.9	0.71	0.12	-0.05	0.10	6.8	14.6	2.4	8.9
Toilet paper	12.1.2.2	15.6	13.9	0.80	0.04	0.05	-0.07	8.3	16.3	7.3	12
Diapers	12.1.2.2	15	17.7	0.85	0.04	-0.03	0.07	8.9	19.9	6.1	17.9
Tampon	12.1.2.2	20.2	15.8	0.89	-0.01	0.03	-0.22	10.7	17.9	9.5	15.8
Electric shaver	12.1.2.3	5.4	46.7	0.60	-0.10	0.10	0.10	3.3	57.3	2.1	14.7
Jewellery, clocks and watches	*12.2.1.0*	*3.1*	*17.2*					*2.1*	*17.2*	*1*	*12.4*
Quartz watch	12.2.1.0	2.1	20.4	-0.09	0.39	0.14	-0.04	1.2	19.1	0.9	15.3
Watch battery replacement	12.2.1.0	1.8	20.6	0.22	0.05	-0.02	-0.02	1.7	20.9	0.2	8.3
Gold wedding ring	12.2.1.0	3.8	17.5	0.00	0.42	-0.02	0.08	2.5	17.8	1.3	14.3
Other personal items	*12.2.2.0*	*4.2*	*30.2*					*3.4*	*29.4*	*0.9*	*17.8*
Wallet	12.2.2.0	3.5	22.8	0.30	0.10	-0.08	0.17	3	20.8	0.5	14.3
Suitcase	12.2.2.0	5	42.3	0.24	0.11	0.06	-0.07	3.7	43.6	1.2	24
Health Insurance	*12.4.3.0*	*3.1*	*60.1*					*2.9*	*58*	*0.1*	*16.3*
Public health insurance premium	12.4.3.0	3.1	60.1	-	-	-	-	2.9	58	0.1	16.3
Other services ..	*12.6.1.0*	*3*	*27.1*					*2.8*	*27*	*0.2*	*7.2*
Funeral	12.6.1.0	3.6	23.7	0.35	0.05	0.11	0.10	3.5	23.3	0.1	11.7
Photocopy	12.6.1.0	0.9	13.5	0.22	0.02	0.07	-0.07	0.6	11.5	0.3	11.6
Cremation	12.6.1.0	3.7	41.1	0.22	0.04	-0.10	0.17	3.6	40.9	0.1	13.6
Passport stamp	12.6.1.0	4.2	71.8	0.06	0.29	0.04	-0.16	4	72.9	0.1	13.2
Total CPI		**15.3**	**7.5**					**8.8**	**10.3**	**6.5**	**9.5**

Appendix B

Proof of equation (4).

Consider an economy with J price leaders that independently set prices according to a Calvo pricing rule of probability θ. Firms are classified into J+1 types according to their price setting rules, as follows:

- type i firms, (i = 1, 2, ….J),follow the price decision of price leader i.
- type J+1 firms set their price independently following a Calvo rule with the same probability θ.

Denote the share of *type i* firms (i = 1, 2, …., J) as α_i. Then the share of J+1 type firms is equal to $\alpha_{J+1} = 1 - \sum_{i=1}^{J} \alpha_i$.

The monthly frequency of price changes in month t is given by

$$f_t = \sum_{i=1}^{J} \alpha_i s_{it} + \alpha_{J+1}\theta \tag{A1}$$

where s_{jt} is a binary variable that takes the value 1 if price leader j changes its price at time t (with probability θ) and zero otherwise and we assume, for simplicity, that the number of type J+1 type firms is large.

The expected frequency of price change is θ and the variance is:

$$V[f_t] = \theta(1-\theta)\sum_{i=1}^{J} \alpha_i^2 \tag{A2}$$

Using equation (3), the *FK* index for this economy is given by

$$FK = \sqrt{\frac{\theta(1-\theta)\sum_{i=1}^{J} \alpha_i^2}{\theta(1-\theta)}} = \sqrt{\sum_{i=1}^{J} \alpha_i^2} \tag{A3}$$

■

Therefore the *FK* index can be viewed as an Herfindhal index based on market shares of price leaders. If there is only one price leader, we end up with the simple interpretation of Dias *et al*. (2005), that the *FK* index represents the share of firms that follow the price leader.

This interpretation provides a lower bound for the *FK* index in finite population of size N. Indeed, the case of perfect staggering can be viewed as an economy with as many price leaders as firms. This implies that, for a finite population:

$$FK = \sqrt{\sum_{i=1}^{J} (1/N)^2} = \sqrt{1/N} \tag{A4}$$