PRICE SETTING BEHAVIOR:
MICRO EVIDENCE ON SLOVAKIA

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ABSTRACT

The paper provides an empirical analysis of price setting behavior in Slovakia, using large micro-level dataset underlying Slovak consumer price index for the period 1997-2001. Similarly to results on advanced market economies, we find that price changes are infrequent and sizeable. Moreover, the relationship between the frequency and size of price changes is highly non-linear. Product-specific inflation is typically highly persistent. We find that market structure is an important determinant of pricing behavior. The dispersion of prices is higher while persistence is lower in the non-tradable sectors, suggesting that higher competition in goods markets is not conducive to lower persistence. Our results, together with the finding that the frequency of price changes depends negatively on the price dispersion and positively on the individual inflation, seem consistent with predictions of Calvo's staggered price model.

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1. Introduction

There is a large and growing body of empirical literature based on micro data on price setting in Eurozone countries, with a view to uncover microeconomic sources of price inertia and possible asymmetries across countries (e.g. the "Inflation persistence network", see Dhyne *et al*., 2006). By contrast, there are no studies based on comprehensive micro data on price setting in New European Union (EU) members (or other emerging economies). In this paper, we analyze actual prices for a wide range of products, which form a large proportion of the consumer basket in Slovakia. In addition to the richness of our dataset, the analysis of a country like Slovakia has two interesting implications. First, in the sample period Slovakia experience an average rate of inflation near two-digit levels, in contrast to previous studies focusing on low inflation countries. Second, there is a debate in Europe on the potentially large asymmetries between price rigidity in the new as opposed to old EU members. These asymmetries would imply sharply asymmetric effects of monetary policies for New member states when join the Eurozone (Elbourne and de Haan, 2006). The presence of strong asymmetries would call for delaying entry in the Eurozone. One of the main objectives of our analysis is indeed to verify the view according to which a country like Slovakia, undergoing a process of massive structural change and market liberalization, is characterized by a more rigid price system, inducing a higher degree of inertia (persistence) in price dynamics (Dhyne *et al*., 2006). In fact, this view does not find empirical support in the case of Slovakia. By comparing price inertia for different sectors, characterized by different market structure, namely manufacturing vs. services, we find that lower degree of market competition is associated with higher price dispersion and lower persistence. This should not come as a surprise, as in the well-known staggered price model of Calvo (1983) as market competition increases inertia tends to increase rather than decrease (see Calvo, 2000). This result has relevant implications as the process of integration of Slovakia in the EU, and the attendant higher degree of competition in goods markets, is likely to increase rather than decrease inflation inertia.

More generally the paper provides evidence for a New EU member on the empirical regularities found for more advanced market economies. In this regard, Taylor (1999) identifies four stylized features of price setting in a market economy. First, price changes have an average frequency of about one year. Second, price setting is highly heterogeneous, with the average frequency of price changes varying dramatically across goods and services. Third, the frequency of price adjustments depends on the average rate of inflation. Fourth, there is

little evidence that price adjustment is synchronized. In this paper we attempt to verify the relevance of the first three regularities for Slovakia. In addition to these stylized facts, we also study the inflation persistence at the product level. In contrast to numerous previous studies of price stickiness based on a single market or a firm, we provide evidence on price setting for a significant part of the typical consumer basket.

In this paper we estimate the frequency and magnitude of price changes, price dispersion and inflation persistence at the level of price setter using a unique dataset, covering a large component of the Slovak consumer price index (CPI) during the period 1997-2001. In addition to the descriptive statistics, we identify the factors that affect price setting behavior. Namely, we study the determinants of frequency and size of price changes, the level of inflation persistence and price dispersion.

The paper is organized as follows. In section 2, we describe the dataset and provide some definitions that we use extensively in this paper. We study price setting behaviour of 423 narrowly defined products in section 3. Section 4 concludes. Appendices contain detailed product-specific results on price setting behaviour and formal definitions of price setting descriptive statistics.

2. Price Setting Behavior

Although there is disagreement on the relevant theoretical model for price setting, Calvo's staggered price model has become a sort of benchmark in the literature (Calvo 1983). In his reduced form, Calvo's model gives a useful framework for empirical analysis.

Calvo price setting has several virtues: first, it can accommodate the case of perfect competition and price flexibility as a limiting case; second, it highlights factors affecting inertia that are likely to be relevant in most theories of price adjustment; third, the model allows us to distinguish factors related to market structure from those linked to aggregate macro variables, that in turn are affected by policy.

As an illustration of the framework consider the following example in which we consider an *ad hoc* formulation of aggregate demand, which we assume depends on real monetary balances and the real interest rate. First, let us consider the well-known New Keynesian Phillips curve (NKPC) obtained from a discrete time version of Calvo's model. As in Calvo (1983), firms change their prices at random intervals, so that at each point in time there is a fraction α of firms that set new prices and a fraction $1-\alpha$ that keep their prices unchanged. New prices are set optimally by firms facing a downward-sloping demand function with price

elasticity -θ. Denoting with π the rate of inflation, such a NKPC relates current inflation to expected inflation and to current output gap (Y_t-Y_t^n):

$$\pi_t = \beta E_t \pi_{t+1} + [(1-\alpha)(1-\beta\alpha)/\alpha]\varsigma(Y_t - Y_t^n)$$

where β is the discount factor and ς a coefficient that characterizes the link between marginal costs and output. It is easy to show that the parameter ς is a decreasing function of the parameter θ, that measures the degree of competition in goods markets (see Woodford (2003) and Calvo (2000)). As markets become more competitive, ς declines. Under perfect competition (θ→∞) ς becomes zero.

The model can be closed by deriving the dynamics of the output gap and assuming a policy rule determining the interest rate.

Focusing on two parameters of the model: α, the frequency of price adjustment and, θ, the elasticity of substitution among goods, Calvo's model has two main implications: first the higher is α , the faster is the adjustment (lower inertia); second, and much less noted in the literature (Calvo 2000 is the exception), the higher is θ, thus the more competitive are goods markets, the slower is adjustment, and thus the higher is inertia. Note that in the simplest version of the model α is a constant. In Yun (1996) α is instead a function of the average inflation rate. In addition, α could be affected by market structure, and increase with market competition. Although more controversial, we assume in the empirical analysis that this channel could be at work, and thus, through higher α market competition reduces inertia. At the same time, market competition increases inertia through the parameter θ. The mechanism is related to the so-called strategic complementarity in price behavior and thus has to do with interaction among price setters (Woodford 2003). The intuition is that as competition increases firms will tend to "follow the pack", as deviations from the average price may push the firm out of the market (see Calvo, 2000).

Summing up, increasing market competition may increase or decrease inertia (persistence) depending on the relative strength of two conflicting effects. One plausible assumption would be that the effect of varying α with average inflation is rather weak: it is necessary to have a substantial increase in average inflation to modify significantly price behavior in terms of frequency of adjustment (Golosov and Lucas, 2005).

3. Empirical analysis

3.1 Dataset

We first illustrate the characteristics of the dataset and some methodological aspects of the analysis. The dataset contains the price records of 604 products collected at monthly frequency by the Slovak Statistical Office (SSO) in 38 districts[1] in 1997-2001. For each record in the dataset, there is information on the date (month and year), district, product category code and the price of item. The data allow tracking individual price dynamics. The price for each product is collected monthly at several stores in the district, but typically only from the capital town of the district.[2] On average, about five stores are monitored in a particular district. As a result, each product contains around 10 000 records. Together, this makes almost 5 millions observations (38 regions, 60 months and 5 stores) in the dataset.

The dataset contains actual prices as opposed to quoted prices or price indices. The unit or quantity of given product is identical across the stores (kg, g, piece, and liter).

Even though the dataset contains price records for 604 products, we work only with 423 products, excluding those products that featured a relatively high share of missing records or those for which it was impossible to follow the dynamics of prices.[3] Further reduction in our sample has been caused by the fact that up to 20% of CPI basket in Slovakia comprises regulated prices that are changed on the basis of administrative decisions. All remaining 423 products are listed in Appendix 2 including the product-specific descriptive statistics. Appendix 3 contains some additional methodological issues.

The products are classified into 12 main categories, according to COICOP – Classification of individual consumption by purpose. These are food and non-alcoholic beverages; alcoholic beverages and tobacco; clothing and footwear; housing, water, gas, and electricity; furnishing and maintenance of housing; health care expenses; transport; communications; leisure and culture; education; hotels, cafés, and restaurants; and miscellaneous goods and services.

Table 1 reports the original weight of given product category in the CPI basket, sample weight and the number of product in the sample for each category in the dataset.

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[1] This is a standard regional division in Slovakia. The districts are as follows: Bratislava, Bratislava – vicinity, Dunajska Streda, Galanta, Senica, Trnava, Povazska Bystrica, Prievidza, Trencin, Komarno, Levice, Nitra, Nove Zamky, Topolcany, Cadca, Dolny Kubin, Liptovsky Mikulas, Martin, Zilina, Banska Bystrica, Lucenec, Rimavska Sobota, Velky Krtis, Zvolen, Ziar nad Hronom, Bardejov, Humenne, Poprad, Presov, Stara Lubovna, Svidnik, Vranov nad Toplou, Kosice, Kosice-vicinity, Michalovce, Roznava, Spiska Nova Ves, and Trebisov.

[2] See Horvath and Vidovic (2004) for more details on the methodology of data collection at the SSO.

[3] It was the case that *x* stores prices were recorded in the month *t* in the particular region, but only *x-1* price records were collected in the month *t+1* without the indication in which store the price of the item has not been collected. For safety reasons, we excluded these products from the sample.

Table 1 – Coverage of the Dataset

	Original Weights	Sample Weights	Number of products in the sample
Food and Non-Alcoholic Beverages	23.60	36.17	121
Alcoholic Beverages and Tobacco	6.98	12.05	10
Clothing and Footwear	7.51	8.43	68
Housing, Water, Gas and Electricity	21.50	4.85	14
Furnishing & Maintenance of Housing	5.18	3.6	70
Health Care Expenses	1.45	0	0
Transport	9.25	9.75	20
Communications	2.73	0	0
Leisure and Culture	7.21	9.19	56
Education	0.58	0	0
Hotels, Cafés and Restaurants	7.22	9.42	30
Miscellaneous Goods and Services	6.79	6.54	34
Total	100	100	423

Box 1 contains a description of the statistics we analyze, while Appendix 1 provides formal derivation of these pricing statistics.

Box 1: Definition of the Descriptive Statistics

Frequency of price changes: is the ratio of price changes in the month to the number of observations for which the price of the particular product is available. This is only possible when there are two consecutive observations in the dataset. For example, the frequency of price changes is 3/7, if there are seven stores from which three of them changed the price as compared to the previous month. In order to produce more tractable information, we average the frequency across regions and time to obtain the final value of the frequency of price changes for a particular product. From this statistic, we recover the duration of single price spell by simply inverting the frequency estimate.

