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Price Setting Behaviour in Denmark – A Study of CPI Micro Data 1997-2005

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Price Setting Behaviour in Denmark

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A Study of CPI Micro Data 1997-2005[1]

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Contents

Abstract

This paper provides empirical evidence on the degree of price rigidity and price flexibility in Denmark. Our data relies on unpublished data from Statistics Denmark on the Danish CPI. The dataset covers the period 1997-2005 and contains around 2.7 million monthly price records. The paper reveals a substantial amount of heterogeneity in the frequency and size of price adjustments across sectors and products. Most price changes are increases, but price decreases are not uncommon. Price changes are generally sizeable compared to aggregate and sectoral inflation rates. We explore how these features are affected by e.g. seasonality, changes in indirect taxation and the level of inflation. Our evidence emphasises the importance of price stickiness and supports the existence of both time and state-dependent pricing strategies.

Resume

Papiret præsenterer en omfattende empirisk analyse af pristræghed og prisfleksibilitet i Danmark. Vores datasæt indeholder de detaljerede priser, som Danmarks Statistik indsamler til beregning af det danske forbrugerprisindeks. Datasættet dækker perioden 1997-2005 og består af omkring 2,7 millioner månedlige prisobservationer. Materialet afslører en betydelig heterogenitet i frekvensen og størrelsen på prisændringer på tværs af sektorer og produkter. Prisstigninger forekommer hyppigst, men prisnedsættelser er ikke ualmindelige. Generelt er prisændringerne store sammenlignet med inflationstakter, man kan beregne ud fra aggregerede prisindeks. Vi undersøger, i hvilket omfang prisændringerne følger et sæsonmønster og er påvirket af ændringer i indirekte skatter og inflationsniveau. Vores resultater understreger, at der er betydelige pristrægheder, og giver støtte til både tids- og tilstandsafhængige modeller for prisdannelsen.

1. Introduction

Price stickiness is a standard assumption in macroeconomic models and considered to be a key ingredient for the understanding of the economy's reaction to a wide range of shocks, including the persistent, though not permanent reaction of real output to monetary shocks. In the new Keynesian literature of the 1980's different microeconomic models of price setting behaviour have been proposed under the label of either time-dependent or state-dependent models[2]. Some of these models are now used in the new generation of micro-founded macroeconometric models for policy analysis.

Despite the importance of pricing assumptions for macro models the empirical evidence from micro data has remained relatively scarce. Taylor (1999) gives an overview of the stylised facts of price setting behaviour. More recently, however, Bils and Klenow (2004), followed by Klenow and Kryvtsov (2005), have studied price setting behaviour in the US by examining a large dataset of prices used in the computation of the consumer price index (CPI). Similar comprehensive studies have subsequently been undertaken for the euro area countries within the Inflation Persistence Network (IPN) under the Eurosystem, and also for other countries[3].

In this paper we provide descriptive evidence about price setting behaviour in Denmark. To that end we analyse the micro data underlying the Danish CPI for the years 1997-2005. Our dataset covers the whole expenditure basket and contains around 2.7 million monthly price records.

We provide evidence on the frequency of price changes, including the duration of price spells and hazard functions, as well as on the size of price changes. Price increases and decreases are treated separately, and special attention is devoted to the investigation of heterogeneity across sectors. Like in related contributions we examine how these features are related to the overall evolution of inflation. The analysis is descriptive and merely yields some indicative information regarding the importance of different pricing models. More structural analyses, including formal econometric testing of competing pricing models, is left for future studies.

The structure of the paper is as follows. The next section provides a description of the dataset, including a discussion of data issues, price

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[2] In time-dependent models the timing of the individual firms' pricing decision is independent of the state of the economy. Time-dependent models include Taylor's (1980) staggered pricing model, in which firms keep prices fixed for a certain number of periods, and the Calvo (1983) model, in which firms are allowed to adjust their prices in a given period with a certain probability. In state-dependent models the timing of the firms pricing decisions is a function of the state of the economy, like in menu-cost models, see e.g. Dotsey, King and Wolman (1999). Time-dependent models are often preferred in macroeconometric models as they are simpler to implement.

[3] The Eurosystem comprises the European Central Bank and the national central banks of those countries that have adopted the euro. More information about the IPN can be found at http://www.ecb.int/home/html/researcher_ipn.en.html.

trajectories, coverage, weighting, etc., as well as a brief overview of the inflation development over the sample period. Section 3 contains methodology and notation. Empirical results are presented in section 4, and in section 5 the covariation between inflation and the frequency, and size, of price increases and decreases is analysed. Finally, our main results are summarised in section 6.

2. The dataset

2.1. The micro data underlying the Danish CPI

The dataset contains the micro data collected by Statistics Denmark in order to compute the Danish CPI, covering the period January 1997 to December 2005 (108 months). A general introduction to, and overview of, the methodology for compiling the CPI is provided in Statistics Denmark (2005).

The raw database is made up of 2.731.841 monthly price records, which corresponds to around 25 thousand records per month on average. Prices are collected between the 7th and 15th of every month. Most individual price quotes refer to a specific item sold in a particular retail outlet at a given point in time. The dataset is subject to statistical confidentiality restrictions and does not enable the name or location of a given outlet to be identified. For each record, we observe the following information:

- the price of the item
- the year and month
- the brand name of the item
- a numeric product code
- a numeric product category code
- the name of the product category
- a numeric code for a given outlet chain
- a numeric outlet code

Together the four numeric codes allow us to identify and track each individual item, i.e. a specific product in a specific outlet. The product category code corresponds to the COICOP[4] 5-digit code, also denoted as the elementary products level. From this we obtain a breakdown into COICOP-divisions[5] (two-digit level), as well as into five special aggregates or components, typically used within the Eurosystem to analyse inflation

[4] The internationally agreed Classification of Individual Consumption according to Purpose.

[5] This is the most commonly used decomposition of Danish consumer prices. It entails a breakdown into 12 subgroups: 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 and services.

developments[6]. In the following we concentrate mainly on the latter breakdown. It has fewer categories, and the groups are fairly homogenous in terms of item characteristics, such as pricing behaviour, and therefore better suited for our analysis. The COICOP-divisions represents a classification of expenditure according to purpose, entailing a large heterogeneity within divisions with respect to e.g. the production process and pricing behaviour[7].

2.2. Data issues

The dataset is considered to be of a high quality and well suited for our purpose. However, some important issues need to be mentioned.

The raw dataset covers 100 per cent of the expenditure on the Danish CPI basket. To align our study with European standard, we focus on the expenditure basket as defined by the EU Harmonised Index of Consumer Prices (HICP). Owner-occupied dwellings and insurance in connection with owner-occupied dwellings are therefore eliminated, as these are not included in the HICP.

For a number of goods and services prices are not collected monthly, but only quarterly, biannually or annually as they are considered not to change very often. Examples of this include housing rent, postage, license fees, social protection services or financial services. In such situations, the price is carried forward unchanged between the two collection periods.

The dataset has beforehand been subject to statistical editing – plausibility checks – by Statistics Denmark in order to identify possible errors, e.g. extreme price observations or prices which have remained unchanged for a long period of time[8]. Erroneous price reports resulting in either very large, or very small price changes, have thus been removed.

As we are only interested in analysing the market-based price setting behaviour, all administered prices, which to a significant extent are regulated by the government, are eliminated from the dataset. There exists no official delineation of administered prices. The following products, mainly services, have been isolated as products with administered prices: rent, pharmaceuticals, medical services, public transport, radio and television license fees, education, social protection, hunting licences and passport fees.

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[6] These are: 1) unprocessed food, 2) processed food incl. alcohol and tobacco, 3) energy, 4) non-energy industrial goods, 5) services.

[7] As an example take transport. It includes both the purchase of vehicles, the repair of vehicles, the purchase of fuels for private cars, and fares related to the transport of passengers by rail, air, etc., that is, goods and services that are very different from each other in terms of production and pricing.

[8] The statistical editing in the Danish CPI is based on the method developed by Hidiroglou and Berthelot (1986).

There are no statistically imputed prices included in the dataset. Imputed prices are used to deal with missing observations, seasonality and quality change in price indices, see Armknecht and Maitland (1999) for statistical imputation techniques.

Not all price quotes are directly linked to an individual item sold in a particular outlet[9]. In these cases prices are eliminated from the dataset.

Another important characteristic of the price records is that the prices are inclusive of all types of sales, rebates and promotions. Compared to databases which exclude these bargains, this can lead to a higher frequency of price adjustment, particularly for the products where sales are common, e.g. clothing and footwear.

2.3. Price trajectories and price spells

From the information in the dataset we construct individual price trajectories, i.e. sequences of price quotes for a specific item sold in a specific outlet. In most cases trajectories are considerably shorter than 108 months. We impose the – rather unrestrictive – rule that every trajectory at least should cover a period of three months, otherwise it is eliminated.

Chart 2.1 shows exemplary price trajectories, selected for their typical pattern. Pricing behaviour is visibly very heterogeneous and the average length of a price spell – defined as the sequence of price quotes with the same price – varies significantly between products. Note that for some products prices appear to be adjusted regularly every six/twelve months. The large price reduction on Gammel Dansk (Danish bitter) in October 2003 reflects a lowering of the excise duties on alcohol, cigarettes and soft drinks in that month (the cross-frontier-trade package).

For quite a number of trajectories, one or more price quotes are missing[10]. Typically the unfilled interval relates to a single month, but prices are sometimes unavailable for several consecutive months. In such situations, we split up the concerned trajectory into new individual trajectories. For example, the price sequence for the sirloin of beef in Chart 2.1 is treated as three separate trajectories[11].

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[9] For pharmaceuticals the price index compiled by the Danish Medicines Agency, which shows the development in the average price of medicine, is used. In the same way, the prices on personal computer and printers – where the model characteristics often change – are averages, calculated on the basis of a large sample of prices from the internet (using a so-called matched model approach). Finally, the recorded prices on books have been divided by the natural logarithm of the number of pages in each book. The latter is an attempt to adjust for price movements resulting from differences in the number of pages when calculating the price index for books.

[10] Missing prices come about for many reasons e.g. because the product is out-of-stock, the outlet is temporarily closed or the price was not timely collected.

[11] In order to deal with missing prices, some of the studies performed within the IPN carry forward the price unchanged from the previous period. We decided not to pursue this method, as we want to strictly rely on observed market prices. Our method reduces the

2.4. The coverage of the dataset and weighting

As a result of our filtering of data 108.352 monthly price records are eliminated, leaving us with a total of 2.623.489. The number of price records is very unevenly distributed across product groups, cf. Table 2.1.

In order to produce aggregate measures of the statistics described in section 3, we compute weighted averages using the official HICP weights published by Statistics Denmark. As the dataset spans over two goods baskets – 1999 and 2003 – the average weights of the two weighting schemes are used. The elementary products level is the most detailed level for which the weights are defined. There are around 450 categories/weights at this level. All statistics at the elementary products level are computed as unweighted averages using all the observations of items belonging to that category. Aggregate statistics are then computed by averaging over elementary products using weights.

The filtered dataset constitutes 85 per cent of HICP's weight basis, cf. Table 2.1, and comprises 411 elementary product categories. The majority of the eliminated expenditure components are related to administered prices, leading to a significant reduction in the relative weight for services. Unprocessed food is clearly overrepresented in terms of observations, representing 24 per cent of the dataset, but only a weight of 7 per cent (6,01/85,21).

2.5. Consumer price developments over 1997-2005

For reference purposes it is helpful to describe the evolution of consumer prices throughout the sample period. Chart 2.2 illustrates the year-on-year rate of change of HICP and the main subcomponents[12].

The different components display different inflation developments. Whereas aggregate annual inflation was relative stable over the sample period, the evolution of the indices for unprocessed food, processed food, and in particular energy, was more volatile. The large movements in the energy index were decisively affected by oil price fluctuations. More pronounced shifts in inflation may better facilitate an investigation of the factors driving the inflationary process, see below.

3. Methodology

In order to gain an insight into the qualitative nature of the price setting process, we look at the frequency of price adjustments, including the duration of price spells and empirical hazard functions, and size of price adjustments.

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average length of trajectories compared to studies which replace the missing prices. Another option is to simply disregard those trajectories containing missing prices, but in our case that would imply eliminating a significant amount of data.

12 The official indices for all-items, non-energy industrial goods and services include some expenditure components which have been eliminated from our dataset.

This section contains an overview of definitions, notation and formulae used in the computations, as well as an assessment of potential biases and aggregation issues.

3.1. Frequency of price changes and duration

Let $I_{j,t}$ be an indicator for price changes for item j in period t:

$$I_{j,t} = \begin{cases} 1 & if\ p_{j,t} \neq p_{j,t-1} \\ 0 & if\ p_{j,t} = p_{j,t-1} \end{cases}$$

where $p_{j,t}$ is the price of item j at time t. The first observation in any price trajectory is thereby discarded.

For each elementary product category n the (unweighted) frequency of price changes can be written

$$F_n = \frac{1}{Q_n} \cdot \sum_{j=1}^{J} \sum_{t=1}^{T_j} I_{j,t}$$

Q_n is the number of observations in product category n, J the number of items in that category and T_j the number of observations for item j. Let N be the number of product categories. The aggregate frequency of price changes is then given by the weighted average of the frequencies at the product category level,

$$F = \sum_{n=1}^{N} \omega_n F_n$$

where ω_n denote HICP weights.

The average duration of a price spell is inferred implicitly from the computed frequency (frequency approach). If, under the assumption of continuous time, prices can change at any moment with a constant probability within every time period, the average duration for product category n becomes[13]

$$D_n = \frac{-1}{\ln(1 - F_n)}$$

Alternatively, the duration could be computed directly as the average length of a price spell (duration approach). The duration approach implies a censoring of data as observations before the first price change and after the last price change in any price trajectory must be removed, hence introducing a potential bias as a larger fraction of observations for items with frequent price changes are retained. The frequency approach allows the use of the

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[13] If instead we assume that price changes happens at most once a month, the mean duration of price spells is asymptotically given by the inverse of the frequency of price changes, $D = 1/F$. The difference between the two measures is small when the frequency of price changes is relatively low, as for most product categories in our sample, whereas our measure leads to a shorter duration than the inverse frequency, when the frequency is high.

full dataset and avoids the potential bias from the censoring of the data, but relies on the other hand on specific distributional assumptions about the distribution of price changes over time[14].

The aggregate duration is given by the weighted mean of durations at the product category level,

$$D = \sum_n w_n \left(\frac{-1}{\ln(1 - F_n)} \right) = \sum_n w_n D_n$$

This measure is sensitive to potential outliers, from those cases where frequencies come close to zero, resulting in very high values of the implied durations. Bearing this in mind, we also compute the aggregate median price duration based on the median frequencies at the product category level. This measure, which is used by e.g. Bils and Klenow (2004), may be a reasonable alternative indicator of aggregate duration, even if it is not an estimator of the average price duration, as pointed out by Baudry et al. (2004).

The aggregate duration can in principle also be derived by simply inverting the aggregate frequency. As demonstrated below, such "pseudo" durations are significantly lower than the weighted durations[15].

3.2. Size of price changes

The size of price changes is computed as logarithmic differences multiplied by 100[16]. If prices are adjusted more than once in a month, the size represents the cumulative change during the month. Similar to the other aggregate statistics, the aggregate size of price changes is computed as a weighted average.

3.3. Empirical hazard functions

The hazard function of item *j* represents the probability of individual price changes in a given period as a function of the time elapsed since the last price change, *k*, i.e.

$$\lambda_j(k) = P(I_{t,j} = 1 \mid I_{t-i,j} = 0 \quad \forall \quad i = 1,...,k-1)$$

---

[14] See Dhyne et al. (2005) for a thorough discussion of this issue.

[15] The difference reflects Jensen's inequality coupled with a significant variation across product categories regarding the frequency of price changes. Jensen's inequality says that if *f* is a strictly convex function – like the one relating duration to the frequency of price changes, *D=f(F)=–1/(ln(1-F))* – and *X* is a random variable that takes the value of its expected mean, *EX*, with probability less than one, then *Ef(X)>f(EX)*.

[16] For small changes log-differences are approximately equal to percentage changes. The former has the advantage of preserving additivity, implying that a change in a price from A to B followed by a return to A will be reported as two price changes of the same size, but with opposite signs.

In practice the empirical hazard function is estimated by splitting up price trajectories into price spells, taking into account left censoring, i.e. discarding observations before the first price change for any item.

Deriving hazard functions across heterogeneous items, e.g. a mix of flexible-price products and sticky-price products, introduces a bias in favour of a downward sloping hazard function at the aggregate level. This is the case even if individual hazards are non-decreasing, as items with frequent price changes are split into many short price spells, dominating at the short horizons, see Álvarez et al. (2005). Goette et al. (2005) address the problem of heterogeneity by analysing a small dataset of homogeneous items known to have sticky prices and similar baseline hazards. They find the shape of hazard functions to be increasing, i.e. price-setters become more likely to adjust their prices the longer time elapsed since the last price change. Gagnon (2005) and Aucremanne and Dhyne (2005) model the probability of individual price changes using logit models, thereby controlling for the inherently different pricing hazards across items. Such a strategy is, however, outside the scope of our descriptive study. Instead, as something new, we try to reduce the aggregation bias by computing the aggregate hazard function as a weighted sum of hazard functions at the elementary products level, where price setting is supposedly more homogenous. Furthermore, we present hazard functions at the disaggregated level.

4. Empirical results

4.1. Frequency of price changes

Table 4.1 presents average monthly frequencies of price changes for the COICOP groups and the sectoral components. On average 17.3 per cent of prices for all-items are adjusted from one month to the next, 10.2 per cent are increased and 7.1 per cent are decreased, i.e. around 40 per cent of all price adjustments are decreases. Prices are therefore lowered nearly as often as they are raised, so prices are not in general more rigid downwards than upwards[17].

Price setting is very heterogeneous across components. Prices for energy and unprocessed food are by far the most flexible, e.g. for energy more than half of the prices are adjusted every month. The frequent price changes for energy and unprocessed food likely reflect that these products are often hit by (supply) shocks, which have a substantial effect on their prices, and not necessarily that the price adjustment costs are lower compared to other items. The highest degree of price stickiness is observed for services,

[17] The large fraction of price decreases could reflect that our dataset includes sales prices. However, excluding those products typically affected by sales, mainly within industrial goods, does not change our results qualitatively. This is in line with the study by Klenow and Kryvtsov (2005), where the share of price decreases only drops from 45 to 42 per cent, when sales prices are excluded.

closely followed by processed food and industrial goods. Price decreases for services occur relatively infrequently, as only 2.2 per cent of prices, corresponding to a quarter of all price changes, are lowered every month. Especially prices from restaurants are rarely lowered. This pattern could be related to the high share of labour in the production costs of services, such that stickiness in wage developments translates into infrequent price changes and downward price rigidity.

Not all of the heterogeneity with respect to price changes is captured by our breakdown of data. This becomes evident when looking at the distribution of frequencies at the elementary products level, cf. Chart 4.1. Energy is composed of items whose prices are adjusted either very frequently, e.g. fuel at the petrol station, and prices that change infrequently, e.g. district heating. None of the other components display a similar dichotomy. Unprocessed food is characterised by evenly distributed frequencies, containing items with high, medium and low frequencies. For processed food, non-energy industrial goods and services, the bulk of the items have frequencies of less than 10 per cent. Frequencies (and sizes) of price changes for each of the 411 elementary products are presented in Table A1.

Seasonality seems to be an important characteristic of the frequency of price changes, cf. Chart 4.2. For unprocessed food price increases are more frequent in the first half of the year, especially in January, April, May and June, than in the second half of the year, whereas price reductions are more frequent in the second half, notably in the third quarter. This pattern is partly driven by prices on fruits and vegetables. For processed food similar spikes are observed, especially regarding the frequency of price increases. The seasonality observed for non-energy industrial goods is to some extent driven by sales. Prices are lowered in January, July and August, where regular end-of-season sales take place, and are raised in the following months. For energy and services most prices are raised in January, reflecting that prices on longer-term contracts like electricity, district heating and insurance are often adjusted in January via a simple indexation scheme.

Looking at frequencies by month and year gives a fuzzier picture concerning seasonality, cf. Chart 4.3. It appears most markedly for non-energy industrial goods. Overall frequencies seem to be fairly constant over time, with the exception of processed food and non-energy industrial goods, where price decreases seem to have become somewhat more frequent. The latter could be a consequence of globalisation and increased competition.

The spike in the frequency of price decreases for processed food in October 2003 reflects a reduction of excise duties in that month, cf. section 2.3. A number of other spikes are related to changes in excise duties, but some also just reflect randomness. The instant price adjustment by many retailers indicates that simple models of time-dependent pricing are inappropriate for

the analysis of this type of policy action. Similar reactions to changes in indirect taxes is found for several euro area countries, see Dhyne et al. (2005). In order to better identify structural features of the price setting behaviour, it could be worthwhile to investigate the price reaction to changes in taxes and duties in more detail.

The frequencies for Denmark are broadly in line with the estimates for the euro area, cf. Table 4.2. The figures for the euro area are based on a sample of 50 products, which is considered to be approximately representative of the full expenditure basket. Restricting our computations to this sample does not change the estimated frequencies for Denmark significantly. The strong increase in the frequencies for energy, when going from the full sample to the 50 products sample, is related to the fact that prices on district heating, which bear a large weight and change infrequently, are not included in the 50 products sample.

Prices in the US appear to be more flexible than in Denmark and the euro area, in particular for services, cf. Table 4.3. The rigid price setting of the European services sector by comparison with the US may be due to differences in the degree of regulation in the labour and product markets of the two regions.

The reference period in the studies for Denmark, the euro area and the US is not exactly the same, but all studies refer to periods with low inflation. Gagnon (2005) studies the price setting behaviour in Mexico over the period 1994-2004, where inflation rose from around 7 per cent in 1994 to above 40 per cent in 1995 before falling to around 4 per cent in 2001. In periods with moderate inflation, price rigidities in Mexico lies between Europe and the US, whereas the frequency increases and becomes closer to the US in periods with high inflation.

4.2. Duration of price spells

The aggregate mean duration of all price spells is estimated to 15.5 months, cf. Table 4.4. As expected, the average price spells of energy and unprocessed food items are the shortest, only lasting around half a year. In contrast, prices on services on average remain unchanged for a period of almost two years.

Besides aggregate mean durations Table 4.4 also presents aggregate median durations as well as aggregate pseudo durations. The median duration for all-items is 11.8 months, nearly 4 months shorter than the mean duration. The gap between the two statistics is largest for components that comprise many items with low frequencies, e.g. non-energy industrial goods and services. This nicely illustrates the problem of outliers, cf. section 3.1. The

pseudo durations are significantly lower than both the mean and median durations, e.g. the implied pseudo duration for all-items is just 5.3 months[18].

The aggregate durations mask considerable differences at the elementary products level, cf. Chart 4.4. Almost half of the price spells for unprocessed food and energy lasts less than 2 months, while the price of some services lasts around 50 months. For all-items the larger part of the distribution relates to durations of less than 30 months.

The Danish duration figures are close to those for the euro area, cf. Table 4.3. The median duration of price spells in the US is more than twice as low as in Denmark and the euro area, adding evidence to the argument that US prices are more flexible.

4.3. Size of price changes

The size of price changes is reported in Table 4.5. Average price changes are relatively large compared to the overall inflation rate observed during the sample period. The size of the typical price increase is 12.3 per cent, and that of price reductions is even larger, namely 15.6 per cent[19]. A similar pattern is obtained for other countries, see below.

Price adjustments are largest for unprocessed food. This is perhaps not surprising as these are perishable[20] products, which are subject to recurrent supply shocks like e.g. changes in weather conditions, diseases affecting livestock production, etc. At the same time, the price elasticity of demand is probably moderate. Together these factors are conducive to large price changes. The smallest price changes are found for energy, reflecting both the gradual and moderate adjustment of fuel prices, district heating and electricity. Note, for energy price increases are on average larger than price decreases.

The distribution of size of price changes reveals an apparent heterogeneity between components, cf. Chart 4.5. As prices are raised more often than they are lowered, a greater part of the distribution lies to the right of the origin – in particular for services. The distribution for energy can be characterised as leptokurtic, with both price increases and decreases normally being less than 5 per cent. For non-energy industrial goods and services the distributions are also uni-modal, but in these cases large price changes are more frequent. The distributions for unprocessed and processed

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[18] As indicated by Dhyne et al. (2005), a mean duration that is three times higher than the pseudo duration is not unusual for reasonable assumptions on the variation in frequencies across products.

[19] Remember that our data includes all types of sales, rebates, etc. Omitting the products typically affected by sales, however, only has a minor effect on the aggregate size of price changes.

[20] Notwithstanding the recent finding of 10-year old meat by the Danish Veterinary and Food Administration, sic!

food are clearly bimodal. For unprocessed food the distribution is almost symmetrical around zero, with almost no absolute price changes of less than 5 per cent.

Chart 4.6 plots the size of price changes by month. The size of price changes is not influenced by seasonality to the same extent as the frequency of price changes. For non-energy industrial goods price decreases are largest during the sales in the beginning of the year and over the summer, while prices are raised notably at the beginning of spring and autumn. Prices on services are reduced significantly during the last four months of the year.

Plotting the size of price changes by month and year further reveals the seasonal element of non-energy industrial goods, cf. Chart 4.7. For unprocessed food the size of both price increases and decreases is highly stable over time, while the series for services are marked by randomness. Notice that the reduction of excise duties in October 2003, which led to a significant change in the frequency of price decreases for processed food in that month, does not show up in the average size of price changes. This should be seen against the fact that price changes are typically large.

The size of price changes for Denmark is somewhat higher than that reported for the euro area, cf. Table 4.6. However, in the analysis of the euro area the data for some countries include sales prices and others not. Considering this, our results are in accordance with those for the euro area and in both cases the average size of price reductions is larger than the average size of price increases. Klenow and Kryvtsov (2005) report an average absolute size of price changes of 13.3 per cent for the US. Hence, whilst prices are adjusted more often in the US than in Europe, there is no marked difference regarding the size of price adjustments in the two areas.

4.4. Empirical hazard functions

Empirical studies of price setting behaviour often draw attention to hazard functions of price changes. Different pricing models usually have different implications for the hazard function. In the simple Calvo (1983) model of time-dependent pricing the probability that a firm gets the possibility to change its price in a given period is independent of the time elapsed since its last price adjustment, implying a constant hazard function. In the even simpler Taylor (1980) model of staggered price setting, the hazard function takes the value of zero during the duration of contracts and one at the expiration of the contract. In models of state-dependent pricing things get more complicated, but often the shape of the hazard function will be increasing as the optimal price, which is a function of the state of the economy, is likely to drift away from the current price as time passes, see e.g. the model by Dotsey, King and Wolman (1999). Furthermore, under state-dependent pricing – unlike time-dependent pricing – the hazard rates will be a function of factors such as the inflation rate.

In practice hazard functions are often found to be downward sloping, cf. Dhyne et al. (2005). This divergence between theory and practice stems from heterogeneity in price setting behaviour. As mentioned in section 3.4, we try to avoid the aggregation bias by estimating weighted average hazard functions.

The empirical hazard functions are presented in Chart 4.8. Despite our efforts to control for heterogeneity we find that the hazard function for all-items is decreasing. However, the hazard rates for very short durations, in particular one month, are significantly lower than those estimated for other countries, cf. Álvarez et al. (2005), suggesting that our efforts were not entirely fruitless. The aggregate hazard function shows some pronounced spikes at durations of 6, 12, 18, 24 and 36 months, reflecting that many retailers adjust their prices annually or semi-annually in a time-dependent manner.

Once again the differences across components are substantial. The hazard function for unprocessed food is downward sloping since it is dominated by flexible-price goods. For energy the shape of the hazard function is rather irregular, e.g. the likelihood of a price adjustment occurring 12 months after the last price adjustment exceeding the one-month hazard rate, reflecting e.g. district heating and electricity. The hazard rates for services are generally low and do not decrease as time passes. The spikes at durations of 12, 24 and 36 months reflect that prices on e.g. insurances are adjusted annually via indexation schemes. For processed food and non-energy industrial goods the hazard functions are relatively flat.