Size of price changes: is calculated as the percentage increase (decrease) of the price of particular item in the month *t* compared to the price of the same item in the month *t-1*, conditional on the occurrence of price change.

Price dispersion: is defined as the standard deviation of the difference between the log of the product sold at various stores in the month *t* and the average monthly specific log of price of the product.

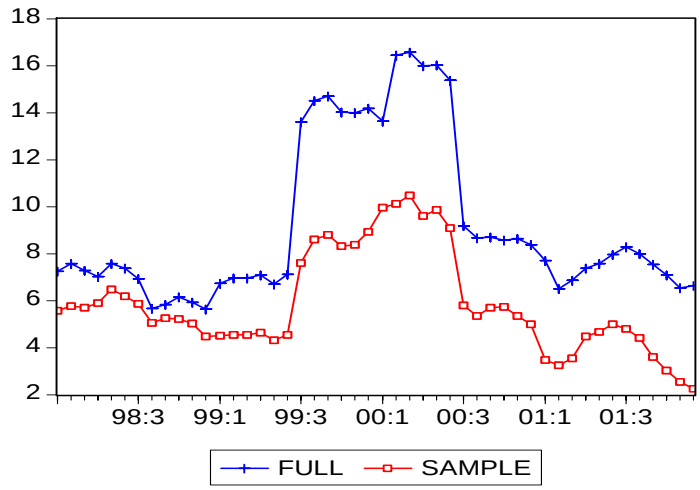
3.2 Evidence

This section contains evidence on price setting behavior in Slovakia. First, we characterize the dynamics of Slovak inflation and analyze its level of inflation persistence at the various level of aggregation. Second, we estimate the frequency of price changes and the implied duration of price spells. Third, estimation of the magnitude of price changes follows. Forth, we examine the links between the frequency and size of price changes. Finally, we study the factors determining price setting behavior. Appendix 2 contains detailed product-specific results on price setting behavior.

3.2.1 Inflation Dynamics and Persistence

In general, the average annual CPI inflation in Slovakia has been about 9% in the period 1998-2001. There is a notable hike in the inflation rate starting in mid 1999, which has been caused by the change of VAT, price deregulations and regulated prices increases. This one-off shock has merely changed the price level and thus largely vanished after one year. From the end of 2000, there is a gradual slowdown in the inflation rate to some 6% at the end of sample period.

Figure 1 – Official CPI inflation and sample inflation, 1998-2001



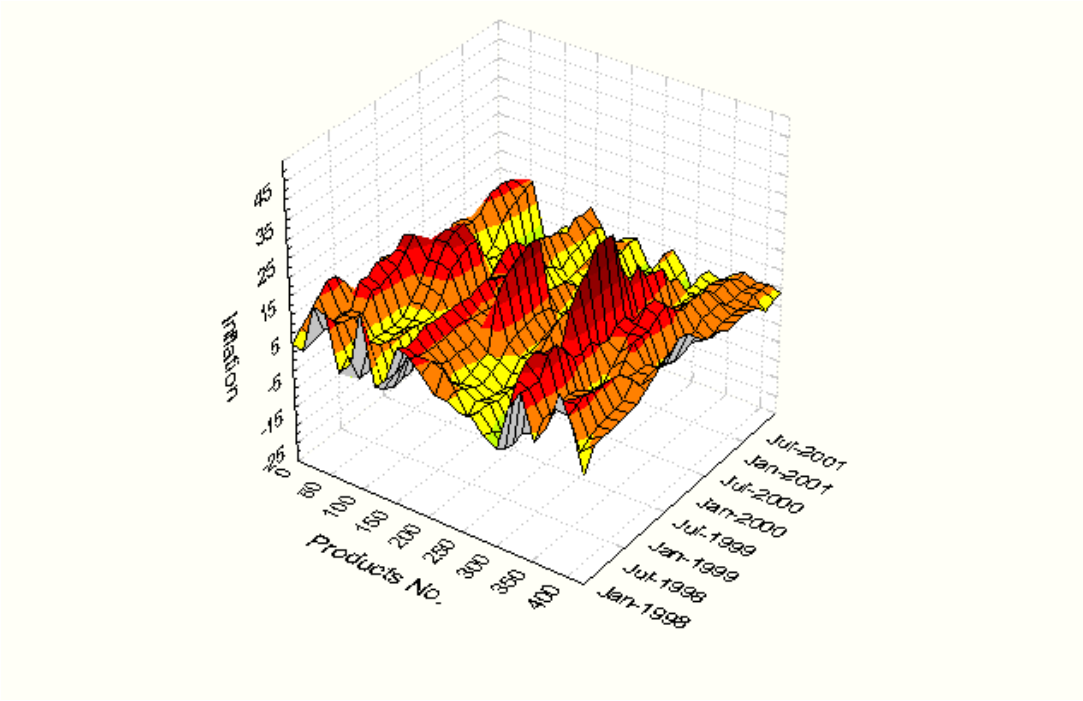
Source: Slovak Statistical Office, own calculations

Figure 1 reports the Slovak official CPI inflation and our sample inflation. The sample contains 57% of the full CPI basket. The sample inflation is lower than aggregate inflation by 3.3 percentage points on average. The difference between official and sample inflation is attributable chiefly to the inflation in regulated prices. For example, regulated prices increased

by 33% from January 1999 to January 2000. Given the weight in the CPI index of 17.8% (see Monetary Survey of National Bank of Slovakia, January 2000), this contributed by 5.9 p.p. to the official inflation and as such, it almost fully explains the difference between official and our sample inflation (Figure 1).

Figure 2 provides a detailed portrait of the structure of inflation across the products and over time. 5th order polynomial has been fitted to these data. The inflation rates differ widely across products, ranging from –19.9% (item 'Imitation of sewing silk') to 81.3% (item 'Suntan milk with protective factor') annually. Nevertheless, product-specific inflation rate has been 5,6% on average (in addition, median inflation has been very close to average inflation). It clearly appears that there is a considerable jump in the inflation rate of most products around the beginning of 2000, reflecting the aforementioned administrative changes.

Figure 2 –Inflation Distribution across Products, 1998-2001



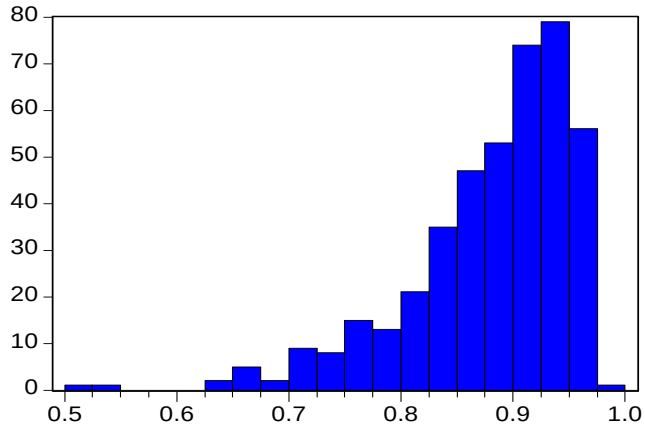
Next, we examine the degree of inflation inertia by applying a non-parametric measure of inflation persistence proposed by Marquez (2004) and Dias and Marquez (2005). This approach builds on the idea that less persistent inflation is more likely to cross its long-run (possibly time-varying) mean of inflation rate and assumes that long-run inflation is close to equilibrium inflation. Specifically, a measure of persistence γ is calculated as follows:

$\gamma = 1 - n/T$, where n is the number of times the series crosses its long-run mean and T is the number of observations. Given the length of our sample, we opt for more flexible method, i.e. we apply Hodrick-Prescott (H-P) filter to approximate the long-run mean.

This approach has several attractive features over more common parametric measure typically based on the sum of autoregressive parameters. Dias and Marquez (2005) derive finite sample and asymptotic properties of this non-parametric measure. They also conduct Monte Carlo simulations and find that the bias of the estimate of persistence based on non-parametric approach is smaller for any sample size, as compared to the parametric measure. Besides, they argue that non-parametric measure is more robust to structural breaks and additive outliers.

Marquez (2004) shows that values of γ close to 0.5 indicate absence of persistence in the series. Values significantly above 0.5 point to positive autocorrelation in the series, while the values substantially below 0.5 signal negative autocorrelation. Marquez (2004) also shows that $2\sqrt{T}(\gamma - 0.5)$ is approximately distributed as $N(0,1)$.

Figure 3 - Inflation Persistence, 423 products



The results presented in Figure 3 indicate that out of 423 products, only 4 of them displays no persistence (γ<0.66), while remaining 419 record positively persistent inflation at 5% significance level. Four products, for which inflation rate follows white-noise process, are as follows: cauliflower, bananas, tomatoes and crystal cup with holder. Relatively low inflation persistence also exhibits the products such as bathrobe for men, shirt for babies, dish cloth and a repair of automatic washing machine (see Appendix 2 for detailed results).

Generally, the degree of inflation persistence is largely similar across the main product categories. To obtain the estimates in Table 2, given the asymmetries within the sectors, we average the product-level inflation persistence, instead of estimating persistence on sectoral data directly, to reduce the potential aggregation bias, Granger, 1980). Indeed, the estimate of aggregate inflation is greater to the average estimates of the product-specific inflation persistence (0.9 vs. 0.87). All the sectors display very high persistence, with the persistence in services inflation somewhat lower.[4] This is surprising, as the services production is relatively more labor intensive and as such, it is expected that the persistence should be greater than for the other sectors. It is noteworthy that also Clark (2006) finds the smallest persistence in the services sectors in the U.S.. Similarly, the results of Lunnemann and Matha (2004) indicate that in 4-5 out of 15 EU countries the persistence in services inflation is smaller than the persistence of overall HICP (see also Altissimo et al., 2004). However, neither of these papers provides an explanation for this "services inflation persistence puzzle". Even though we do not want to overestimate the robustness of this result, it is remarkable that services, a sector typically characterized by a much lower degree of competition, does not display higher persistence in inflation. It is worth noting that Calvo's model of staggered prices predicts such result, as higher degree of competition in goods market produces a process of "follow the pack", which is consistent with a high degree of price homogeneity across firms (Calvo 2000). When markets are highly competitive individual prices cannot diverge much from the average, as firms would loose large shares of market. In the limit case of perfect competition prices would be exactly the same. This effect arises because the degree of strategic complementarity increases with higher competition, implying that the strategy of an individual price setting firm is an increasing function of the average strategy (price) in the market (see also Woodford (2003)). Therefore, although competition reduces costly dispersion in prices, from a dynamic perspective it may increase persistence.[5]

Table 2– Inflation Persistence, Raw vs. Processed Goods, Perishables and Durables, Non-Durables and Services

	No. of Products	Sample Weights	Inflation Persistence	Inflation Persistence – Weighed
Processed Goods	375	79.28	0.874	0.867

[4] The difference in the results between the expenditure-weighted and non-weighted persistence in services inflation is largely driven by a single item 'complete lunch in a factory canteen'. This item's inflation persistence stands at 0.71 and its sample weight is 6.9%.

[5] Coricelli (2005) discusses the implications of this issue for the conduct of monetary policy. Overview on inflation persistence and the conduct of monetary policy is presented in Levin and Moessner (2005).

Raw Goods	48	20.72	0.846	0.875
Perishables	64	23.65	0.862	0.869
Durables	231	36.39	0.874	0.886
Non-durables	136	49.62	0.874	0.876
Services	56	13.99	0.851	0.796
Total	423	100	0.871	0.868

Notes: Raw goods category contains meats, fruits, vegetables, milk, cream, honey, eggs, salt, mineral water, gasoline, fuel oil, motor oil and coolants. The results in the last column are expenditure-weighted. Non-durables contain mainly food and beverages. Services include mainly the category 'Hotels, cafés and restaurants' and fees and repairs for various categories of products. Durables contain the remaining products. Perishables are a sub-category of food.

3.2.2 Frequency of Price Changes

The results in Table 3 indicate that the expenditure-weighted frequency of price changes is 0.34 in the sample. This means that 1 in every 3 consumer prices is changed in a given month. It implies that the expenditure-weighted average duration of price spell is 3.75 months (and 4.2 months without CPI weights). As the distribution of the duration is asymmetric, the median duration reaches 3.9 months.[6] Thus, consumer prices in Slovakia change more often than the one year frequency often found in advanced market economies (see Dhyne *et al.*, 2006). The probability that the single price spell would last longer then 12 months is essentially zero. Namely, there are only 3 out of 423 products having the average duration of price spells longer than one year.

There is a considerable degree of heterogeneity in terms of the frequency of price changes. Products such as fruits and vegetables or gasoline typically change the price less than bimonthly. On the other hand, several services such as dancing course fee keep the price fixed for almost 2 years.[7] The duration of price spell is more than 7 months for services. One of typical reasons for this relatively high duration is that services are less exposed to international competition. Bils and Klenow (2004) note that the lower variability of demand for services can be behind their prolonged inaction of price adjustment. On the other hand, prices change most frequently for the raw goods. Diversification of inputs for raw goods is typically limited, as compared to processed goods and thus price change is triggered more likely.

Table 3 - Frequency of Price Changes, Raw vs. Processed Goods, Perishables and Durables, Non-Durables and Services

[6] Additional results using median, weighted median and simple average to estimate the frequency are available on a request.

[7] The results of the estimation of the frequency of price changes for all 423 products are reported in Appendix 2.

	No. of products	Sample Weights	Average Frequency	Average Duration
Processed Goods	375	79.28	0.28	4.3
Raw Goods	48	20.72	0.6	1.83
Perishables	64	23.65	0.46	2.43
Durables	231	36.39	0.34	3.76
Non-durables	136	49.62	0.35	3.75
Services	56	13.99	0.15	7.25
Total	423	100	0.34	3.75

Notes: Frequency refers to the frequency of price changes, i.e. empirical probability that price of the product will change. Duration indicates the number of months between price changes. CPI weights are used for weighting.

We report the histogram of the frequency of price changes in Figure 4. The frequency of price changes between 0.1-0.4 is far more common than other frequencies. There are only four products, truly flexible prices, changing the price more often than in 80% of the cases. Overall, there is no simple way of saying if prices are sticky or flexible, as the degree of price stickiness varies dramatically across the products being analyzed. The distribution of the frequency price changes is skewed to the right, similarly to what has been found for the other countries (see Diaz et al., 2004, for evidence on Portugal and Baharad and Eden, 2004, for Israel).

Figure 4 -Frequency of Price Changes

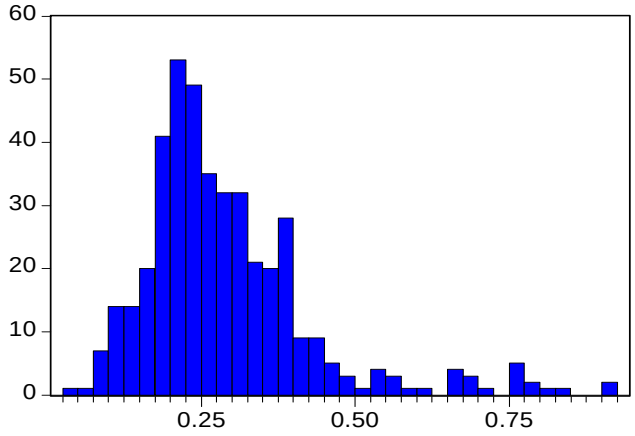


Table 4 puts our results in an international perspective. The frequency is somewhat higher in Slovakia than for comparable studies reflecting higher Slovak inflation in the sample period. However, there are also methodological differences. While Slovak, French and Portuguese statistical offices collect the price on temporary sales, Belgian price data collectors (see Aucremanne and Dhyne, 2004) are given the instruction to ignore the summer and winter

sales. Yet, neither study cover 100% of CPI and missing products do not necessarily overlap across the countries.

Despite some methodological differences results reveal certain common features across the countries in the pattern of price stickiness. The categories 'Hotels, cafés and restaurants' and 'Health care expenses', part of the service sector, display low frequencies in all the countries. On the other hand, food and non-alcoholic beverages feature relatively common price changes in almost all countries. This may reflect the extremely high frequency of price changes of unprocessed goods.[8]

Table 4 – Frequency of Price Changes, International Comparison

	Slovakia	Austria	Belgium	France	Italy	Luxembourg	Netherlands	Portugal	USA
Food and Non-Alcoholic Beverages	0.43	0.17	0.28	0.19	0.15	0.19	0.23	0.37	0.25
Alcoholic Beverages and Tobacco	0.31	0.15	0.11	0.22	0.08	0.14	0.19	0.14	NA
Clothing and Footwear	0.25	0.12	0.03	0.18	0.05	0.20	0.21	0.27	0.29
Housing, Water, Gas and Electricity	0.19	0.11	0.22	0.24	0.23	0.29	0.19	0.08	NA
Furnishing & Maintenance of Housing	0.24	0.07	0.04	0.16	0.04	0.18	0.08	0.11	0.26
Health Care Expenses	NA	0.06	0.11	0.08	NA	0.03	NA	0.05	0.09
Transport	0.59	0.36	0.21	0.36	0.28	0.21	0.88	0.26	0.39
Communications	NA	0.09	0.06	0.23	NA	0.04	NA	0.11	NA
Leisure and Culture	0.24	0.24	0.12	0.13	0.05	0.13	0.08	0.12	0.11
Education	NA	0.05	NA	0.06	NA	0.05	NA	0.08	NA
Hotels, Cafés and Restaurants	0.14	0.08	0.03	0.08	0.06	0.05	0.08	0.19	NA
Miscellaneous Goods and Services	0.25	0.07	0.06	0.12	0.04	0.11	0.10	0.11	0.11
% of CPI	57	100	68	65	20	100	8	100	---
Total	0.34	0.15	0.17	0.19	0.09	0.17	0.17	0.22	0.26

Notes: Own calculations for Slovakia, the authors of results in other countries are as follows: Austria – Baumgartner *et al*. (2005), Belgium - Aucremanne and Dhyne (2004), France - Baudry *et al*. (2004), Italy – Veronese *et al*. (2005), Luxembourg – Lunnemann and Matha (2005), Netherlands – Jonker *et al*. (2005), Portugal – Dias *et al*. (2004), USA – Bils and Klenow (2005). All averaged frequencies are expenditure-weighted. International comparison of the frequency of price changes in the Euro area countries based on 50 representative products is available in Dhyne et al. (2006).

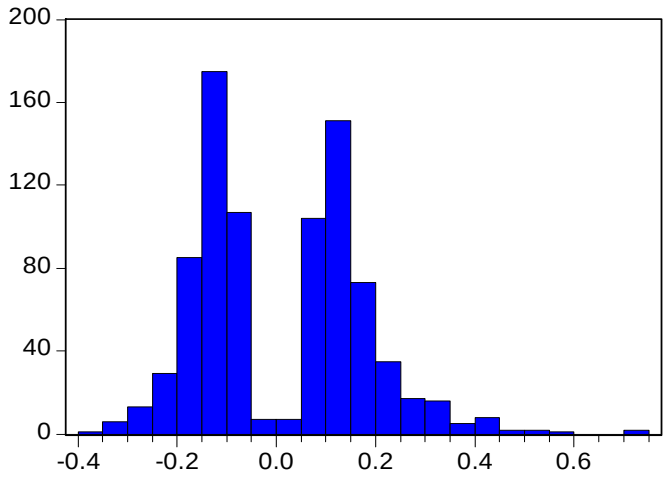
[8] We can also compare some of the results with a neighboring transition economy. Ratfai (2006) estimates the frequency of price changes using the store level monthly data of retail prices of 14 meat products in 1993-1996 in Hungary. He finds the frequency for this category about 0.4 on average. Examining all 20 meat products present in our dataset, we find the corresponding frequency slightly larger, with the corresponding average value of 0.48. Konieczny and Skrzypacz (2005) find the average frequency of price changes to be only 0.37 using 52 products from Poland over the period 1990-1996 with average inflation rate of 54%.

3.2.3 Magnitude of Price Changes

In this section, we estimate the average size of price increases and decreases. We find that the magnitude of both price changes is sizeable. The average size of expenditure-weighted price increases and decreases is 12% and -11%, respectively. The corresponding size of changes rises to 16% and -14% without CPI weights.

The results are comparable (though not directly given the slightly different methodologies applied) to the findings for other Euro area countries (see Dhyne *et al.*, 2006). The stylized fact of these studies for consumer price data is that the magnitude of price changes is typically nearly 10%, both for price increases and decreases. Thus, the Slovak data feature relatively larger size of price changes.

Figure 5 - Size of Price Changes



Although most price increases and decreases range between 5-15% in absolute terms (274 and 303 products, respectively), there are very long tails toward one, as apparent from the histogram in Figure 5.

Table 5 illustrates the results on the size of price changes. Typically, services exhibit the greatest magnitude of price changes reaching more than 15% in absolute terms. On the other hand, non-durables, raw goods and perishable products tend to change their price by a relatively smaller amount. In terms of the size of price changes, durables and processed goods stand somewhere in between.