5. Inflation against frequency and size

So far we have discovered a great amount of variation in both the frequency and size of price changes over time and across products. In this section we take a look at the relationship between inflation and the frequency and size of price changes through some simple regressions, leaving out more thorough analyses for future study.

To get a rough impression of the covariation between the overall inflation rate and the frequency and size of price changes, we compare annual inflation rates to 12-months moving averages (MA) of the frequency, and size, of price increases and decreases, cf. Chart 5.1. The rise in inflation through 1999 from 1 to 3 per cent was visibly associated with an increase in the frequency of price increases and a decline in the frequency of price decreases. During the same year, the size of price increases remained almost constant, whereas the size of price decreases went in the "wrong" direction, namely up. From this, it appears that the rise in inflation in 1999 reflects a relatively higher share of price increases. A similar story seems to hold for the evolution of inflation from 2003 to 2005. In this case, the drop in inflation in 2003 and the subsequent rise in inflation was associated with a

parallel movement in the frequency of price increases and an opposite movement, although less distinct, in the frequency of price decreases. Over the same period, both the size of price increases and decreases moved in the "wrong" direction in relation to the inflation development.

These observations tend to hold at the disaggregate level. As an example, we provide evidence for unprocessed food, as it displays a significant amount of variation in inflation, cf. Chart 5.2. Again, the important factor for the development in inflation appears to be the frequency of price changes and not the magnitude. Especially the frequency of price decreases, which in this case is characterised by large swings, is strongly correlated with inflation.

The previous charts are crude and no more than suggestive. In order to obtain more detailed information on the driving forces of inflation, we look at scatter plots of month-on-month inflation and the frequencies, and size, of price increases and decreases, cf. Charts 5.3-5.6. The matching results from simple linear regressions are reported in Tables 5.1 and 5.2.

Looking at Charts 5.3-5.4 and Table 5.1 it is clear that there is a significant correlation between the month-on-month inflation rates and the frequency of price changes. The relationship is especially strong for unprocessed food, processed food and energy. These are also the three components where fluctuations in inflation have been sizeable. This underlines that variation in the frequency of price changes are important for the evolution of consumer prices. The covariation between inflation and the frequency for services is less visible, although still statistically significant. For non-energy industrial goods there is a strong negative correlation between inflation and price decreases, likely reflecting the influence of sales.

The correlations between inflation and the size of price increases and decreases are low, and sometimes also of the "wrong" sign, cf. Charts 5.5-5.6 and Table 5.2. The strongest relationship is found for non-energy industrial goods, while for many of the other components the correlations are not statistically significant.

The fact that the frequency of price changes is correlated with inflation is consistent with state-dependent pricing strategies. Gagnon (2005) – using graphical analysis and linear regressions – also finds that inflation is more correlated with the frequency of price increases and decreases than with the size of price increases and decreases. This holds for both high and low levels of inflation in Mexico. However, through a more formal inflation variance decomposition Gagnon discovers a much larger role for movements in the size of price changes. For example, when restricted to the low-inflation period, the share of inflation variance represented by the time-dependent term reaches 83.5 per cent. Considering the full sample, the time-dependent term only represents 42.5 per cent of the inflation variance. In

addition, Gagnon provides evidence of both time- and state-dependence using logit models.

Klenow and Kryvtsov (2005) also quantify the importance of fluctuations in the overall frequency and size of price changes for the variance of inflation. They find that 95 per cent of the variation in inflation is accounted for by changes in the size of price changes, leaving almost no role for fluctuations in the frequency.

On the other hand, many of the country-studies performed within IPN find evidence of state-dependent pricing behaviour. For example, for Austria, Belgium, Germany and Portugal there exists a positive correlation between inflation and the frequency of price changes. Like in our case, there seems to be stronger evidence for state-dependence at the sectoral level. Álvarez and Hernando (2004) and Veronese et al. (2004) provide evidence of state-dependence using econometric models, and Aucremanne and Dhyne (2005) find evidence of state-dependent pricing for Belgium using logit models.

6. Summary

In this paper we have studied the price setting behaviour in Denmark over the period 1997-2005 using CPI micro data. Through a comprehensive descriptive analysis we have derived a set of stylised facts that are broadly in line with recent evidence from euro area countries, though in some case at odds with our a priori conjectures.

Our main observations are:

- Prices generally change rather infrequently. On average 17.3 per cent of prices are adjusted from one month to the next and the average duration of price spells ranges from 4 to 5 quarters.
- There is no sign of downward price rigidity, except for services. On average 40 per cent of all price adjustments are decreases.
- Pricing behaviour is very heterogeneous across sectors and products. Prices for energy and unprocessed food are most flexible, while those for services, processed food and non-energy industrial goods are much stickier.
- Price changes are sizeable compared to the overall inflation rate. The magnitude of the average price increase is 12.3 per cent, while the average reduction of prices is larger, namely 15.6 per cent.
- Seasonality is an important characteristic of the frequency of price changes, but not so much of the size of price changes.
- Retailers appear to adjust their prices instantly to large changes in indirect taxes.
- Empirical hazard functions are downward sloping for flexible-price products and flatter for sticky-price products. The aggregate hazard function is downward sloping, but for very short durations the hazard

rates are significantly lower than the empirical hazard rates for other countries.

- Whilst prices are adjusted more often in the US than in Denmark and the euro area, there is no marked difference regarding the size of price adjustments.

The results stress the importance of heterogeneity in price setting behaviour. To better understand the dynamics of aggregate inflation, this heterogeneity should be addressed when setting up the theoretical framework for micro-founded macroeconometric models.

Our evidence supports the use of both time- and state-dependent pricing strategies. The application of time-dependent strategies is supported by the seasonal pattern in the frequency of price changes and the fact that the hazard functions are characterised by mass points every 6 and/or 12 months. However, the significant relationship between inflation and the frequency of price changes is in line with state-dependent pricing strategies. Likewise, the fact that changes in indirect taxation significantly affect the frequency of price changes supports the use of state-dependence. However, since our analysis is basically descriptive, interpretations should be made with care. More structural interpretations await further econometric studies that rely on well-founded identification schemes.

7. Literature

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Appendix

Tables

TABLE 2.1. COVERAGE OF THE DATASET.

	Official HICP-weight	Weight after filtering	# observations after filtering	# items	Average length of trajectories
COICOP-groups:					
1. Food and non-alcoholic beverages	14.81	14.81	1.121.269	68.364	16.4
2. Alcoholic beverages and tobacco	5.34	5.34	113.164	4.487	25.2
3. Clothing and footwear	5.93	5.93	313.931	23.597	13.3
4. Housing	18.83	11.11	61.254	1.135	54.0
5. Furniture and household equipment	6.96	6.96	316.055	12.631	25.0
6. Health	3.13	1.97	34.985	835	41.9
7. Transport	14.37	13.69	126.972	3.604	35.2
8. Communications	2.45	2.45	27.956	1.316	21.2
9. Recreation and culture	11.69	9.59	319.341	13.518	23.6
10. Education	0.93	0	0	0	0
11. Restaurants and hotels	5.92	5.92	71.544	2.538	28.2
12. Miscellaneous goods and services	9.63	7.43	117.018	3.887	30.1
Main components:					
Unprocessed food	6.01	6.01	661.857	45.368	14.6
Processed food incl. alcohol/tobacco	14.13	14.13	572.576	27.483	20.8
Energy	10.70	10.70	25.290	366	69.1
Non-energy industrial goods	30.69	28.50	1.054.853	53.104	19.9
Services	38.46	25.87	308.913	9.591	32.2
All-items	100.00	85.21	2.623.489	135.912	19.3

Note: The weights are reported in per cent, while the average length of trajectories is in months. The weights have been computed as averages of the two official weighting schemes with reference period in, respectively, 1999 and 2003.

TABLE 4.1. FREQUENCY OF PRICE CHANGES, MONTHLY BASIS, PER CENT.

	Frequency of price …			% of price
	… changes	… increases	… decreases	increases
COICOP-groups:				
1. Food and non-alcoholic beverages	23.2	12.6	10.7	54.0
2. Alcoholic beverages and tobacco	9.1	6.5	2.6	71.7
3. Clothing and footwear	15.4	6.2	9.2	40.3
4. Housing	23.6	15.0	8.6	63.6
5. Furniture and household equipment	6.7	4.5	2.2	66.5
6. Health	10.1	9.1	1.1	89.7
7. Transport	37.7	21.2	16.5	56.2
8. Communications	3.3	1.1	2.2	32.7
9. Recreation and culture	9.6	5.8	3.7	60.9
10. Education	-	-	-	-
11. Restaurants and hotels	3.6	3.2	0.4	89.0
12. Miscellaneous goods and services	6.1	5.3	0.8	87.3
Main components:				
Unprocessed food	39.8	20.6	19.2	51.8
Processed food incl. alcohol/tobacco	10.8	6.8	4.0	63.1
Energy	52.4	28.9	23.5	55.1
Non-energy industrial goods	9.8	5.7	4.2	57.7
Services	8.9	6.7	2.2	75.5
All-items	17.3	10.2	7.1	59.0

TABLE 4.2. FREQUENCY OF PRICE CHANGES, MONTHLY BASIS, DK VS. EURO AREA, LOG-DIFFERENCES.

Frequency of price…	…increases			…decreases		
	Denmark		Euro area	Denmark		Euro area
	All products	50 products	50 products	All products	50 products	50 products
Unprocessed food	20.6	29.9	14.8	19.2	27.6	13.3
Processed food incl. alcohol/tobacco	6.8	9.7	7.1	4.0	7.9	5.9
Energy	28.9	51.3	42.0	23.5	43.3	35.8
Non-energy industrial goods	5.7	4.3	4.2	4.2	4.0	3.2
Services	6.7	6.3	4.2	2.2	1.0	1.0
All-items	10.2	10.4	8.3	7.1	7.1	5.9

Note: For the euro area, because of different weighting methods, the frequency of price increases and decreases do not add up to the overall frequency of price changes presented in table 4.3., see Dhyne et al. (2005).
Source: Dhyne et al. (2005) and own calculations.

TABLE 4.3. SELECTED AGGREGATE STATISTICS FOR DENMARK, THE EURO AREA AND THE US

	Denmark		Euro area	US
	All products	50 products	50 products	
Overall frequency of price changes:				
- All-items	17.3	17.5	15.1	26.1
- Services	8.9	7.3	5.6	20.7
Size of price changes:				
- Absolute	13.7	-	-	13.0
- Increases	12.3	12.6	8.2	-
- Decreases	15.6	17.6	10.0	-
Durations:				
- Mean	15.5	15.1	13.0	-
- Median	11,8	11,0	10,6	4,3
- Pseudo	5.3	5.2	6.1	3.3

Note: The average price duration is computed under the assumption of continuous time.
Source: Dhyne et al. (2005), Bils and Klenow (2004), Klenow and Kryvtsov (2005) and own calculations.

TABLE 4.4. DURATION OF PRICE SPELLS, MONTHLY BASIS.

Implicit average duration based on…	Mean frequencies at the product category level	Median frequencies at the product category level	Inverting the aggregate frequency (pseudo duration)
Unprocessed foods	6.1	5,2	2.0
Processed foods	14.2	12,2	8.8
Energy	5.8	5,4	1.3
Non-energy industrial goods	15.4	10,8	9.7
Services	23.0	17,2	10.7
All-items	15.5	11,8	5.3

TABLE 4.5. SIZE OF PRICE CHANGES, LOG-DIFFERENCES, MONTHLY BASIS.

	Size of price …	
	… increases	… decreases
Unprocessed foods	20.1	21.6
Processed foods	10.5	14.5
Energy	4.4	3.8
Non-energy industrial goods	15.4	19.4
Services	11.1	15.5
All-items	12.3	15.6

TABLE 4.6. SIZE OF PRICE CHANGES, MONTHLY BASIS, DK VS. EURO AREA, LOG-DIFFERENCES.

Size of price…	…increases			…decreases		
	Denmark		Euro area	Denmark		Euro area
	All products	50 products	50 products	All products	50 products	50 products
Unprocessed food	20.1	22.3	14.7	21.6	23.5	16.3
Processed food incl. alcohol/tobacco	10.5	13.5	6.9	14.5	16.7	8.1
Energy	4.4	3.4	3.4	3.8	3.1	2.4
Non-energy industrial goods	15.4	18.3	9.4	19.4	22.5	11.4
Services	11.1	9.0	7.3	15.1	16.4	9.7
All-items	12.3	12.6	8.2	15.6	17.6	10.0

Source: Dhyne et al. (2005) and own calculations.

TABLE 5.1. FREQUENCY OF PRICE CHANGES AND INFLATION, LINEAR REGRESSIONS

	Price increases			Price decreases		
	α	β	R^2	α	β	R^2
Unprocessed food	20.58 (133.47)	1.05 (8.17)	0.39	19.21 (106.62)	-1.10 (-7.35)	0.34
Processed food	6.33 (17.82)	4.15 (5.18)	0.20	4.28 (27.68)	-2.51 (-7.21)	0.33
Energy	26.81 (22.87)	5.27 (6.50)	0.29	24.66 (23.87)	-5.93 (-8.31)	0.40
Non-energy industrial goods	5.65 (28.30)	0.13 (0.70)	0.00	4.26 (23.80)	-1.66 (-10.15)	0.50
Services	5.92 (14.11)	3.45 (3.15)	0.09	2.62 (11.48)	-1.84 (-3.08)	0.08
All-items	9.80 (33.58)	2.52 (3.36)	0.10	7.60 (32.20)	-3.19 (-5.90)	0.25

Note: The table shows results for the estimation of $y = \alpha + \beta$*inflation, where y is the frequency of price increases and price decreases, respectively. Numbers in parentheses are t-values.

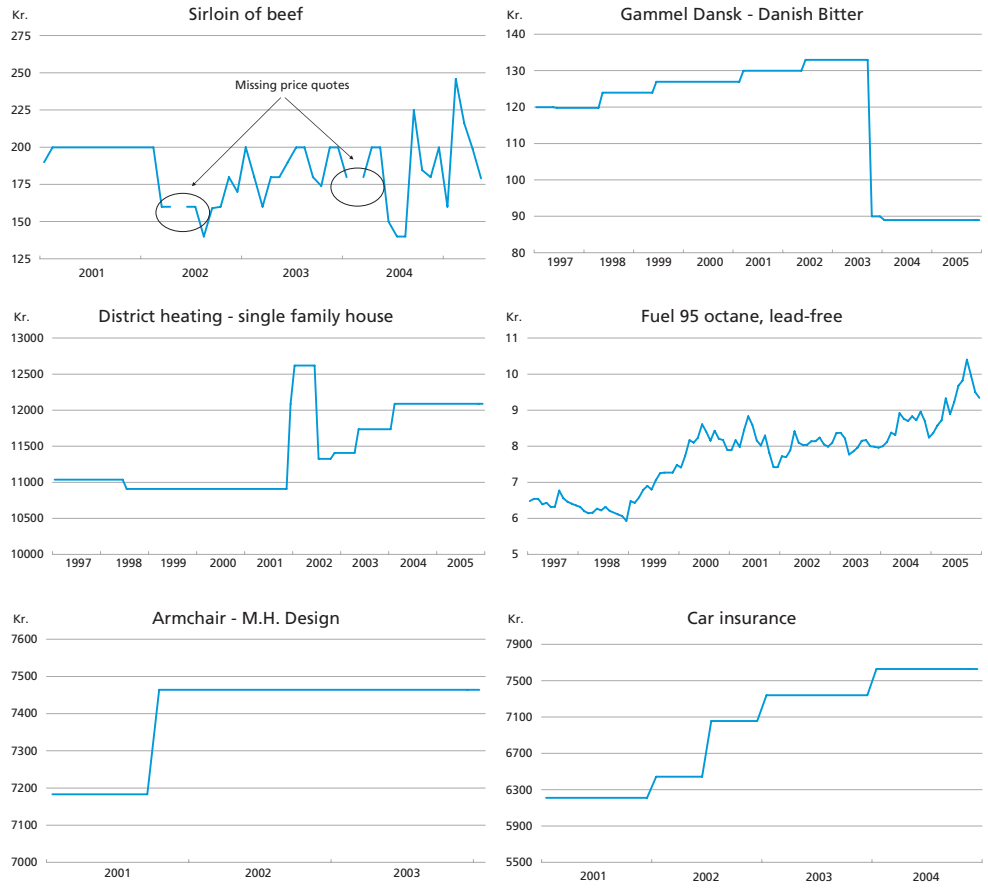
TABLE 5.2. SIZE OF PRICE CHANGES AND INFLATION, LINEAR REGRESSIONS

	Price increases			Price decreases		
	α	β	R^2	α	β	R^2
Unprocessed food	20.08 (126.35)	0.35 (2.64)	0.06	21.63 (155.53)	-0.19 (-1.63)	0.02
Processed food	10.74 (35.74)	-1.75 (2.58)	0.06	14.63 (49.17)	-0.78 (-1.16)	0.01
Energy	4.30 (12.92)	0.17 (0.73)	0.01	3.78 (9.33)	-0.38 (-1.35)	0.02
Non-energy industrial goods	15.24 (49.03)	2.21 (7.76)	0.36	19.50 (60.01)	-1.24 (-4.16)	0.14
Services	11.40 (15.55)	-1.08 (-0.56)	0.00	16.51 (14.82)	-4.12 (-1.41)	0.02
All-items	12.02 (52.02)	1.50 (2.52)	0.06	15.63 (62.30)	-0.04 (-0.07)	0.00

Note: The table shows results for the estimation of $y = \alpha + \beta$*inflation, where y is the size of price increases and price decreases, respectively. Numbers in parentheses are t-values.

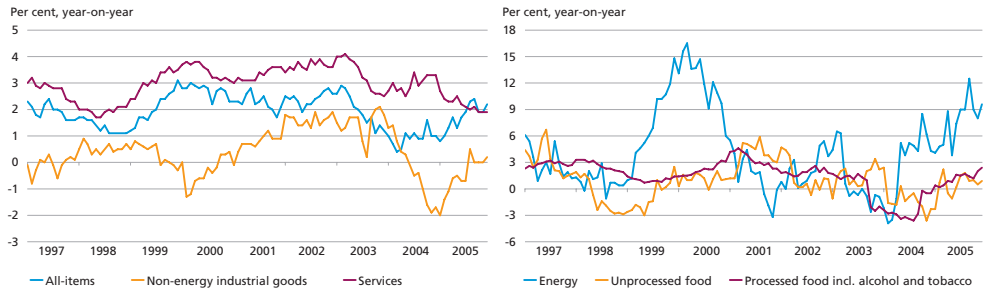
Charts

EXAMPLES OF INDIVIDUAL PRICE TRAJECTORIES — Chart 2.1



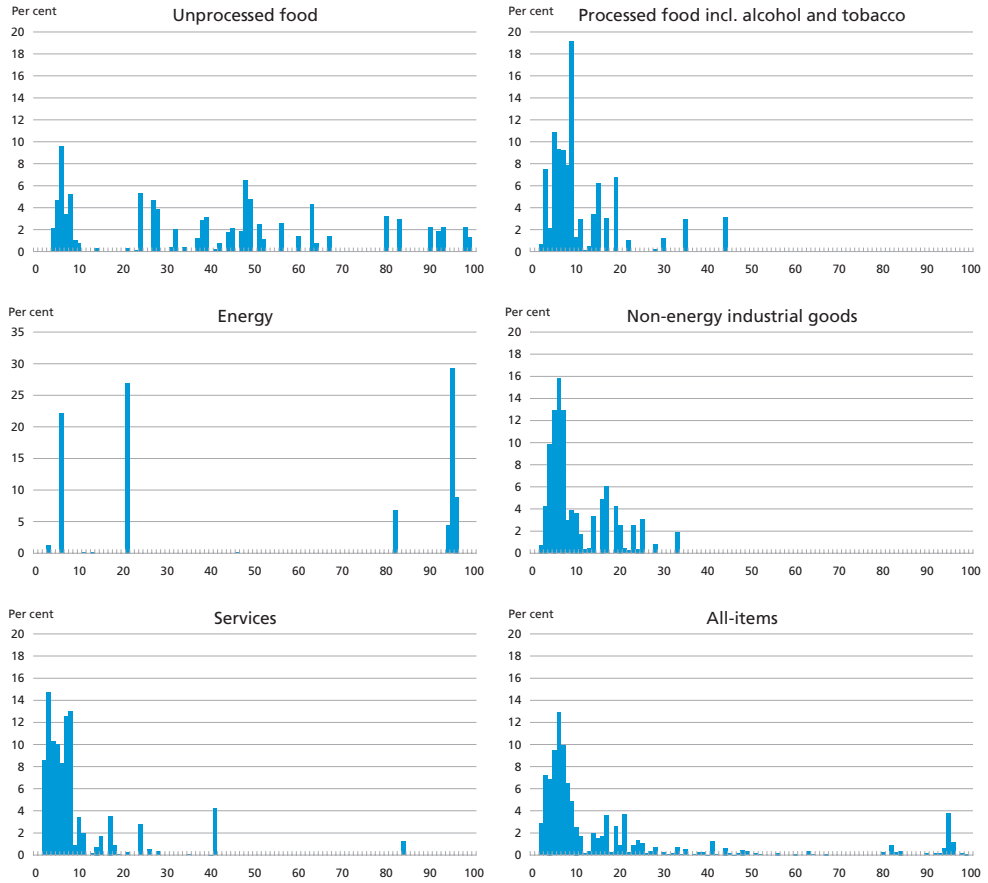
Note: Prices are in levels, denominated in Danish Kroner.

ANNUAL INFLATION RATES, HICP AND SUBCOMPONENTS — Chart 2.2



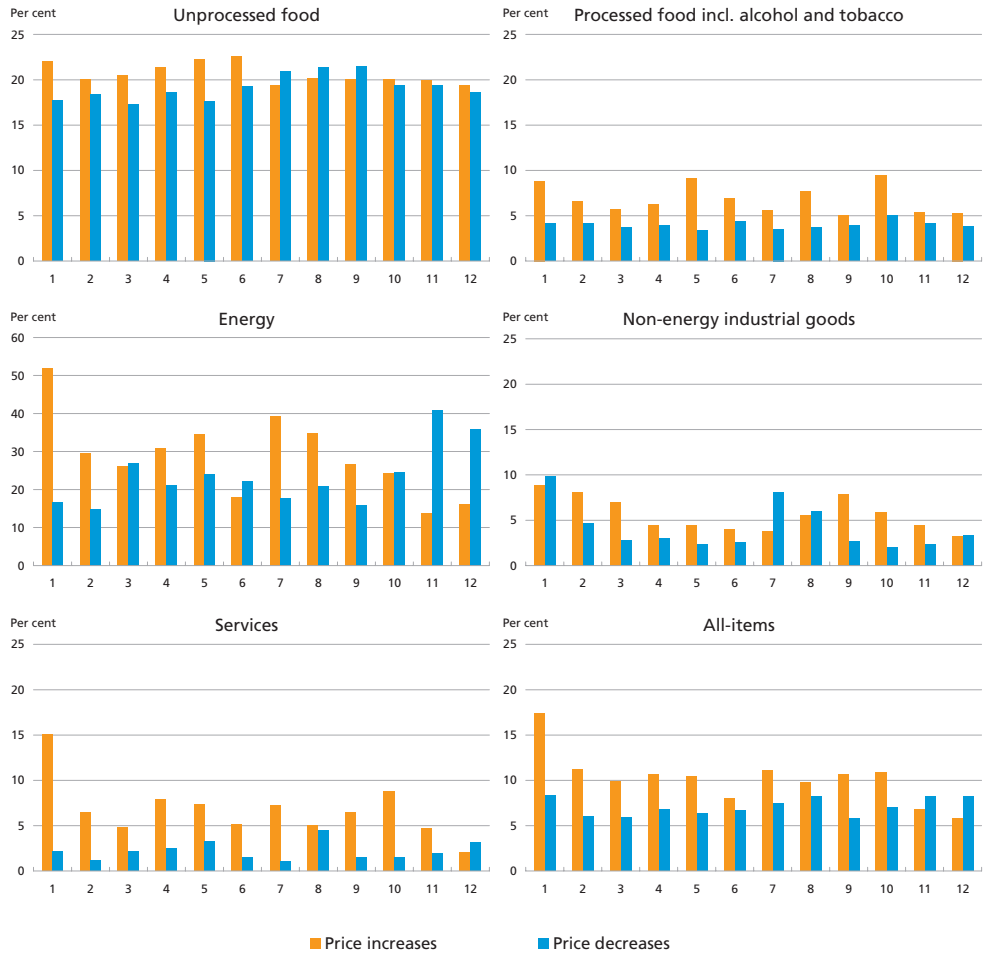
Source: Eurostat.

DISTRIBUTION OF MONTHLY FREQUENCY OF PRICE CHANGES Chart 4.1



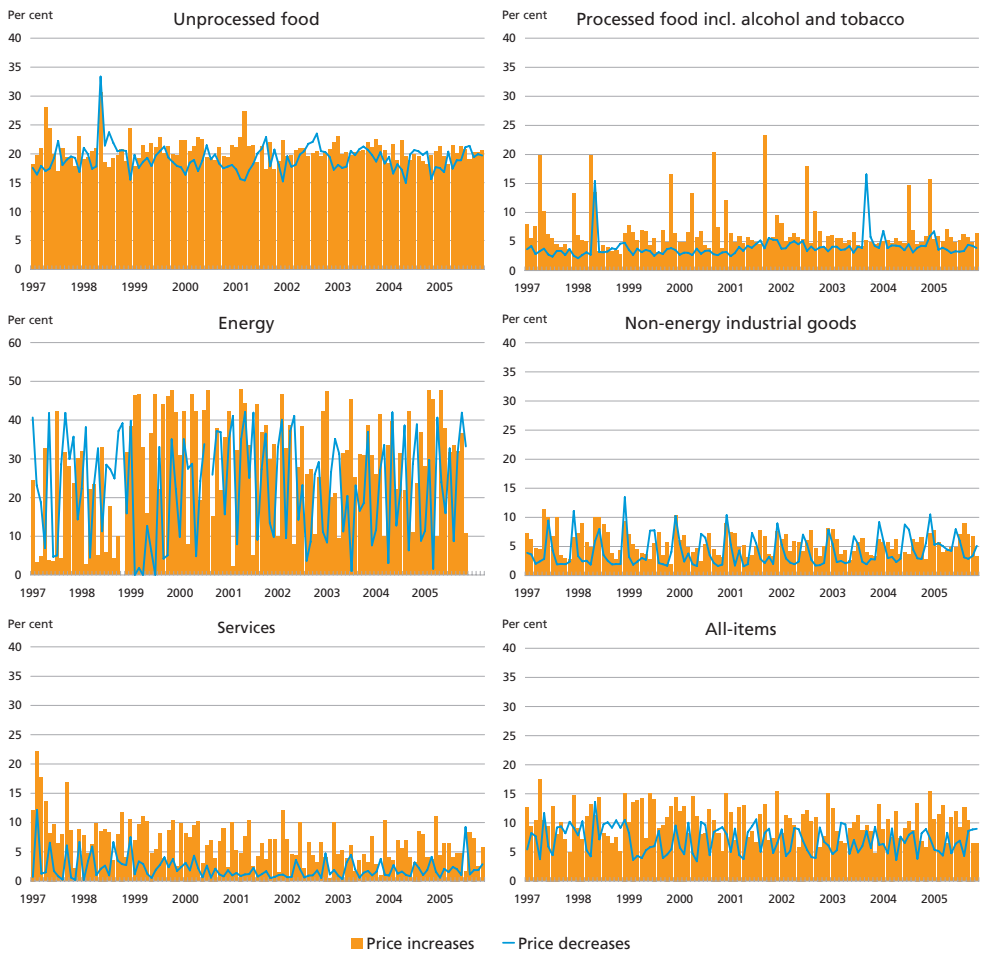
Note: Frequencies are weighted at the elementary products level.