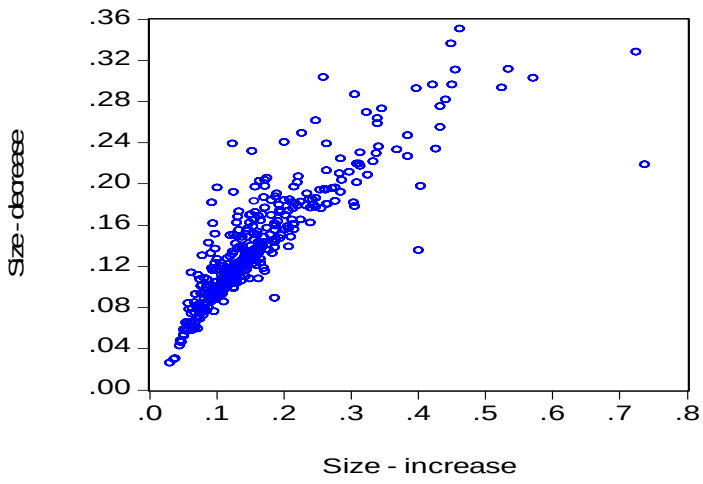
Table 5 - Size of Price Changes, Raw vs. Processed Goods, Perishables and Durables, Non-Durables and Services

	No. of products	Sample Weights	Increase – Weighted	Decrease - Weighted
Processed Goods	375	0.79	0.12	-0.12
Raw Goods	48	0.21	0.10	-0.08
Perishables	64	0.24	0.11	-0.10
Durables	231	0.36	0.13	-0.11
Non-durables	136	0.50	0.10	-0.10
Services	56	0.14	0.17	-0.15
Total	423	1	0.12	-0.11

Notes: See Table 2.

Next, we find a strong positive correlation between the magnitude of price increases and decreases (0.87 in the absolute values). This finding may reflect pricing practices at the retail level. Price decreases mainly point to temporary sales, while price increases are generally compatible with the end of sales as well as positive inflation.

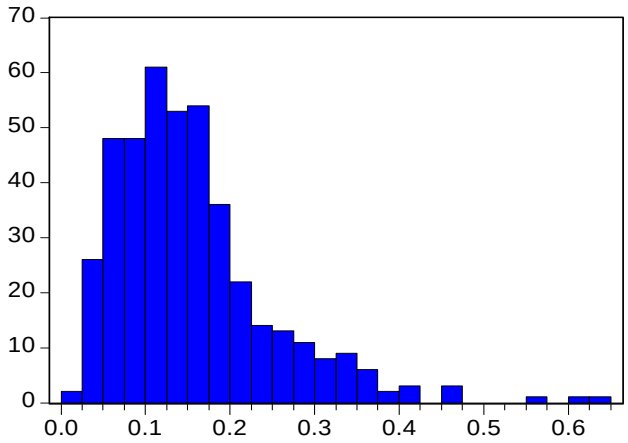
Figure 6 – Size of Price Increases and Decreases



3.2.4 Price Dispersion

Price dispersion is one of the characteristics of market structure. We examine to what extent prices of identical products sold in the same month differ across the regions and Figure 7 shows large variation in price dispersion.

Figure 7 –Product-Specific Price Dispersion



The results in Table 6 suggest prices in services sector are by far the most dispersed, in comparison to non-durables, raw goods and perishables is twice as much. Our results thus correspond to Crucini *et al.* (2005), who find, using micro data from the EU-15 that the price dispersion decreases with tradability of the product.

Table 6 – Price Dispersion, Raw vs. Processed Goods, Perishables and Durables, Non-Durables and Services

	No. of products	Sample Weights	Dispersion –Weighted	Dispersion – No weights
Processed Goods	375	0.79	0.130	0.161
Raw Goods	48	0.21	0.085	0.112
Perishables	64	0.24	0.081	0.100
Durables	231	0.36	0.155	0.172
Non-durables	136	0.50	0.078	0.094
Services	56	0.14	0.181	0.233

Notes: See Table 2.

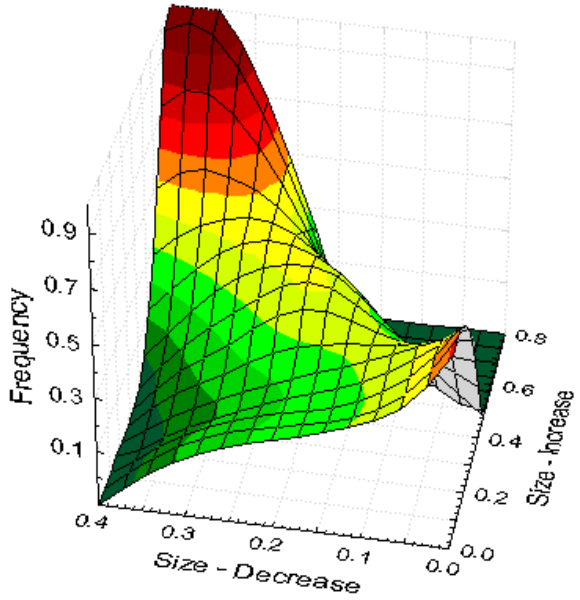
3.2.5 Trade-off between Frequency and Size of Price Changes?

Menu costs models predict that when there are significant costs of price adjustment, price adjustment should occur less frequently and the change should be sizeable (Mankiw, 1985). In this regard, Carlton (1986) finds a positive correlation between the frequency of price changes and average absolute price change. In principle, the correlation may differ according to whether the price increases or decreases. We find that the simple correlation between product-specific frequency and size of price increases fails to be significant. On the other hand, frequency is negatively correlated at the value of -0.17 with the size of price decreases. This

would suggest some mild support for the notion of trade-off between the frequency and the magnitude of price changes.

To examine this issue further, we fit spline among the frequency, size of price increases and decreases. Interestingly, results in Figure 8 suggest negative relationship between frequency and size only for more rigid prices. For the certain part of the basket, the relationship is reversed. These are products changing prices often and by large amounts (such as fruits and vegetables). The results also put forward that there are products with the convex costs of price adjustment in line with Rotemberg 1982 model. These products such as gasoline change prices often, but only by a tiny magnitude.

Figure 8 –Frequency and Size of Price Changes



3.2.6 Determinants of Price Setting Behavior

In this section we identify the factors that affect the firm's price adjustment, analyzing the determinants of inflation persistence, frequency and size of price changes and price dispersion.

Table 7 presents the results on the determinants of inflation persistence. We find that price dispersion, as a proxy for the level of market competition, tends to decrease persistence.[9] This

[9] The list of our instruments used in this section includes: raw goods, services, durables, perishables and expenditure weight. Note that the set of instruments differs across the tables and thus the degrees of freedom for Sargan-Hansen test varies correspondingly.

is in line with our conjecture laid out in section 2; more competitive environment is associated with greater persistence of shocks. Besides, greater frequency of price changes is associated with smaller persistence Galí (2004) shows that this finding is likely to be consequence of backward looking behaviour of some fraction of price setters. Assuming hybrid NKPC as in Gali and Gertler (1999), it is possible to show that inflation persistence is positive function of the fraction of backward looking price setters. In this regard, Cecchetti and Debelle (2006) claim that greater price rigidity generates more backward looking behavior and thus more persistence.

Table 7 – Determinants of Inflation Persistence

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Price dispersion	-0.18***		-0.41***		
	(0.07)		(0.12)		
Frequency		0.04	-0.17***		
		(0.04)	(0.06)		
Raw goods				-0.03**	-0.04**
				(0.01)	(0.02)
Services				-0.03**	-0.04***
				(0.01)	(0.01)
Durables					-0.01
					(0.01)
Perishables					-0.002
					(0.01)
No. of observations	423	423	423	423	423
R-squared	---	---	---	0.03	0.04
Sargan-Hansen test	7.97(0.09)	13.9(0.01)	1.17(0.56)	---	---
Estimation Method	GMM	GMM	GMM	OLS	OLS

Note: p-value is in the parentheses for Sargan-Hansen test.

Staggered price setting models imply that in the steady state the products with less frequent price changes exhibit greater price dispersion and smaller product-specific inflation rate. The price dispersion among the homogenous products may occur because of the inability of firms to adjust their price to a shock instantaneously. The greater the inability, the greater is price dispersion. Higher inflation rate erodes the real price more quickly and therefore price adjustment is triggered more often.

Baharad and Eden (2004) attempt to discriminate between the staggered price setting and uncertain and sequential trade (UST) models by running the regression of the frequency of

price changes on the price dispersion and inflation rate.[10] In contrast to the UST model, the staggered price setting model implies a significant relationship between frequency of price changes, price dispersion and inflation rate. In addition, we examine the importance of product characteristics in determining the length of inaction in price adjustment.

Table 8 provides the results on the determinants of frequency of price changes. The results suggest that product characteristics are the primary force triggering the price changes. Individual inflation rate matters as well. Price dispersion seems to be associated with less frequent price changes, but this result should be interpreted with caution, as the test for overidentifying restrictions is rejected. We have also tested whether we find any non-linear relationship between frequency and inflation, but we failed to find any significant non-linearity. All in all, our results rather give support to the staggered price setting model.

Table 8 – Determinants of Frequency of Price Changes

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Price dispersion	-3.62***		-1.63***		
	(0.78)		(0.21)		
Individual Inflation		0.06**	0.02**		
		(0.03)	(0.01)		
Raw goods				0.26***	0.17***
				(0.03)	(0.02)
Services				-0.10***	-0.17 ***
				(0.01)	(0.02)
Durables					-0.10***
					(0.01)
Perishables					0.05***
					(0.02)
No. of observations	423	423	423	423	423
R-squared	---	---	---	0.47	0.59
Sargan-Hansen test	6.00(0.01)	2.25(0.13)	11.87(0.01)	---	---
Estimation Method	GMM	GMM	GMM	OLS	OLS

Note: T-statistic in parentheses. Heteroscedasticity corrected standard errors & covariance. In the second and forth column, the instruments are as follows: Services, Raw goods, Durables and Perishables dummy. P-value is reported for the Sargan-Hansen test.

We present the results on the determinants of the size of price changes in Table 9. The positive relationship between the individual inflation rate and the size of price changes suggest that when inflation accelerates, there is a tendency for the frequency and size of price

[10] UST models assume that there is price dispersion in the equilibrium. There is a trade-off between high price and the probability of making a sale in the model. If seller quotes relatively low price, he increases the changes of selling his product. He may also charge high price, but at the expense that the probability of making a sale is then rather low. This implies that the seller does not have to change the price of a product, even if the inflation erodes his price. This is so, as it increases the probability of making a sale. Therefore, UST models claim that prices may be only seemingly rigid, to a certain extent.

changes to increase (Sheshinski and Weiss, 1977), albeit the effect is stronger on the frequency (Konieczny, 1993). Price dispersion is not significantly associated with the size of price changes. Product characteristics matter for the size of price changes as well.

Table 9 – Determinants of Size of Price Changes

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Price dispersion	0.32		0.43		
	(0.21)		(0.28)		
Individual Inflation		0.03***	0.02**		
		(0.01)	(0.01)		
Raw goods				0.03**	0.05**
				(0.01)	(0.02)
Services				0.10***	0.14***
				(0.01)	(0.02)
Durables					0.06***
					(0.01)
Perishables					0.03
					(0.02)
No. of observations	423	423	423	423	423
R-squared	---	---	---	0.12	0.17
Sargan-Hansen test	3.83(0.21)	1.16(0.76)	0.04(0.98)	---	---
Estimation Method	GMM	GMM	GMM	OLS	OLS

Note: Table presents the determinants of the size of price increases.