FREQUENCY OF PRICE CHANGES BY MONTH Chart 4.2



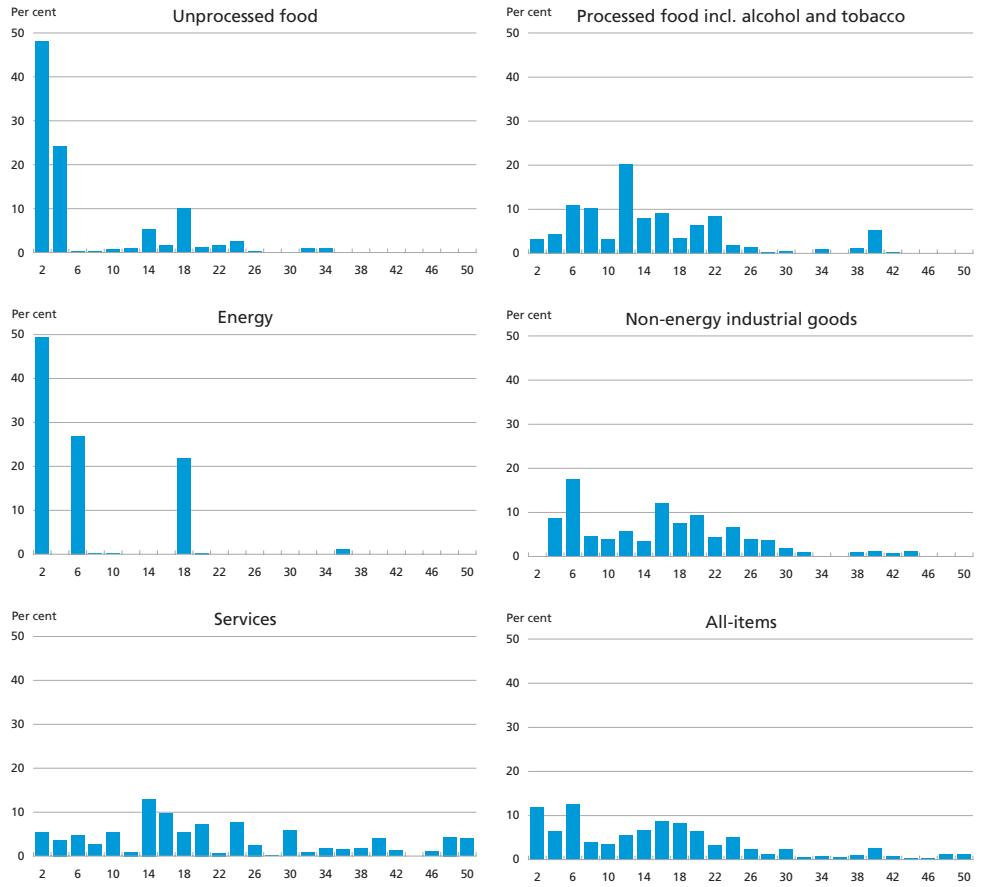
Note: Frequencies are weighted at the elementary products level.

FREQUENCY OF PRICE CHANGES BY MONTH AND YEAR Chart 4.3



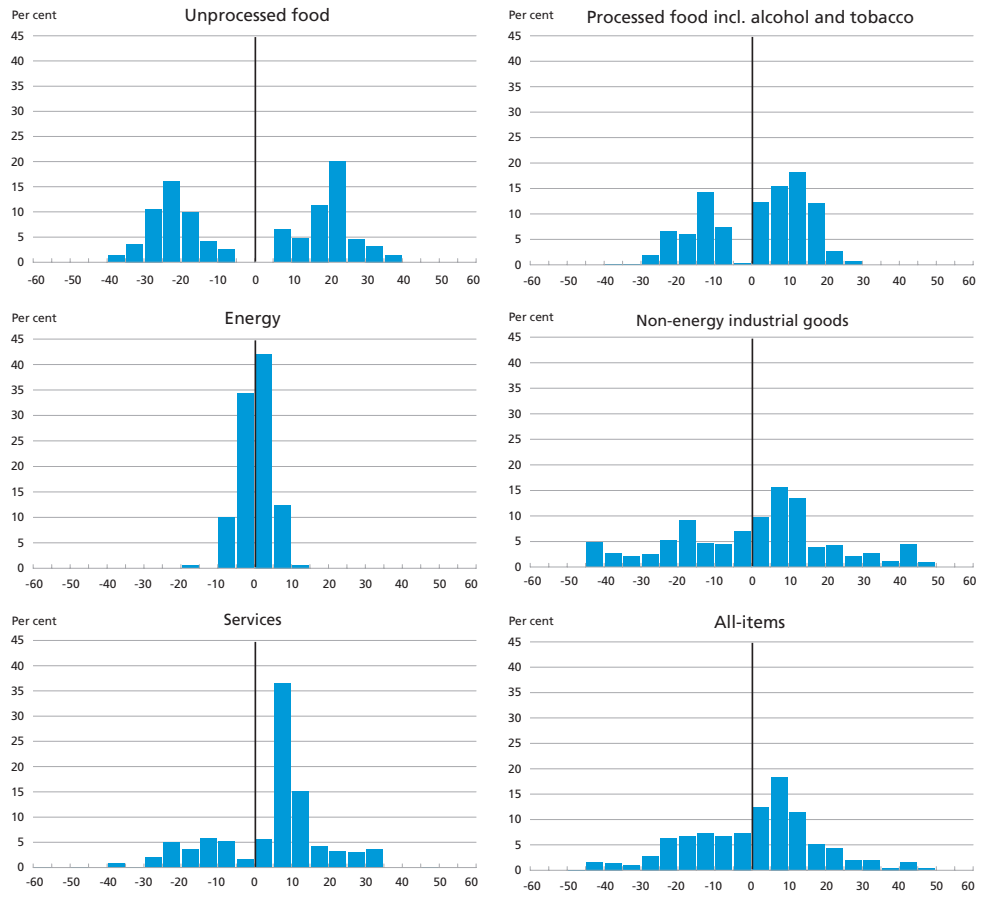
Note: Frequencies are weighted at the elementary products level.

DISTRIBUTION OF DURATIONS Chart 4.4



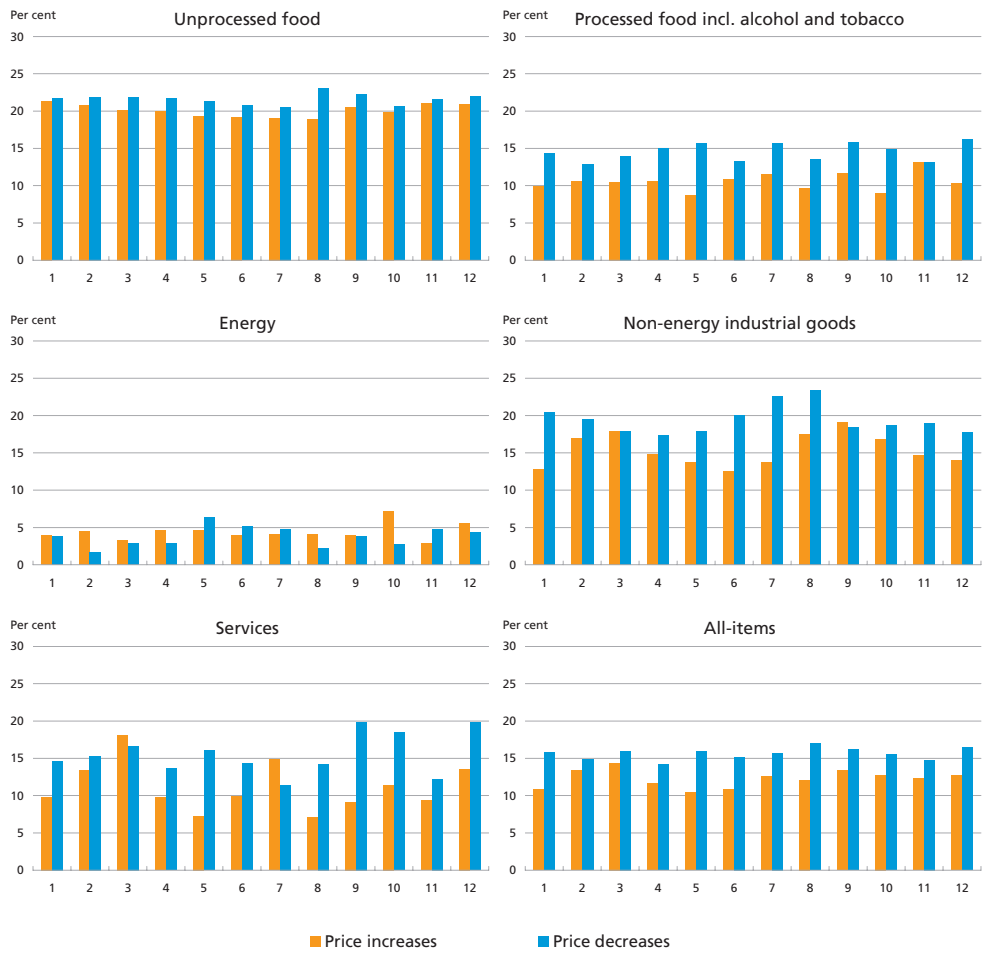
Note: Durations are weighted at the elementary products level. The distributions are truncated at the horizon of 50 months.

DISTRIBUTION OF SIZE OF PRICE CHANGES, LOG-DIFFERENCES Chart 4.5



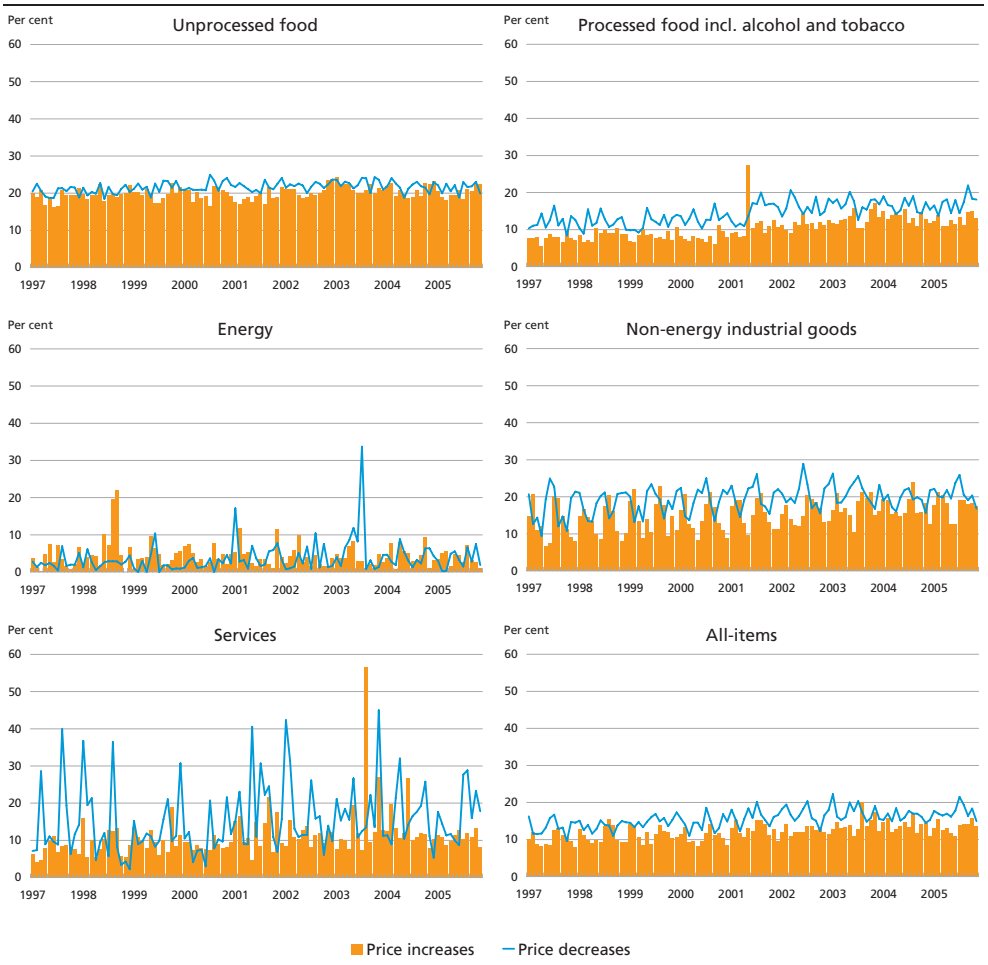
Note: The size of price changes are weighted at the elementary products level.