Table 10 contains the results on the determinants of price dispersion. We find that greater frequency of price changes decreases the dispersion, while individual inflation likely increases it. This is in line with e.g. Lach and Tsidon (1992) and Konieczny and Szkrypacz (2005), who also find that inflation increases price variability. In addition, prices in services exhibit greater dispersion, while prices of raw goods are typically less dispersed.

Table 10 – Determinants of Price Dispersion

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Frequency		-0.50***	-0.33***		
		(0.05)	(0.09)		
Individual Inflation	0.02***		0.02***		
	(0.01)		(0.01)		
Raw goods				-0.04***	0.01
				(0.01)	(0.01)
Services				0.09***	0.15 ***
				(0.02)	(0.02)
Durables					0.08***
					(0.01)
Perishables					0.01
					(0.01)

No. of observations	423	423	423	423	423
R-squared	---	---	---	0.12	0.25
Sargan-Hansen test	25.6(0.00)	3.43(0.18)	1.20 (0.27)	---	---
Estimation Method	GMM	GMM	GMM	OLS	OLS

4. Conclusions

This paper identifies the empirical features of price setting behavior at the level of price setter in Slovakia in 1997-2001 using a large dataset underlying consumer price index. The main conclusions are as follows.

Inflation persistence is relatively high for the majority of goods and services. One of our primary findings is that prices in services sector exhibit smaller inflation persistence, despite services are typically more labor-intensive. This is fully in line with Calvo (2000), who argues that more competitive environment may be associated with greater persistence in terms of response to shocks. Analogously, we find that products with greater price dispersion (a proxy for lower level of competition) exhibit smaller inflation persistence. Besides, more frequent price changes lead to smaller persistence as well.

Concerning our results on the frequency of price changes, one of three prices is changed every month on average. This implies that the duration of typical price spell is around four months. The duration is lower, as compared to most of studies on price setting mechanism using the data underlying consumer price index. For example, typical non-adjustment period is about one year in Euro area countries (Dhyne *et al.*, 2006). Nevertheless, there is a great deal of heterogeneity in the frequency of price changes across the categories of goods and services. In consequence, there are both flexible and sticky prices in the economy. This heterogeneity is much less prevalent for the size, as compared to the frequency of price changes.

The most frequent price changes occur for raw goods, with the average length of the inaction in price adjustment less than two months. This probably reflects the limited diversification of inputs and some of their 'material' characteristics. On the other hand, services feature around 7 month's non-adjustment period. Generally, our results show that price changes are less common, when the level of competition is lower. Frequency of price changes increases with the level of product-specific inflation.

Price changes are typically sizeable. When the prices are altered, it involves a change more than 10% on average (12% and 11% for increases and decreases in absolute terms, respectively). Yet, price increases are systematically larger than price decreases. There is also a strong correlation between the size of price increases and decreases. This may reflect pricing

policies of firms at the retail level. Price decreases mainly indicate temporary sales, while price increases are generally compatible with the end of sales. The relationship between frequency and size of price changes is non-linear. For majority of goods and services, there is a trade-off between the frequency and size of price changes, as simple staggered price setting model predicts. Nevertheless, there are also product changing price often and by relatively large amounts. Besides, we also find products, which prices seem to feature convex cost of adjustment a la Rotemberg (1982), namely the prices of these products change frequently and by small magnitude.

Next, we find that prices in services sector are by far the most dispersed, in comparison to non-durables, raw goods and perishables is twice as much. Price dispersion is smaller, when prices change more often. On the other hand, prices are more dispersed, when inflation accelerates.

All in all, frequency, persistence and inflation rate are higher in Slovakia as compared to West. Looking forward, higher market competition may increase persistence. By contrast, an increase in the importance of the service sector may in fact reduce persistence. Therefore, it is not easy to predict the tendency in persistence as Slovakia becomes more and more integrated with EU countries and its economic structure converges to that of EU countries.

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APPENDICES

APPENDIX 1 – PRICING STATISTICS

In this Appendix we derive formally the pricing statistics used thorough the paper. This includes the frequency of price changes, duration of single price spell, the size of price increases/decreases, and price dispersion (inflation persistence is already defined formally in the main text).

To define frequency of price changes and duration of single price spell formally, let p_{ist} denote the price of product i in store s at time t, where $t = 1,...,T$, $s = 1,...,S$ and $i = 1,...,I$. Let

$$x_{ist} = \begin{cases} 1 \text{ if } p_{ist} \neq p_{ist-1} \\ 0 \text{ if } p_{ist} = p_{ist-1} \end{cases}$$

As a result, the product-specific frequency of price changes, μ_i, is computed as:

$$\mu_i = \frac{1}{T}\sum_{t=1}^{T}\frac{1}{S}\sum_{s=1}^{S}x_{ist}$$

We compute average duration of single price spell, ϕ, as simple average over product-specific frequencies $\phi_1 = \frac{1}{I}\sum_{i=1}^{I}\mu_i^{-1}$ or weighted average of product-specific frequencies $\phi_2 = \frac{1}{I}\left(\sum_{i=1}^{I}\sum_{w=1}^{W}w_i\mu_i\right)^{-1}$, where w_i is the consumption weight of product i in the basket (note that $\sum_{w=1}^{W}w_i = 1$). Alternatively, the duration can be defined in terms of medians instead of averages.

The product-specific size of price increases, λ_i, is computed as $\lambda_i = \frac{1}{T}\sum_{t=1}^{T}\frac{\sum_{s=1}^{S}\varphi_{ist}\frac{p_{ist}-p_{ist-1}}{p_{ist-1}}}{\sum_{s=1}^{S}\varphi_{ist}}$,

where $\varphi_{ist} = \begin{cases} 1 \text{ if } p_{ist} > p_{ist-1} \\ 0 \text{ if } p_{ist} \leq p_{ist-1} \end{cases}$. Similarly, the product-specific size of price decreases, τ_i, is computed as $\tau_i = \frac{1}{T}\sum_{t=1}^{T} \frac{\sum_{s=1}^{S} \varsigma_{ist} \frac{p_{ist} - p_{ist-1}}{p_{ist-1}}}{\sum_{s=1}^{S} \varsigma_{ist}}$, where $\varsigma_{ist} = \begin{cases} 1 \text{ if } p_{ist} < p_{ist-1} \\ 0 \text{ if } p_{ist} \geq p_{ist-1} \end{cases}$. Average size of price change can be computed as the simple or weighted average (or median) of product-specific size of price changes.

Product-specific price dispersion is defined as follows. $\sigma_i = \frac{1}{T}\sum_{t=1}^{T} SD(\log p_{ijt})$, where $\log p_{ijt}$ is a logarithm of average price of product i at region j.

APPENDIX 2 – PRODUCT-SPECIFIC DESCRIPTIVE STATISTICS

Table 11 – Product-Specific Statistics for All 423 Products

	CPI Weights	Frequency	Duration (mean)	Price dispersion	Inflation rate – y-o-y change	Size - increase	Size - decrease	Inflation persistence
Rice	0,29	0,40	2,51	0,07	1.77	0,07	-0,07	0.88
Rice in boiling packets	0,03	0,38	2,66	0,08	-9.98	0,15	-0,16	0.93
Wheat Flour Half Fine	0,42	0,40	2,48	0,05	2.40	0,07	-0,08	0.95
Farina	0,03	0,31	3,19	0,04	6.02	0,06	-0,07	0.85
Rye bread	1,33	0,29	3,49	0,12	9.11	0,10	-0,10	0.88
Bread white	0,80	0,25	3,97	0,13	8.70	0,10	-0,13	0.85
White roll	1,02	0,22	4,63	0,09	5.03	0,13	-0,14	0.90
Christmas cake	0,61	0,29	3,43	0,13	8.82	0,10	-0,12	0.85
Biscuits without filling	0,17	0,35	2,88	0,10	9.38	0,09	-0,16	0.95
Biscuits with filling	0,33	0,36	2,79	0,07	7.30	0,05	-0,07	0.90
Waffles with filling	0,59	0,36	2,79	0,06	6.09	0,06	-0,07	0.90
Wafers without flavor	0,21	0,39	2,54	0,06	7.23	0,08	-0,10	0.90
Salted crackers	0,16	0,32	3,15	0,19	9.43	0,14	-0,14	0.90
Pasta (with eggs)	0,42	0,38	2,63	0,13	6.64	0,09	-0,09	0.90
Dumpling	0,31	0,30	3,33	0,11	7.24	0,08	-0,10	0.90
Puff pastry (listkove)	0,10	0,36	2,76	0,07	4.85	0,11	-0,12	0.88
Porridge (without flavor)	0,03	0,39	2,58	0,08	2.10	0,10	-0,10	0.80
Chuck roast with bone	0,23	0,37	2,69	0,08	2.66	0,09	-0,09	0.90
Boneless chuck roast	0,24	0,39	2,58	0,06	5.78	0,07	-0,08	0.85
Beef rear without bone	0,36	0,40	2,50	0,06	4.33	0,06	-0,07	0.80
Beef joint without bone, lower	0,09	0,32	3,13	0,06	4.80	0,07	-0,08	0.80
Pork meat with bone	0,93	0,57	1,75	0,04	4.83	0,06	-0,06	0.73
Pork neck with bone	0,43	0,54	1,84	0,04	5.04	0,07	-0,06	0.83
Flank of bacon	0,29	0,54	1,84	0,05	5.96	0,11	-0,10	0.93
Pork leg without bone	0,36	0,57	1,76	0,06	3.76	0,09	-0,08	0.83
Pork shoulder without bone	0,47	0,56	1,78	0,05	4.34	0,07	-0,06	0.88
Chicken without insides	1,16	0,53	1,90	0,03	6.15	0,05	-0,06	0.88
Chicken portioned fresh and frozen	1,19	0,49	2,02	0,04	2.99	0,08	-0,08	0.90
Pork diet salami	0,28	0,46	2,17	0,06	0.81	0,08	-0,08	0.90
Fine frankfurters	0,61	0,47	2,13	0,05	1.62	0,07	-0,07	0.93
Ham salami	0,52	0,47	2,12	0,04	0.90	0,06	-0,06	0.93
Durable salami	0,59	0,38	2,62	0,06	4.50	0,06	-0,08	0.80
Boneless smoked pork neck	0,16	0,58	1,73	0,06	7.39	0,13	-0,12	0.90
Pork stewed ham	0,59	0,44	2,30	0,04	2.44	0,06	-0,06	0.93
Smoked bacon with skin	0,26	0,37	2,69	0,13	10.20	0,16	-0,17	0.90
Luncheonmeat pork	0,03	0,35	2,86	0,10	1.78	0,11	-0,11	0.88
Pork meat paste	0,55	0,40	2,48	0,12	3.40	0,11	-0,10	0.93
Pork liver	0,10	0,33	3,05	0,08	0.78	0,09	-0,09	0.93