SIZE OF PRICE CHANGES BY MONTH Chart 4.6



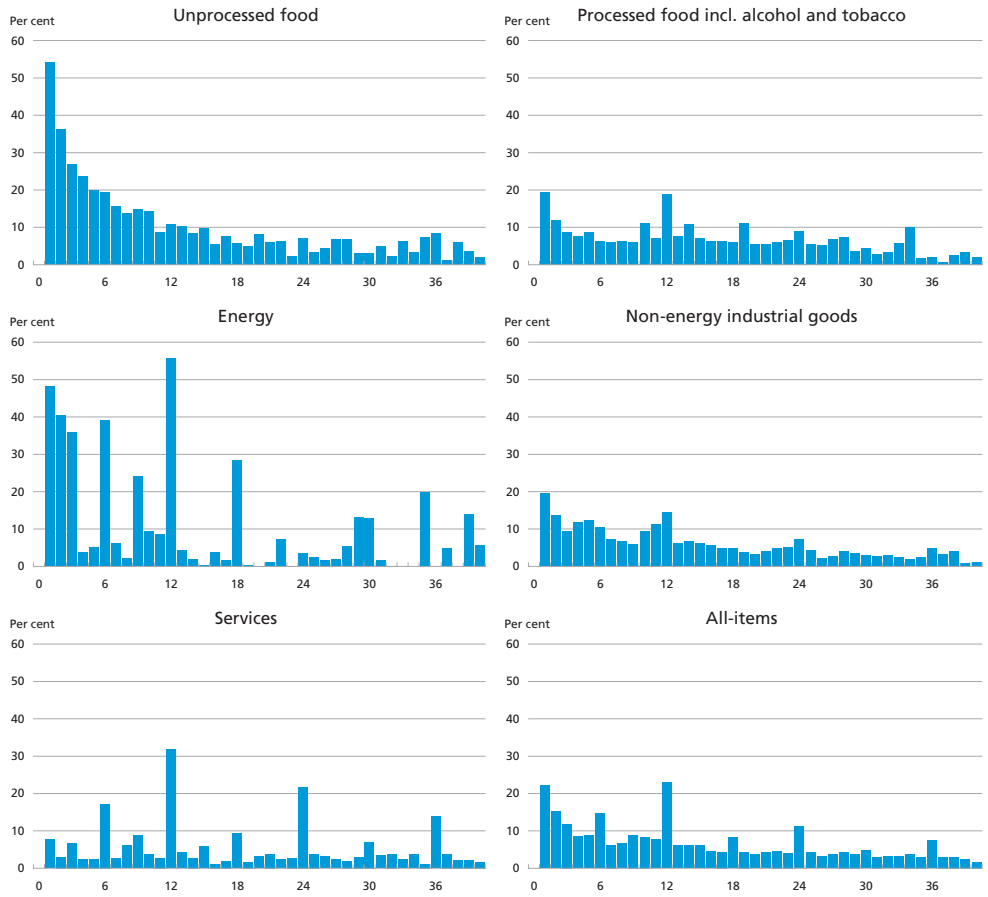
Note: The size of price changes are weighted at the elementary products level.

SIZE OF PRICE CHANGES BY MONTH AND YEAR Chart 4.7



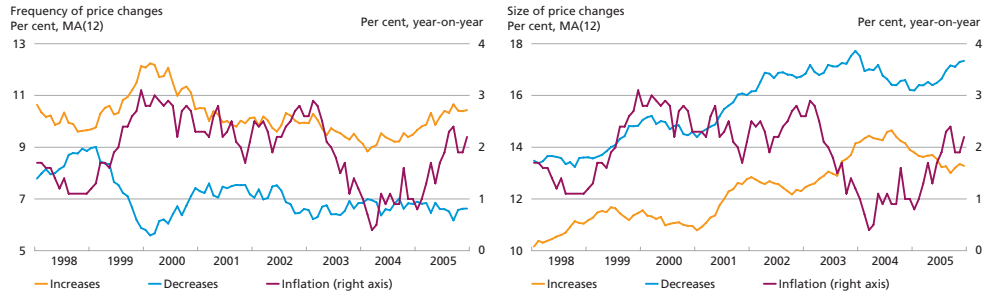
Note: The size of price changes are weighted at the elementary products level.

EMPIRICAL HAZARD FUNCTIONS — Chart 4.8

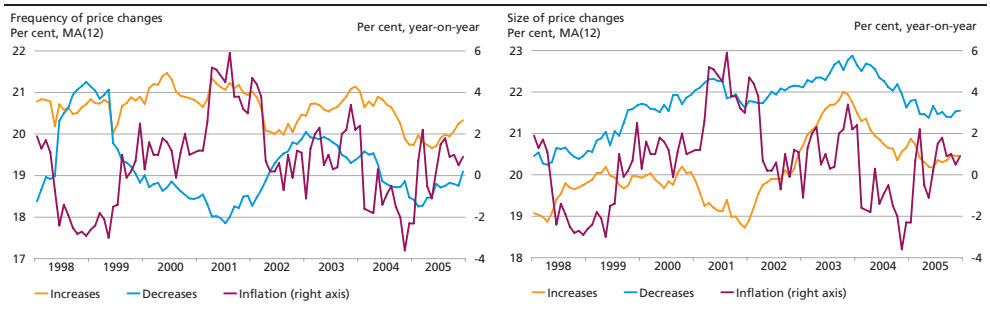


Note: Hazard rates are weighted at the elementary products level. Empirical hazard rates represent the frequency of price changes as a function of the number of months elapsed since the latest price change. Hazard rates are truncated at the horizon of 40 months. Beyond that horizon the uncertainty of the hazard rates increases substantially, as the number of products where prices have still not changed decreases.

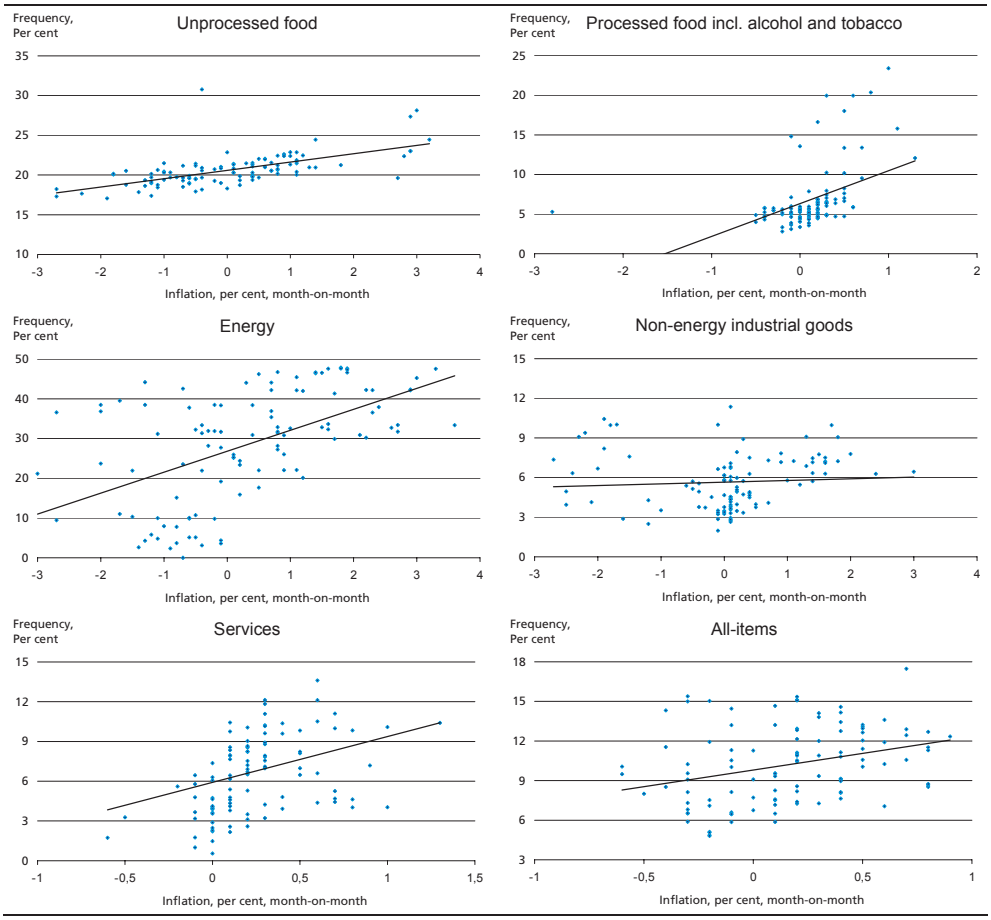
FREQUENCY, SIZE AND INFLATION – ALL-ITEMS Chart 5.1



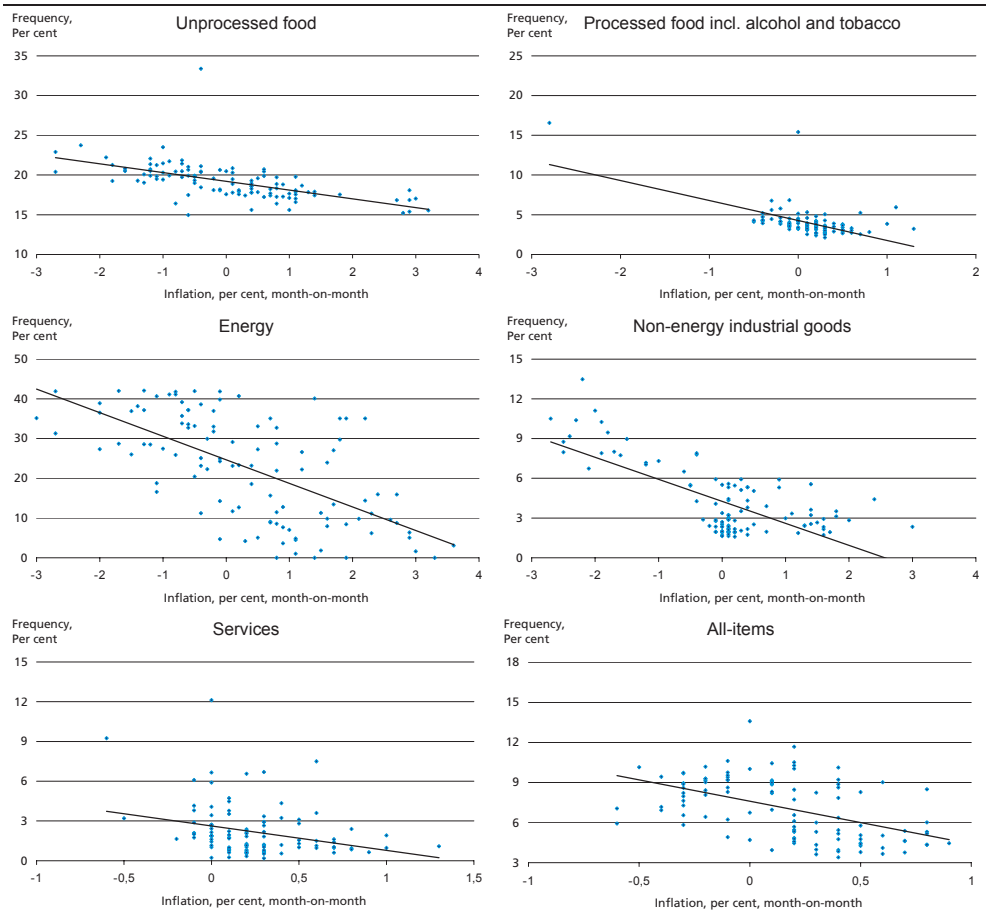
FREQUENCY, SIZE AND INFLATION – UNPROCESSED FOOD Chart 5.2



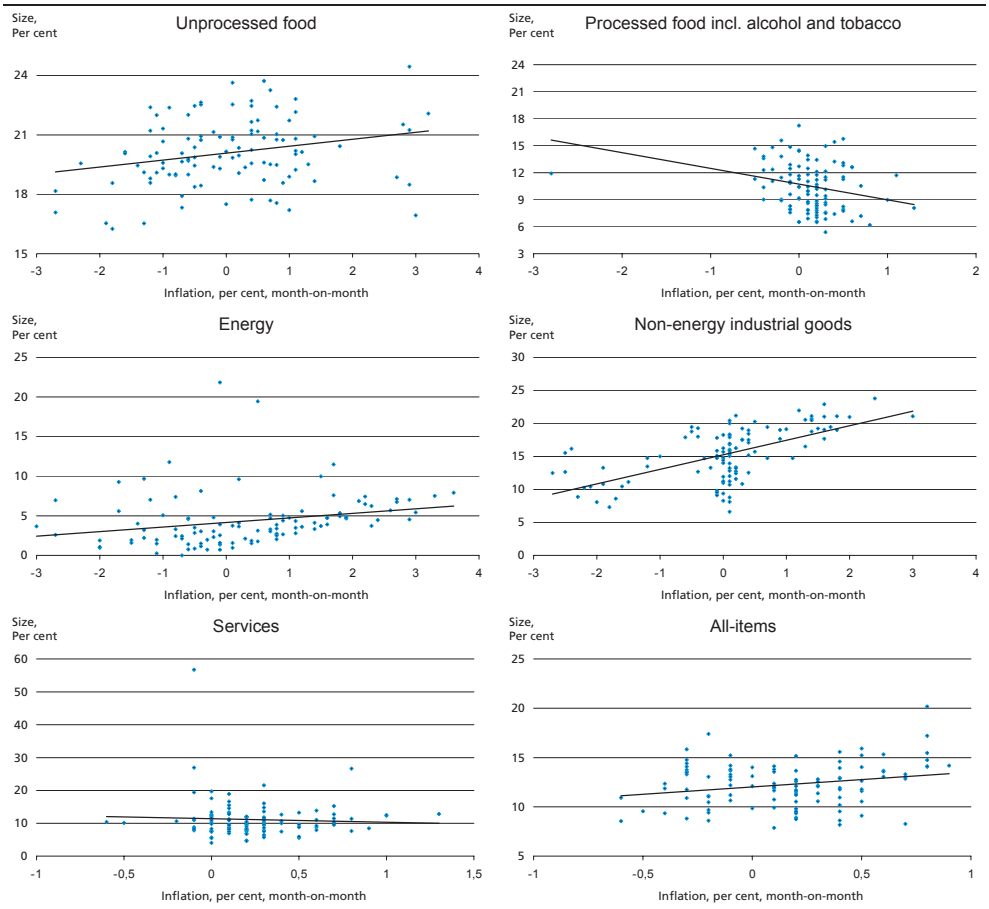
FREQUENCY OF PRICE INCREASES AGAINST INFLATION Chart 5.3