File-fish not breaded	0,43	0,45	2,24	0,07	12.90	0,16	-0,17	0.93
Carp (live and frozen)	0,07	0,22	4,51	0,28	4.18	0,16	-0,13	0.93
Smoked fish (mackerel with head)	0,05	0,33	3,05	0,08	10.94	0,08	-0,09	0.93
Sardines in oil	0,24	0,38	2,60	0,07	6.82	0,07	-0,07	0.95
Fish salad with mayonnaise	0,26	0,35	2,89	0,12	8.64	0,10	-0,14	0.88
Fish in sour	0,09	0,36	2,78	0,08	10.11	0,13	-0,17	0.93
Pasteurized half-fat milk	0,90	0,30	3,29	0,07	6.99	0,05	-0,05	0.88
Thick milk Tatra without sugar	0,02	0,33	3,00	0,04	11.14	0,08	-0,13	0.83
Dried Milk for Babies	0,09	0,39	2,60	0,06	6.15	0,15	-0,13	0.93
Dried Milk Half-fat	0,02	0,41	2,45	0,06	3.87	0,10	-0,10	0.93
Fruit yoghurt	1,02	0,39	2,54	0,07	-0.10	0,06	-0,08	0.95
Sour milk (acidophilus)	0,16	0,27	3,74	0,24	79.07	0,40	-0,14	0.95
Sweet cream 33%	0,24	0,31	3,25	0,05	5.86	0,05	-0,05	0.90
Sour cream	0,29	0,32	3,16	0,07	6.48	0,08	-0,11	0.78
Cheese Eidam, block	0,74	0,39	2,53	0,05	5.87	0,05	-0,06	0.88
Spreadable cheese	0,68	0,39	2,60	0,07	-9.23	0,07	-0,11	0.95
Ostiepok rolled smoked cheese	0,03	0,39	2,59	0,10	7.94	0,07	-0,08	0.83
Mold cheese Niva	0,09	0,34	2,93	0,06	7.81	0,08	-0,11	0.98
Bryndza sheep cheese	0,14	0,50	2,01	0,05	7.22	0,06	-0,08	0.87
Eggs (chicken, fresh)	0,80	0,65	1,54	0,07	4.81	0,11	-0,10	0.90
Butter	0,68	0,45	2,20	0,05	-0.47	0,06	-0,06	0.93
Margarine	0,66	0,38	2,60	0,08	4.15	0,07	-0,08	0.95
Edible oil	0,85	0,39	2,56	0,05	4.60	0,06	-0,06	0.95
Pork lard	0,03	0,50	1,98	0,14	5.05	0,16	-0,14	0.93
Apples	0,59	0,77	1,30	0,11	6.45	0,17	-0,16	0.85
Oranges	0,28	0,81	1,23	0,08	6.57	0,16	-0,12	0.90
Mandarins	0,24	0,79	1,27	0,10	3.91	0,18	-0,14	0.85
Lemons	0,12	0,77	1,29	0,07	2.27	0,12	-0,10	0.78
Kiwi	0,07	0,77	1,30	0,17	6.11	0,33	-0,21	0.85
Bananas	0,55	0,83	1,21	0,06	7.87	0,16	-0,13	0.54
Dried grapes	0,05	0,42	2,39	0,07	6.41	0,11	-0,11	0.90
Peanuts peeled salted	0,29	0,41	2,45	0,09	-0.97	0,10	-0,10	0.93
Poppy seeds	0,05	0,39	2,54	0,11	6.04	0,17	-0,14	0.93
Celery	0,02	0,61	1,64	0,17	5.91	0,31	-0,22	0.68
Carrot	0,07	0,72	1,40	0,16	9.38	0,31	-0,22	0.78
Parsley	0,03	0,75	1,33	0,17	19.20	0,37	-0,23	0.88
Cauliflower	0,10	0,78	1,28	0,18	4.28	0,38	-0,23	0.51
Cabbage (white)	0,10	0,66	1,51	0,15	4.64	0,33	-0,22	0.76
Salad cucumbers	0,14	0,92	1,09	0,15	4.14	0,72	-0,33	0.71
Paprika	0,21	0,90	1,11	0,18	5.64	0,52	-0,29	0.78
Onion	0,10	0,68	1,47	0,12	4.59	0,24	-0,19	0.88
Tomatoes	0,28	0,67	1,50	0,41	5.37	0,44	-0,28	0.63
Beans white dried	0,03	0,36	2,75	0,10	3.70	0,09	-0,09	0.95
Lentils (big)	0,03	0,35	2,85	0,08	3.54	0,08	-0,09	0.90
Frozen vegetable mix	0,19	0,38	2,62	0,13	9.97	0,12	-0,13	0.85
Frozen spinaches	0,03	0,38	2,62	0,08	2.83	0,10	-0,10	0.93
Sour cabbage (sterilized)	0,07	0,39	2,57	0,07	4.73	0,11	-0,10	0.90
Sterilized peas in salty water	0,07	0,33	3,00	0,12	4.22	0,15	-0,14	0.93
Paprika and tomatoes sterilized (without sausage)	0,02	0,48	2,10	0,07	-4.43	0,17	-0,19	0.88
Potatoes	0,40	0,67	1,49	0,14	7.66	0,40	-0,20	0.78
Potato chips	0,16	0,39	2,53	0,08	8.75	0,09	-0,09	0.93
Frozen French fries	0,10	0,45	2,24	0,11	0.04	0,11	-0,11	0.95
Crystal sugar	0,61	0,42	2,39	0,04	8.23	0,10	-0,08	0.88
Ground sugar	0,14	0,42	2,37	0,05	9.17	0,11	-0,10	0.93

Honey	0,12	0,46	2,15	0,10	1.92	0,11	-0,11	0.95
Strawberry jam	0,03	0,32	3,11	0,06	3.02	0,07	-0,08	0.93
Milk chocolate	0,45	0,39	2,54	0,08	4.32	0,06	-0,07	0.83
Cooking chocolate	0,12	0,37	2,68	0,05	3.96	0,08	-0,10	0.83
Chocolate bar with filling	0,26	0,34	2,97	0,09	6.77	0,09	-0,12	0.90
Dessert chocolates	0,29	0,40	2,48	0,10	8.31	0,07	-0,07	0.83
Fruit jelly	0,07	0,34	2,90	0,11	7.77	0,09	-0,10	0.88
Hard candies without filling	0,31	0,39	2,57	0,08	10.04	0,07	-0,07	0.90
Chewing gum - slices	0,42	0,23	4,37	0,18	-2.47	0,11	-0,12	0.93
Salt	0,07	0,25	3,94	0,04	5.28	0,05	-0,06	0.85
Ground sweet paprika	0,09	0,38	2,62	0,10	6.70	0,13	-0,11	0.88
Ground pepper	0,07	0,40	2,50	0,11	18.51	0,18	-0,13	0.85
Caraway not ground	0,02	0,34	2,90	0,15	4.34	0,20	-0,15	0.78
Vinegar 8%	0,10	0,34	2,94	0,06	1.82	0,10	-0,10	0.93
Mustard full-fat	0,17	0,32	3,08	0,06	3.77	0,07	-0,08	0.76
Ketchup	0,21	0,44	2,26	0,10	1.23	0,10	-0,10	0.83
Mayonnaise	0,10	0,39	2,57	0,10	39.82	0,19	-0,09	0.95
Baking powder	0,03	0,26	3,81	0,06	-2.52	0,16	-0,15	0.90
Fresh yeast	0,07	0,27	3,72	0,31	11.92	0,21	-0,14	0.95
Dehydrated soup (not instant)	0,19	0,39	2,56	0,17	2.49	0,10	-0,10	0.85
Vanilla pudding	0,07	0,31	3,18	0,07	9.00	0,10	-0,09	0.88
Dried vegetable flavoring	0,21	0,35	2,86	0,05	4.14	0,08	-0,07	0.85
Coffee beans	0,90	0,43	2,33	0,08	-0.98	0,09	-0,09	0.95
Instant coffee with caffeine	0,31	0,36	2,79	0,09	5.69	0,08	-0,09	0.85
Black tea without flavor	0,28	0,32	3,17	0,17	3.36	0,12	-0,13	0.80
Cocoa powder	0,05	0,34	2,90	0,05	0.38	0,09	-0,09	0.80
Cocoa granko	0,12	0,36	2,81	0,04	5.04	0,06	-0,06	0.83
Table mineral water	0,66	0,29	3,41	0,11	7.42	0,11	-0,12	0.93
Fruit syrup	0,33	0,31	3,20	0,07	-0.04	0,06	-0,06	0.95
Rum 38-40%	0,36	0,36	2,77	0,03	2.27	0,05	-0,06	0.95
Vodka 38-40%	1,56	0,33	3,01	0,09	-4.92	0,07	-0,09	0.95
Brandy 38-40%	1,26	0,37	2,71	0,08	-7.99	0,06	-0,11	0.95
Bottled red wine	0,38	0,36	2,79	0,04	4.30	0,05	-0,05	0.90
Bottled white wine	0,88	0,36	2,80	0,05	3.20	0,05	-0,05	0.85
Bottled sparkling wine	0,68	0,31	3,18	0,03	3.49	0,05	-0,05	0.88
Beer 10% bottled	1,11	0,28	3,57	0,09	7.01	0,08	-0,08	0.85
Beer 12% bottled	0,78	0,29	3,45	0,09	6.20	0,07	-0,07	0.85
Cigarettes "Mars" 20 pieces	4,41	0,30	3,31	0,03	10.94	0,07	-0,06	0.85
Cigarettes "Dalila" 20 pieces	0,62	0,22	4,61	0,04	12.88	0,12	-0,24	0.88
Cotton dress for women	0,16	0,26	3,78	0,17	16.00	0,26	-0,20	0.90
Synthetic dress material	0,05	0,29	3,42	0,17	14.42	0,26	-0,19	0.95
Wool dress for women	0,02	0,18	5,52	0,12	-0.20	0,12	-0,10	0.76
Short underwear for men	0,07	0,35	2,85	0,20	8.55	0,13	-0,10	0.83
Long knitted underwear for men	0,02	0,39	2,55	0,13	1.47	0,12	-0,11	0.76
Undershirt for men	0,03	0,32	3,15	0,13	2.62	0,13	-0,11	0.80
Pajamas for men (from fabric)	0,09	0,32	3,13	0,15	5.14	0,14	-0,12	0.76
Shorts for men	0,03	0,25	3,96	0,14	3.74	0,14	-0,12	0.90
Bathrobe for men	0,02	0,18	5,53	0,21	5.75	0,23	-0,19	0.66
Panties for women	0,16	0,33	3,00	0,18	10.29	0,13	-0,12	0.88
Women night-gown	0,03	0,37	2,72	0,16	4.18	0,13	-0,11	0.88
Women slip	0,00	0,29	3,40	0,14	8.06	0,13	-0,11	0.95
Pajamas for women (from fabric)	0,09	0,30	3,30	0,14	5.59	0,16	-0,14	0.88
Ladies bra	0,23	0,34	2,95	0,18	9.72	0,12	-0,11	0.85
Home dress for women	0,02	0,27	3,74	0,26	4.69	0,18	-0,14	0.73