FREQUENCY OF PRICE DECREASES AGAINST INFLATION Chart 5.4



SIZE OF PRICE INCREASES AGAINST INFLATION — Chart 5.5



SIZE OF PRICE DECREASES AGAINST INFLATION — Chart 5.6

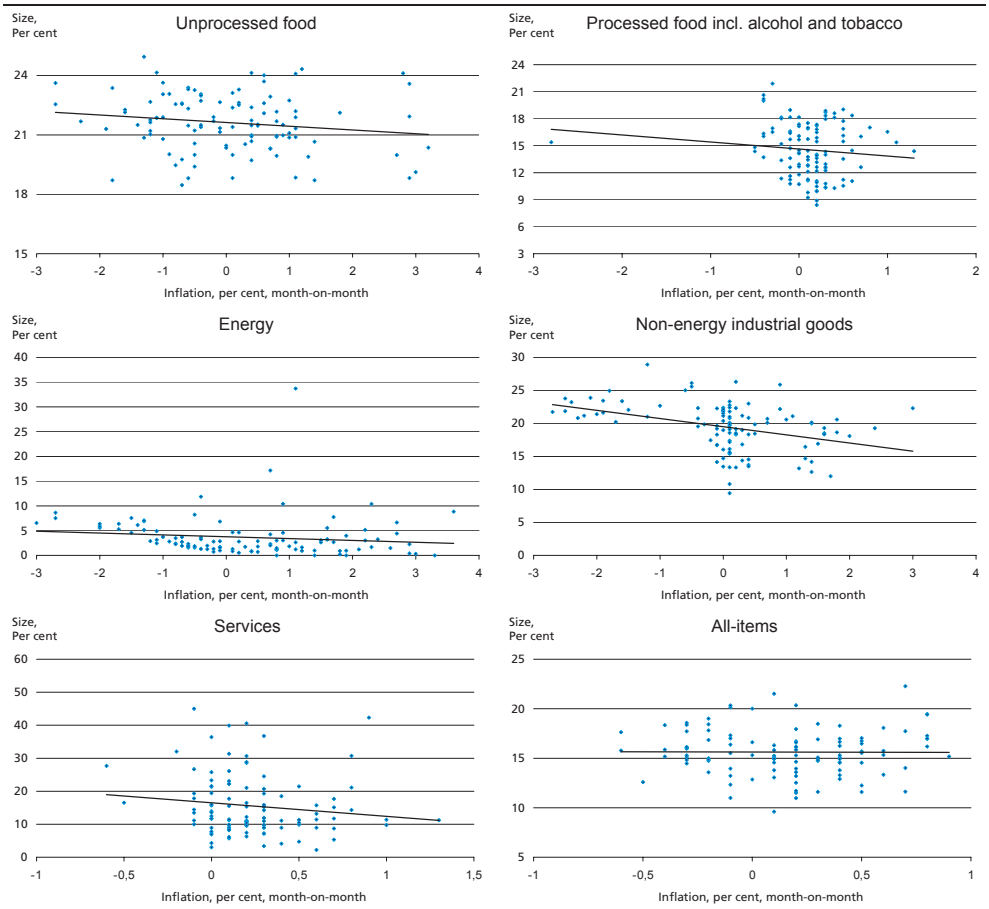


TABLE A1. FREQUENCY AND SIZE OF PRICE CHANGES, MONTHLY BASIS, PER CENT.

Elementary products:	Frequency of price …		Size of price…	
COICOP 5-digit code and label	… increases	… decreases	… increases	…decreases
Unprocessed food:				
11211 Minced beef	24.3	23.3	24.3	25.2
11212 Shoulder of beef	21.3	20.0	24.7	26.1
11213 Diced beef	32.5	30.3	16.0	16.5
11214 Beef tenderloin	25.4	23.0	19.4	20.8
11215 Minced beef, ecological	10.5	9.9	13.3	13.8
11221 Diced veal	26.0	24.5	15.0	14.6
11222 Veal, top round	26.9	24.4	14.8	15.2
11231 Diced pork	32.8	30.6	21.7	22.8
11233 Neck of pork	20.0	17.5	20.5	22.2
11234 Pork tenderloin	30.2	28.8	22.5	24.1
11236 Neck of pork with lard	28.2	26.9	28.7	30.4
11237 Minced pork	25.4	23.5	24.7	25.9
11238 Minced pork, ecological	11.8	11.0	12.7	13.7
11240 Lamb	24.6	22.8	19.9	21.2
11251 Chickens, deep-frozen	3.1	2.9	9.1	11.2
11252 Ducks, chickens	1.8	1.3	13.0	10.3
11253 Breast of turkey	25.5	24.8	22.6	23.2
11254 Fillet of chicken	22.8	21.7	19.0	19.1
11255 Chicken salad	3.6	1.8	12.4	19.1
11261 Meat, intestines	13.7	12.5	25.4	26.3
11271 Slice of meat, pork	4.4	3.2	8.9	9.1
11272 Slice of meat, salt meat	3.4	2.4	8.0	9.3
11273 Slice of meat, fillet of pork	3.8	3.4	10.5	11.5
11274 Ready-made dinner, deep-frozen	3.9	1.9	8.6	16.5
11275 Ready-made dinner, canned	3.7	1.7	9.7	12.2
11276 Saddle of pork	24.1	23.1	23.1	24.6
11278 Slice of meat, sausage	15.0	12.7	17.7	19.2
11280 Liver paste	14.8	11.4	21.9	25.4
11282 Ready-made meat	22.4	20.8	22.9	23.9
11283 Frankfurters	13.2	10.7	17.7	20.1
11284 Slice of meat, Danish salami	3.7	0.7	8.5	15.1
11311 Codfish	17.2	13.2	22.2	23.8
11312 Flounder	14.5	12.0	18.5	20.1
11313 Fillet of herring	7.7	5.8	17.2	18.9
11314 Fillet of salmon	25.0	21.7	18.9	19.8
11321 Fillet of codfish, deep-frozen	4.1	2.3	12.4	14.0
11322 Fillet of flounder, deep-frozen	4.0	2.4	9.9	16.5
11331 Smoked mackerel	23.5	20.9	13.7	13.1
11332 Smoked salmon, sliced	12.2	10.9	21.3	22.6
11333 Mackerel, canned	4.6	1.0	8.7	7.0
11334 Cod roe, canned	2.6	1.8	16.1	18.6
11335 Herring, marinated	2.8	1.8	11.8	9.1
11336 Salad of mackerel	4.3	1.5	10.9	17.0
11338 Minced fish	5.4	4.5	13.3	18.5
11339 Shrimps	4.5	4.0	18.0	21.8
11611 Apples	40.1	39.4	20.6	20.8
11612 Oranges	46.0	43.3	21.8	22.9
11613 Kiwi	16.3	15.0	25.9	26.6
11614 Bananas	46.8	45.9	21.0	21.1
11615 Grapes	33.9	32.6	36.2	38.8
11621 Raisins, prunes	3.0	2.1	13.4	15.3
11622 Nuts, almonds	3.4	2.3	10.8	10.2
11630 Fruit, canned	2.6	1.4	12.1	15.5
11711 Carrots	23.2	23.0	25.2	26.0
11712 Leek	45.5	46.1	32.9	33.9
11713 Tomatoes	41.5	40.8	23.7	23.8
11714 Cucumbers	48.8	48.9	24.4	25.0
11715 Onions	17.9	18.2	25.0	25.1
11716 Fresh mushrooms	14.3	13.4	25.9	27.2
11717 Iceberg lettuce	32.4	29.6	32.2	34.3
11718 Capsicum	46.1	45.7	23.5	24.2
11719 Cabbage	49.7	47.8	32.8	33.7
11721 Potatoes	19.5	18.9	30.1	29.7
11724 Potatoes, ecological	16.4	16.6	26.1	24.1
11731 Vegetables, deep-frozen	4.0	3.2	23.8	30.3
11732 French fries	3.1	3.7	22.8	19.6
11751 Vegetables, canned	2.9	2.6	15.2	18.5

11752 Potato chips	2.9	0.2	9.1	11.9
11753 Fries onions	3.7	1.6	9.4	11.8
11754 Vegetable mayonnaise	3.5	1.2	9.9	13.3
11791 Cauliflower	48.5	49.8	36.5	36.3
11794 Carrots, ecological	22.9	17.7	20.6	27.8
Processed food:				
11110 Rice	0.7	2.0	7.4	9.6
11121 Flour	2.6	2.5	9.0	9.2
11122 Oats	2.0	1.5	6.0	8.8
11131 Rye bread	9.6	6.4	18.2	23.8
11133 Mixed-grain loaf	11.7	9.4	16.8	20.2
11134 White bread	6.2	2.4	10.8	18.1
11135 Rolls	4.3	1.1	15.8	26.2
11136 French loaf, pita bread	4.8	5.7	28.2	28.6
11137 Crisp-bread	2.9	1.6	16.3	23.2
11141 Danish pastry	5.5	1.0	6.9	10.9
11142 Cream cake	5.6	1.6	9.1	14.4
11143 Madeira cake	2.5	0.5	9.3	8.9
11144 Biscuits	2.8	1.2	9.2	9.8
11145 Crackers	2.2	1.5	15.1	12.3
11150 Spaghetti, macaroni, pasta	1.6	1.1	14.3	11.4
11160 Cornflakes	7.4	6.4	21.2	22.8
11411 Full milk	5.0	2.0	5.8	7.3
11412 Semi-skimmed milk	5.3	2.9	7.3	8.9
11413 Skimmed milk	5.4	2.5	7.6	9.7
11414 Processed milk	5.4	2.5	10.1	16.6
11416 Full milk, ecological	5.6	2.4	7.4	11.0
11417 Semi-skimmed milk, ecological	6.7	3.6	9.0	13.7
11418 Skimmed milk, ecological	6.6	4.3	9.4	11.4
11431 Double cream	9.0	7.9	18.0	19.6
11432 Crème fraiche	7.7	5.2	11.7	15.8
11433 Yoghurt	7.7	5.6	14.9	18.6
11434 Chocolate milk	5.0	1.5	9.5	11.2
11441 Cheese spread	3.0	1.4	10.0	17.4
11442 Brie	7.4	5.7	15.2	17.9
11443 Cheese, 45%	18.2	16.4	17.4	19.1
11450 Eggs	16.7	13.1	14.3	16.3
11452 Eggs, ecological	15.2	12.0	12.7	14.4
11511 Butter	5.8	2.4	8.5	13.9
11512 Butter, light	6.4	3.8	7.3	9.0
11521 Margarine	85.6	11.1	9.8	13.1
11522 Vegetable margarine	8.9	3.0	10.2	13.0
11531 Sweet oil	4.3	3.6	10.4	10.0
11810 Sugar	2.4	2.0	5.9	8.1
11821 Jam	2.7	17	11.4	15.6
11822 Honey	6.7	3.2	9.1	10.9
11831 Chocolate	4.4	1.8	12.6	21.0
11832 Sweets, candy	1.8	0.7	11.5	13.7
11840 Ice cream	4.1	3.7	14.6	15.8
11911 Salt	1.9	1.8	20.9	20.8
11912 Pepper	2.2	0.7	10.4	17.0
11913 Vanilla-flavoured sugar	2.5	0.9	11.0	18.8
11914 Herbs	1.0	0.6	20.1	29.2
11921 Vinegar	3.5	1.8	9.1	16.8
11922 Mustard	4.6	1.1	9.9	11.0
11923 Tomato ketchup	4.8	0.9	9.4	13.2
11924 Sauce, ready-made	3.9	1.2	6.3	9.7
11925 Salad dressing	4.0	1.9	9.5	12.7
11926 Baking ingredients	1.7	0.7	10.9	18.4
11931 Mayonnaise	3.2	1.8	8.9	7.7
11932 Remoulade	3.2	1.5	8.5	6.7
11945 Vegetable soup, baby food	3.7	0.7	8.7	14.3
12110 Coffee	22.4	21.0	13.4	14.0
12120 Tea	4.6	2.0	14.6	36.2
12130 Cocoa powder	3.4	1.5	11.4	3.9
12210 Mineral water	3.1	2.4	21.1	27.2
12221 Soft drink	9.3	5.1	10.7	13.5
12222 Fruit water	3.5	2.7	7.6	10.1
12231 Orange juice	3.8	3.7	20.7	20.8
12232 Apple juice	3.5	3.8	15.1	14.9
21101 Bitters, liquor	6.2	2.9	2.6	5.9

21102 Gammel Dansk, Danish bitter	8.1	4.7	3.4	4.7
21103 Gin, liqueur	3.1	2.6	4.5	15.5
21104 Whisky, cognac	2.6	2.7	4.1	15.2
21211 Red wine	2.3	2.2	6.0	5.9
21212 White wine	2.9	2.5	6.7	5.4
21221 Vermouth, champagne	3.3	1.6	4.8	4.6
21222 Port, sherry	3.5	2.0	5.9	6.4
21301 Beer	10.2	8.1	18.2	22.2
21302 Strong beer	3.8	2.1	4.9	7.4
21303 Light beer	2.7	0.9	7.1	9.3
22010 Cigarettes	7.8	0.9	2.6	12.5
22021 Cigars, cigarillos	7.5	0.6	4.7	32.1
22022 Tobacco, pipe	6.5	0.0	3.7	0.0
22023 Cigarette paper	0.7	0.9	9.4	10.4
Energy:				
45100 Electricity	14.1	6.1	3.1	2.2
45210 Coal gas	46.1	35.8	3.0	2.3
45220 Bottled gas	8.2	2.7	5.6	7.7
45301 Heating oil	54.5	40.6	3.5	3.6
45302 Petroleum	28.6	16.8	3.2	2.9
45401 Coal and coke	10.7	1.6	5.4	1.9
45402 Firewood	0.8	1.9	10.2	16.0
45500 District heating	3.5	1.9	8.6	7.7
72201 Petrol	44.6	48.6	3.1	2.1
72202 Petrol, lead-free	48.6	45.6	2.9	2.5
72203 Diesel oil	53.8	40.6	2.8	2.7
72204 Motor oil	4.4	0.8	8.6	7.0
Non-energy industrial goods:				
31211 Man's overcoat	6.5	14.3	38.9	37.7
31212 Man's coat, skin	5.1	11.6	36.7	36.9
31213 Man's suit	7.8	8.9	32.7	34.4
31215 Man's trousers	7.7	8.9	31.4	34.0
31217 Man's jacket	9.6	11.7	40.3	39.2
31218 Man's shirt	7.9	8.6	35.9	38.0
31219 Man's sweat-shirt	7.0	9.4	40.2	41.0
31220 Man's underwear	3.5	1.8	14.7	23.7
31221 Man's socks	2.1	1.5	19.2	26.4
31222 Man's pullover	6.6	11.9	38.6	41.1
31223 Man's rainwear	4.6	0.7	3.9	177
31224 Man's track suit	2.7	3.5	31.3	40.1
31225 Man's shorts	2.2	1.8	30.4	40.7
31241 Woman's overcoat	5.0	18.6	45.2	40.9
31242 Woman's coat	6.2	17.9	44.6	40.5
31243 Woman's coat, skin	4.4	14.8	39.6	39.6
31245 Woman's dress	8.7	16.1	46.0	43.0
31246 Woman's skirt	9.4	14.7	44.4	41.3
31248 Woman's trousers	9.4	14.6	46.8	42.8
31249 Woman's shirt blouse	4.5	3.4	24.7	35.7
31250 Woman's socks	2.7	2.1	23.3	34.1
31251 Woman's cardigan	9.0	13.8	43.6	40.5
31261 Baby clothes	4.7	4.9	33.7	35.0
31262 Children's wear	7.7	11.7	44.4	43.4
31302 Gloves, belts, ties	2.7	2.7	32.2	43.7
31304 Knitting yarn	2.4	0.2	6.6	11.6
31305 Sewing thread	1.4	1.3	22.5	32.1
31306 Dress fabrics	1.5	0.3	7.9	4.7
32111 Man's shoe	4.4	4.7	25.7	33.4
32112 Slippers, rubber boot	2.4	1.0	15.0	37.5
32121 Woman's shoe	5.0	5.5	28.4	32.0
32124 Boots, sandals	3.4	5.9	30.0	38.5
32131 Children's shoes	3.8	4.3	31.6	38.1
32202 Repair items for shoes	2.2	0.3	11.8	17.6
43101 Cement, concrete	8.1	5.8	9.8	10.6
43102 Other housing materials	6.4	4.1	12.9	16.6
43103 Paint	5.4	0.7	7.2	16.7
43104 Wallpaper	1.7	0.2	11.1	8.8
43105 Articles of wood	4.3	2.9	9.8	12.8
43106 Other garden materials	5.0	3.3	15.8	21.9
44100 Water	4.3	0.8	8.1	6.2
51121 Beds, plank-beds	3.0	1.9	9.3	14.8