Shirt for babies (from fabric)	0,00	0,24	4,11	0,10	6.51	0,12	-0,11	0.66
Cotton napkins for babies tetra	0,00	0,29	3,47	0,05	5.04	0,09	-0,10	0.93
Short sleeved shirt for babies	0,14	0,27	3,70	0,32	13.12	0,19	-0,16	0.83
Panties for girls	0,02	0,30	3,31	0,12	4.31	0,12	-0,12	0.76
Underwear for boys	0,02	0,31	3,23	0,16	2.57	0,13	-0,12	0.78
Children pajamas	0,07	0,35	2,87	0,14	5.47	0,13	-0,12	0.85
Shirt for babies without sleeves	0,02	0,27	3,69	0,13	4.77	0,12	-0,11	0.90
Shorts for boys	0,00	0,18	5,60	0,18	8.72	0,29	-0,20	0.93
Long winter coat for men	0,07	0,19	5,34	0,10	4.97	0,14	-0,13	0.93
Winter jacket for men	0,31	0,24	4,16	0,18	4.72	0,17	-0,14	0.88
Longer leather jacket for men	0,12	0,24	4,16	0,15	1.23	0,16	-0,13	0.83
Spring jacket for men	0,09	0,18	5,56	0,15	4.72	0,21	-0,17	0.83
Short sleeved shirt for men	0,42	0,24	4,12	0,22	1.30	0,14	-0,12	0.83
Long winter coat for women	0,42	0,22	4,65	0,12	4.75	0,13	-0,12	0.93
Winter jacket for women	0,24	0,20	5,03	0,21	4.88	0,17	-0,14	0.88
Rabbit fur coat for women	0,09	0,18	5,46	0,13	3.00	0,13	-0,14	0.78
Long spring coat for women	0,12	0,22	4,50	0,11	4.10	0,15	-0,12	0.95
Thin costume for women	0,57	0,31	3,22	0,13	5.19	0,16	-0,14	0.88
Summer dress for women	0,24	0,16	6,30	0,15	1.19	0,22	-0,18	0.93
Tailoring of a dress for women	0,05	0,11	8,94	0,34	6.67	0,20	-0,24	0.90
Spring children jacket	0,07	0,21	4,73	0,31	0.55	0,28	-0,21	0.88
Winter jacket for boys	0,35	0,21	4,78	0,21	-4.23	0,21	-0,15	0.88
Jeans for boys	0,40	0,19	5,40	0,36	12.59	0,18	-0,14	0.86
Small baby coat	0,02	0,31	3,28	0,19	4.94	0,15	-0,13	0.88
Baby stockings	0,02	0,31	3,23	0,20	3.69	0,14	-0,12	0.83
Stockings for women	0,24	0,23	4,43	0,26	2.89	0,10	-0,09	0.93
Stocking for children	0,07	0,28	3,61	0,12	0.11	0,14	-0,14	0.90
Handkerchief for women	0,00	0,25	4,02	0,12	4.02	0,13	-0,12	0.88
Shawl for adults	0,03	0,16	6,43	0,13	6.55	0,20	-0,17	0.93
Felt hat for men	0,00	0,21	4,87	0,21	1.13	0,18	-0,17	0.93
Fur cap for women	0,00	0,20	5,09	0,17	7.98	0,22	-0,17	0.90
Knit cap for children	0,05	0,18	5,41	0,25	2.68	0,16	-0,14	0.83
Knit gloves for children	0,02	0,21	4,78	0,17	6.33	0,21	-0,20	0.88
Tie for men	0,05	0,23	4,30	0,22	4.93	0,13	-0,12	0.88
Thread for sewing, Tebex	0,02	0,23	4,33	0,19	5.48	0,09	-0,09	0.80
Imitation of sewing silk (Nora)	0,00	0,13	7,89	0,12	-3.43	0,12	-0,11	0.90
Knit tread	0,05	0,21	4,76	0,14	-19.86	0,12	-0,13	0.95
Elastic waistband	0,00	0,19	5,26	0,10	5.41	0,21	-0,18	0.95
Metal zipper	0,02	0,18	5,41	0,15	6.43	0,12	-0,11	0.90
Cleaning of trousers in 3 days	0,02	0,10	9,92	0,08	4.98	0,21	-0,16	0.90
Cleaning of coats	0,03	0,12	8,42	0,37	11.94	0,15	-0,15	0.93
Leather walking shoes for men	0,38	0,35	2,85	0,25	4.43	0,10	-0,10	0.88
Leather walking shoes for men, sandals	0,07	0,22	4,63	0,11	8.87	0,24	-0,18	0.90
Leather winter shoes	0,23	0,19	5,19	0,18	11.47	0,15	-0,13	0.93
Leather sport shoes	0,38	0,29	3,51	0,11	7.92	0,21	-0,16	0.83
Leather walking shoes for women	0,55	0,28	3,60	0,20	5.14	0,14	-0,12	0.71
Leather shoes for women, sandals	0,36	0,23	4,27	0,16	11.12	0,19	-0,16	0.93
Leather winter shoes for women	0,52	0,21	4,66	0,17	8.80	0,16	-0,13	0.85
Textile indoor shoes for women, slippers	0,09	0,31	3,24	0,14	7.02	0,14	-0,12	0.88
Baby leather shoes	0,00	0,24	4,11	0,11	4.85	0,19	-0,16	0.95
Plastic winter shoes for children - boots	0,24	0,23	4,27	0,13	5.67	0,08	-0,09	0.73
Leather summer shoes for children, sandals	0,10	0,23	4,36	0,08	5.68	0,21	-0,16	0.93
Women's shoes heels repair	0,05	0,28	3,60	0,15	3.47	0,19	-0,19	0.90
Paint (Primalex, Farmal, Permal etc.)	0,19	0,25	4,06	0,21	9.00	0,17	-0,14	0.90

Basic synthetic paint	0,10	0,23	4,36	0,08	9.05	0,11	-0,11	0.93
Synthetic and oil paint thinner	0,03	0,22	4,47	0,15	4.51	0,12	-0,15	0.85
Cement	0,57	0,22	4,52	0,07	10.10	0,09	-0,18	0.93
Lime	0,05	0,18	5,66	0,06	9.91	0,09	-0,12	0.88
Ceramic tiles, smooth, natural	0,64	0,22	4,59	0,09	7.94	0,14	-0,14	0.95
Porous white and colored wall tiles	0,36	0,20	5,12	0,16	12.31	0,14	-0,13	0.78
Wood (imitation of wood) board	0,23	0,10	9,88	0,16	6.94	0,12	-0,13	0.76
Lever faucet	0,31	0,22	4,51	0,37	4.96	0,11	-0,10	0.90
WC bowl with flusher	0,14	0,24	4,17	0,16	1.42	0,09	-0,08	0.85
Installation services	0,21	0,13	7,97	0,09	5.44	0,15	-0,17	0.90
Painting services	0,47	0,12	8,13	0,29	2.26	0,18	-0,18	0.95
Varnishing of doors and windows	0,14	0,14	7,36	0,41	15.09	0,15	-0,16	0.90
Glass services	0,12	0,16	6,31	0,26	11.36	0,15	-0,23	0.78
Upholstered chair	0,14	0,23	4,36	0,19	5.78	0,12	-0,11	0.93
Kitchen table	0,05	0,21	4,71	0,25	6.07	0,22	-0,21	0.71
Two door closet for clothes	0,16	0,16	6,30	0,13	0.77	0,09	-0,09	0.88
Kitchen cupboard	0,50	0,21	4,72	0,18	2.46	0,11	-0,11	0.73
Bed with storage	0,12	0,15	6,62	0,11	-1.47	0,09	-0,09	0.93
Bed for children with mattress	0,00	0,22	4,46	0,11	3.90	0,08	-0,08	0.90
Furniture set for living room	0,33	0,21	4,87	0,18	-0.23	0,18	-0,15	0.93
Upholstered set	0,54	0,24	4,17	0,10	1.44	0,11	-0,11	0.85
Set of plastic garden furniture	0,03	0,20	5,02	0,22	-2.37	0,10	-0,10	0.95
Synthetic carpet sewn-in	0,14	0,25	3,95	0,19	2.38	0,12	-0,10	0.83
Plastic floor covering (pvc)	0,10	0,27	3,76	0,15	-1.96	0,16	-0,20	0.93
Repair of upholstered sitting set	0,05	0,10	9,75	0,34	-2.76	0,34	-0,24	0.95
Curtains	0,16	0,21	4,78	0,28	-9.76	0,12	-0,11	0.93
Bed sheet	0,03	0,16	6,07	0,17	4.68	0,10	-0,09	0.76
Bed linen for children - 1 bed	0,00	0,23	4,37	0,08	1.60	0,13	-0,12	0.90
Bed linen for adults - 1 bed damask	0,02	0,27	3,66	0,12	3.08	0,15	-0,13	0.73
Bed linen for adults - 1 bed	0,09	0,32	3,16	0,16	3.10	0,09	-0,09	0.80
Turkish towel	0,05	0,31	3,27	0,10	2.82	0,15	-0,16	0.90
Table cloth	0,07	0,28	3,54	0,15	5.87	0,13	-0,10	0.78
Dish cloth	0,02	0,21	4,65	0,09	2.41	0,11	-0,10	0.66
Big synthetic blanket (Larisa)	0,03	0,23	4,42	0,09	4.21	0,10	-0,10	0.93
Comforter filled with synthetic material	0,07	0,19	5,17	0,12	2.73	0,11	-0,12	0.93
Down comforter; quilt feather filling	0,00	0,18	5,62	0,09	-5.22	0,09	-0,13	0.93
Refrigerator with freezer 260 liter	0,23	0,32	3,11	0,08	0.68	0,09	-0,09	0.88
Freezer 130 liter	0,02	0,19	5,23	0,04	1.13	0,07	-0,07	0.88
Air damper	0,02	0,23	4,27	0,33	-15.92	0,30	-0,29	0.93
Electric suitcase sewing machine	0,05	0,35	2,84	0,14	1.19	0,19	-0,17	0.93
Electric kitchen robot	0,03	0,22	4,50	0,20	1.40	0,13	-0,12	0.93
Electric hand whipping tool	0,03	0,23	4,44	0,09	3.62	0,10	-0,09	0.93
Electric juicer	0,02	0,19	5,26	0,18	-0.32	0,12	-0,11	0.78
Electric fryer	0,02	0,21	4,70	0,13	0.01	0,15	-0,13	0.88
Electric coffee maker with filter	0,02	0,25	4,04	0,15	2.10	0,09	-0,09	0.90
Repair of electric refrigerator	0,03	0,23	4,33	0,21	5.09	0,12	-0,11	0.83
Repair of automatic washing machine	0,05	0,17	5,99	0,20	5.20	0,12	-0,15	0.66
Repair of electric vacuum cleaner	0,02	0,15	6,58	0,30	18.88	0,25	-0,26	0.90
Repair of combined stove	0,00	0,09	11,69	0,35	6.08	0,13	-0,14	0.80
Glass without holder 100ml	0,09	0,30	3,34	0,22	2.60	0,13	-0,14	0.90
Lead crystal cup with holder	0,05	0,28	3,59	0,16	2.91	0,13	-0,12	0.63
Plate set for 6 persons	0,12	0,25	3,99	0,15	7.24	0,12	-0,12	0.95
Porcelain cup with decorations	0,05	0,25	4,02	0,11	5.59	0,10	-0,09	0.93
Storage cans Omnia 720ml	0,02	0,21	4,71	0,08	5.42	0,15	-0,13	0.80