51122 Cupboards	2.4	1.6	9.5	15.5
51131 Tables	3.3	1.3	8.5	15.1
51132 Dining chairs	3.8	1.0	7.5	11.9
51133 Armchairs, sofas	3.9	1.5	7.8	12.4
51134 Bookshelves	3.3	1.2	7.6	15.1
51143 Lamps	3.7	1.8	11.3	18.3
51144 Decoration articles	3.7	0.6	8.2	23.5
51145 Venetian blinds	5.0	1.2	10.1	16.7
51146 Lounge bed	3.0	1.6	11.4	20.9
51200 Carpets	2.3	1.3	9.4	12.9
52001 Curtains	2.8	1.4	21.7	38.1
52002 Duvet	3.0	3.0	24.5	29.9
52003 Bed linen	3.0	2.1	20.0	25.5
52004 Towel	1.8	0.5	17.0	34.4
52005 Table-cloth	3.0	1.1	16.3	34.0
52006 Cushions, gym mat	4.0	2.9	16.1	20.2
53104 Cooker hood	4.8	3.6	15.7	20.4
53111 Refrigerator, deep freezer	7.3	5.9	7.2	8.6
53121 Washing machine	7.5	7.5	9.4	9.7
53123 Dish washer	7.2	6.6	8.2	9.1
53131 Electric cooker	5.6	4.4	7.4	9.6
53132 Microwave oven	4.5	5.4	16.0	17.6
53151 Vacuum cleaner	3.9	4.2	11.2	14.0
53152 Sewing machine	4.7	3.6	9.1	12.0
53200 Electrical household equipment	3.7	3.4	15.7	18.8
54011 Glasses	4.6	1.9	14.4	23.8
54012 Dinner set	3.9	1.7	17.7	25.5
54020 Cutlery of stainless steal	3.5	2.1	29.1	44.5
54031 Pot, frying-pan	6.4	4.9	24.1	29.8
54032 Vacuum jug	4.1	2.6	20.7	27.4
54033 Washing-up bowl	3.0	1.4	17.1	29.9
55211 Electrical plug	2.3	1.4	24.4	27.7
55212 Electric bulb	2.3	1.0	14.4	15.6
55213 Electric tools	3.2	3.2	11.0	12.5
55214 Batteries	1.1	1.3	17.1	20.7
55221 Tools	3.5	1.8	10.2	13.5
55222 Garden tools	3.8	1.6	10.1	13.7
56111 Detergents	4.1	3.8	22.2	24.7
56112 Softener	2.7	2.4	9.5	8.9
56113 Cleaning materials	3.3	1.8	11.3	13.6
56115 Polish	4.2	1.7	7.2	11.8
56121 Washing-up brush, broom	2.6	1.3	18.0	24.8
56122 Nails	3.5	1.3	13.7	16.3
56123 Candle lights	1.7	0.9	7.7	20.1
56124 Aluminium foil	3.0	3.3	8.7	8.0
56125 Plastics bags	2.5	3.5	8.1	9.3
56126 Matchsticks	3.6	0.8	10.7	6.5
56127 Kitchen paper	1.4	3.0	9.9	9.7
56128 Coffee filter	2.1	1.8	9.5	9.4
56129 Glue, tape	1.6	0.4	13.8	13.3
61102 Vitamins, minerals	1.9	0.6	4.4	6.5
61201 Other pharmaceutical products	2.5	0.8	5.7	8.7
61301 Glasses	2.6	0.8	6.3	17.3
61302 Contact lenses	1.6	0.7	11.5	15.0
71100 Cars	13.0	6.5	2.1	2.2
71201 Motorbikes	2.6	1.3	5.8	4.9
71202 Mopeds	3.0	1.6	12.2	19.1
71300 Bicycles	3.1	2.1	7.5	12.4
72101 Spare parts, accessories, cars	4.5	2.4	11.9	15.9
72102 Spare parts, accessories, bicycle	3.7	0.3	8.8	25.1
91113 Television	2.2	3.0	9.4	14.1
91114 DVD and video recorder	1.7	5.3	10.4	16.0
91121 Stereo, CD player, minidisc	1.6	1.7	12.3	17.6
91122 Loudspeaker, microphone	4.3	2.1	12.7	21.9
91201 Photographic equipment	1.9	6.0	11.2	14.1
91202 Video camera	1.8	6.4	13.4	13.1
91410 CD's, cassette tapes	2.9	0.8	6.1	4.8
91421 Film, camera	1.1	0.6	14.0	15.0
91423 Video cassette	1.1	1.1	15.6	15.1
92101 Caravan, trailer	5.2	0.5	3.6	2.7
92103 Boats	3.9	2.8	5.3	5.4
92200 Music instruments	3.6	5.4	12.8	14.5

93102 Games, leisure and garden	2.7	3.1	21.0	23.4
93103 Doll	2.3	3.1	29.7	42.9
93104 Building-set of plastic	2.4	2.7	29.7	39.6
93105 Toy car, train-set	1.9	2.6	30.7	35.7
93201 Hunting, fishing and sports gear	2.3	1.8	16.6	25.9
93202 Sports accessories	1.7	1.0	10.6	22.1
93301 Garden plants	2.9	0.8	14.1	25.5
93302 Cut flowers	10.3	8.2	20.1	20.5
93303 Potted plants	7.1	6.6	18.7	20.4
93304 Fertilizer	1.6	1.0	16.5	20.1
93305 Sphagnum	3.3	2.9	20.4	27.7
93401 Purchase of pets	2.7	1.3	29.2	38.8
93402 Pet food	3.2	1.1	13.3	18.4
93404 Pet materials	2.2	1.3	17.7	22.7
93500 Veterinary	9.9	0.0	4.1	22.3
93501 Book club	2.2	0.4	13.6	37.0
95201 Newspapers	8.1	0.1	5.2	9.8
95202 Weekly/monthly magazines	3.7	0.7	7.2	16.4
95401 Paper articles	2.4	1.5	20.0	25.4
95402 Pencils	2.9	1.6	26.3	32.8
121201 Electric razor	2.8	3.9	16.7	20.7
121202 Hair-dryer	3.3	3.1	19.5	22.6
121301 Toothbrush	2.5	1.2	7.8	8.6
121302 Hairbrush	0.7	0.5	20.2	19.0
121303 Soap, personal care	2.2	2.0	7.0	10.4
121304 Hair shampoo	4.1	3.8	24.2	28.0
121305 Toothpaste	10.2	9.5	23.8	26.0
121306 Crème and lotion	4.7	0.7	8.2	19.4
121307 After shave	4.0	0.8	6.2	5.9
121308 Cosmetics	4.2	0.4	5.8	16.4
121309 Hairstyling	3.7	1.7	10.2	11.8
121310 Deodorant	4.9	1.8	10.9	21.1
121311 Perfume	5.4	1.0	5.3	15.6
121312 Razorblades	6.5	1.2	7.6	9.5
121313 Toilet paper	2.8	2.9	17.8	18.0
121314 Diapers, sanitary towel, cotton	1.9	1.9	7.5	9.7
123101 Jewellery, gold and silver	1.9	0.6	13.1	24.0
123103 Watches	1.1	0.6	13.9	30.9
123104 Repair items for watches	2.6	0.4	9.6	11.5
123210 Bags, trunks and purses etc.	2.8	1.4	10.8	23.4
123220 Baby carriage, sunglasses etc.	3.5	2.4	10.9	17.0
Services:				
31401 Reparation of clothes	1.9	0.6	17.5	13.6
31402 Coin-operated laundry	2.9	0.2	7.0	17.3
31403 Cleaning of clothes	4.4	0.5	7.0	25.2
41201 Rent, holiday house	5.0	1.3	4.4	11.9
43201 Maintenance of oil burner	5.1	0.3	4.7	14.8
43202 Craftsman, house expenses	18.9	4.7	1.7	9.5
44200 Renovation	4.2	1.2	8.4	9.3
44300 Drainage tax	6.2	1.2	6.4	7.0
44401 Gardening	6.9	0.4	12.7	17.8
44402 Chimney sweeper	7.0	0.0	3.7	0.0
44403 Home salvage corps, subscription	7.3	0.0	4.3	0.0
51300 Recovering of furniture	6.6	0.2	5.4	3.0
53300 Repairs, household machines	21.5	3.7	1.5	19.3
56211 Cleaning lady	7.9	0.5	16.2	19.0
56212 Housemaid	13.3	0.0	1.8	0.0
56213 Babysitter	2.6	0.0	15.6	0.0
56231 Window cleaning	5.0	1.2	12.8	10.5
56232 Rental of tables, cutlery etc.	1.5	0.0	14.6	3.5
62210 Dentist	14.0	0.6	2.7	27.4
62330 Physiotherapist	15.0	1.9	8.3	25.0
63000 Hospitalization	4.1	0.2	7.0	12.6
72301 Carwash	1.4	0.6	14.7	18.8
72302 Repairs, cars	5.8	1.0	10.3	23.4
72303 Repairs, bicycles	3.0	0.3	9.6	16.7
72304 Car salvage corps, subscription	7.5	0.0	3.8	0.0
72401 Driving school	2.4	0.4	11.9	16.2
72402 Garage rental	17.8	0.0	19.0	0.0
72403 Car rental	3.3	1.4	11.6	14.0
73301 Flight ticket, international	43.9	39.5	7.1	8.7

73302 Flight ticket, domestic	16.2	4.6	6.8	8.9
73400 Ferry service	9.1	4.9	12.2	16.2
73600 Removals and storage	6.6	0.4	6.1	8.1
81100 Postage	5.8	0.3	9.6	9.5
82102 Telecommunications equipment	5.1	7.4	21.8	23.8
82103 Mobil phone	7.9	20.0	61.1	48.1
82204 Tele services	0.5	1.5	22.1	23.8
82205 Mobile phone, subscription	0.4	1.7	31.8	21.1
82206 Internet, subscription	1.2	1.0	30.4	21.2
91500 Repairs, television/radio	1.9	0.3	9.0	13.3
94101 Sporting expenses	3.7	1.2	11.9	27.0
94102 Sporting event	2.7	1.2	15.8	19.8
94104 Music instruction	5.1	0.4	10.1	9.3
94105 Tivoli etc.	9.1	5.8	16.5	16.6
94210 Film development, camera	0.7	0.5	26.1	26.7
94221 Theatre	5.9	0.1	7.2	6.1
94222 Cinema	4.6	0.7	11.4	16.7
94223 Zoo, museums etc.	5.5	1.8	23.6	45.0
94225 Cable network	4.7	0.5	10.5	17.4
94226 Movie rentals	1.7	1.7	14.0	26.7
96000 Charter flights, holidays	21.2	19.5	15.9	18.3
111111 Restaurant, sandwich	3.0	0.3	10.3	12.1
111112 Restaurant, hot meal	3.6	0.6	7.2	9.8
111113 Restaurant, coffee	2.8	0.2	9.8	11.7
111121 Restaurant, beer	3.0	0.4	8.4	14.2
111122 Restaurant, wine	4.1	0.3	6.9	8.2
111123 Restaurant, bitter	2.1	0.4	9.8	15.8
111124 Restaurant, soft drink	3.7	0.2	8.5	12.2
111131 Restaurant, steak sandwich	3.1	0.1	7.8	18.4
111132 Restaurant, chicken, fish	2.5	0.0	7.7	0.0
111133 Restaurant, hot-dog	2.8	0.2	8.5	13.7
111135 Restaurant, pizza	2.3	0.4	7.1	11.1
111200 Canteen	2.4	0.2	11.4	12.6
112010 Hotel, bed-night	4.9	1.1	6.9	9.8
112020 Camping ground, youth hostel	5.1	0.0	6.7	0.9
121110 Hairdresser	7.0	0.1	5.0	12.3
125201 Insurance, household goods	10.0	0.3	4.6	3.0
125300 Accident insurance	6.7	0.4	5.6	23.5
125401 Travel insurance	7.6	0.2	6.2	28.2
125402 Auto insurance	9.1	0.7	8.3	4.8
126201 Financial services	1.2	0.1	27.8	35.7
126202 Accountant, assistance	5.5	0.1	5.0	12.3
127003 Lawyer, assistance	3.2	0.6	8.4	13.0
127005 Funeral, purchase of burial spot	6.6	0.1	6.2	23.7