Glass bowl from silex with cover	0,02	0,29	3,48	0,10	8.38	0,12	-0,13	0.93
Kitchen pot 4 liters	0,07	0,30	3,35	0,26	12.21	0,14	-0,11	0.95
Enameled tea kettle	0,02	0,27	3,68	0,10	5.25	0,14	-0,13	0.85
Cutlery for 6 persons - rustles	0,02	0,30	3,34	0,22	-0.52	0,17	-0,14	0.93
Kitchen knife with plastic handle	0,03	0,27	3,77	0,20	2.95	0,11	-0,11	0.83
Soup ladle - rustles	0,00	0,21	4,66	0,11	4.42	0,12	-0,11	0.95
Pan without cover - tefal	0,09	0,30	3,39	0,16	4.26	0,14	-0,13	0.95
Plastic bottle for babies	0,02	0,29	3,43	0,17	3.56	0,19	-0,15	0.90
Kitchen scales - 1 bowl	0,03	0,22	4,54	0,07	7.69	0,13	-0,16	0.95
Wooden ladle	0,03	0,23	4,42	0,13	4.39	0,14	-0,12	0.83
Vacuum bottle without pump, 1 liter	0,09	0,28	3,61	0,08	5.08	0,10	-0,09	0.95
Electric drilling machine - two speeds	0,10	0,24	4,13	0,14	2.98	0,13	-0,12	0.76
Flat light switch	0,03	0,25	4,05	0,11	6.42	0,13	-0,16	0.93
Electric adapter	0,02	0,20	5,03	0,07	2.94	0,12	-0,12	0.83
Thin battery 1,5 v (alkaline)	0,17	0,25	3,99	0,13	5.02	0,12	-0,12	0.90
Regular light bulb 60w	0,19	0,22	4,65	0,07	0.04	0,10	-0,09	0.93
Tape measure, 2 meters	0,00	0,26	3,89	0,28	-5.32	0,24	-0,18	0.90
Combination pliers (PVC handle)	0,00	0,23	4,30	0,26	5.20	0,28	-0,22	0.90
Screw driver (PVC handle)	0,02	0,24	4,13	0,17	16.47	0,14	-0,12	0.95
Metal rake without handle	0,00	0,19	5,27	0,09	2.75	0,14	-0,11	0.83
Aluminum double ladder to 180cm	0,03	0,28	3,60	0,16	4.02	0,11	-0,10	0.85
Household scissors	0,00	0,23	4,34	0,28	-0.85	0,34	-0,23	0.83
Clothes drying rack	0,03	0,21	4,79	0,14	-1.92	0,09	-0,09	0.76
Ironing board, holder and Teflon cover	0,02	0,24	4,23	0,19	1.18	0,22	-0,18	0.85
Liquid detergent for dish-washing	0,19	0,28	3,54	0,08	5.14	0,10	-0,10	0.88
Spray insecticide	0,02	0,24	4,18	0,07	7.18	0,08	-0,08	0.95
Construction nails 70 mm	0,02	0,17	5,82	0,30	-5.29	0,10	-0,12	0.95
Long screws 3x20mm	0,02	0,14	7,38	0,07	3.71	0,43	-0,23	0.95
Mechanical carpet cleaning	0,03	0,15	6,66	0,34	6.48	0,17	-0,20	0.93
Škoda Fabia 1,4 Classic (44 kW)	0,47	0,43	2,30	0,08	1.87	0,12	-0,10	0.90
Škoda Felicia, 1999	0,17	0,45	2,23	0,16	3.28	0,20	-0,16	0.93
Children bicycle	0,10	0,21	4,72	0,13	9.05	0,08	-0,08	0.90
Radial car tire	0,57	0,28	3,59	0,10	2.29	0,31	-0,22	0.90
Accumulator	0,17	0,44	2,27	0,26	7.53	0,28	-0,19	0.88
Left front fender	0,05	0,30	3,32	0,22	5.32	0,17	-0,15	0.90
Oil filter	0,03	0,31	3,20	0,38	4.07	0,45	-0,31	0.83
Gasoline 91 octane	1,68	0,69	1,44	0,37	6.56	0,04	-0,03	0.90
Gasoline 95 octane	5,02	0,69	1,45	0,01	10.35	0,04	-0,03	0.95
Oil fuel	0,54	0,77	1,30	0,01	11.24	0,03	-0,03	0.95
Motor oil	0,05	0,23	4,43	0,25	12.28	0,12	-0,19	0.90
Gear box oil	0,00	0,22	4,52	0,22	12.77	0,10	-0,20	0.93
Non freezing liquid for cooler	0,02	0,22	4,51	0,18	8.55	0,15	-0,13	0.88
Complete repair of motor	0,38	0,14	6,95	0,47	6.54	0,57	-0,30	0.95
Complete repair of brakes	0,09	0,24	4,17	0,61	12.85	0,40	-0,29	0.80
Basic balancing of car wheels	0,02	0,20	4,98	0,46	5.68	0,34	-0,26	0.88
Complete lacquer	0,24	0,11	8,96	0,32	11.13	0,16	-0,20	0.90
Replacement of door frame	0,05	0,22	4,63	0,56	16.42	0,53	-0,31	0.80
Car washing	0,05	0,12	8,65	0,24	7.17	0,21	-0,17	0.93
Taxi - personal fare + fare for 5 km	0,03	0,15	6,89	0,19	9.37	0,16	-0,15	0.93
Portable radio with tape, stereo	0,07	0,27	3,65	0,16	-4.89	0,22	-0,20	0.93
Walkman	0,03	0,25	4,04	0,23	-4.07	0,26	-0,24	0.95
Stereo set	0,36	0,25	4,03	0,14	10.84	0,16	-0,15	0.88
TV set	0,54	0,23	4,30	0,10	-3.77	0,17	-0,12	0.93
VCR - 6 heads	0,23	0,26	3,89	0,14	1.45	0,16	-0,11	0.90

Camera with auto focus	0,05	0,22	4,49	0,20	1.43	0,19	-0,14	0.90
Video camera	0,09	0,23	4,32	0,16	-3.05	0,17	-0,12	0.85
PC, Pentium - without accessories	0,52	0,44	2,29	0,19	5.64	0,30	-0,18	0.88
Electronic pocket calculator	0,03	0,21	4,66	0,31	-4.22	0,26	-0,18	0.90
Compact disc	0,21	0,22	4,46	0,18	7.36	0,14	-0,13	0.93
Videotape - clean	0,10	0,20	5,02	0,16	-6.61	0,12	-0,10	0.83
Tape for sound recording - clean	0,03	0,21	4,70	0,28	-3.22	0,14	-0,15	0.83
Color film into the camera	0,16	0,19	5,19	0,15	3.80	0,16	-0,14	0.90
Teddy bear 50 cm	0,07	0,33	3,06	0,23	4.62	0,14	-0,12	0.90
Dressed doll with hair, PVC, from 40-50cm	0,10	0,29	3,43	0,33	10.04	0,21	-0,16	0.85
Small bicycle for children	0,10	0,20	5,06	0,24	12.46	0,38	-0,25	0.93
Children game "Clevece, nehnevaj sa"	0,05	0,26	3,89	0,19	7.68	0,17	-0,16	0.85
Paper puzzle	0,03	0,22	4,53	0,17	7.39	0,24	-0,16	0.76
Construction set Duplo	0,14	0,30	3,37	0,46	6.05	0,30	-0,18	0.85
Downhill skis, 140 - 160 cm	0,14	0,20	4,91	0,30	11.37	0,30	-0,21	0.90
Binding for downhill skiing	0,03	0,18	5,64	0,15	-1.84	0,15	-0,13	0.93
Plastic bob sled with brakes	0,02	0,15	6,74	0,12	3.45	0,10	-0,10	0.90
Ice-skating shoes	0,12	0,20	4,92	0,09	2.69	0,11	-0,11	0.95
Ball for volleyball	0,02	0,22	4,56	0,19	1.87	0,14	-0,13	0.83
Sleeping pack with a pack	0,09	0,18	5,56	0,25	5.68	0,20	-0,16	0.88
Rose bush	0,19	0,15	6,54	0,20	6.73	0,14	-0,12	0.90
Apple tree 1st class	0,28	0,12	8,07	0,15	9.89	0,14	-0,12	0.93
Fertilizer	0,03	0,26	3,89	0,17	7.65	0,15	-0,15	0.93
Karafiat (a flower)	0,17	0,39	2,60	0,12	4.98	0,15	-0,13	0.71
Rose	0,42	0,54	1,84	0,12	8.89	0,14	-0,11	0.76
Dog food	0,35	0,33	3,04	0,15	-0.41	0,13	-0,17	0.90
Covered swimming pool ticket	0,05	0,26	3,85	0,27	16.53	0,34	-0,27	0.85
Fee for exercises (in fitness center)	0,07	0,12	8,66	0,31	12.06	0,26	-0,30	0.90
Dancing course fee	0,12	0,05	22,00	0,33	11.11	0,25	-0,19	0.90
Cinema ticket	0,09	0,26	3,87	0,12	14.41	0,11	-0,10	0.76
Videotape - 1 day borrowing	0,03	0,08	12,05	0,15	7.55	0,23	-0,25	0.95
ID picture	0,03	0,09	11,16	0,26	3.29	0,21	-0,18	0.93
Color film developing	0,12	0,10	10,44	0,26	8.31	0,31	-0,23	0.93
Colored photo enlargement 9x13 cm	0,14	0,09	11,28	0,11	-3.73	0,14	-0,12	0.85
Books for children, age: from 6 to 9	0,09	0,20	5,10	0,15	8.07	0,12	-0,11	0.71
Pocket Dictionary Slovak-English	0,02	0,17	5,93	0,27	4.86	0,17	-0,21	0.83
Book - prose - foreign author	0,29	0,21	4,68	0,10	9.20	0,10	-0,09	0.71
Book - prose - Slovak author	0,09	0,27	3,65	0,15	11.72	0,14	-0,15	0.85
Colored postcard, in envelope	0,07	0,24	4,24	0,24	7.42	0,13	-0,12	0.90
Spiral calendar, size 30x20cm	0,03	0,18	5,71	0,14	3.51	0,14	-0,13	0.93
Notebook - half thick 40 sheets	0,23	0,19	5,24	0,07	4.54	0,08	-0,08	0.85
Note book A4 format	0,02	0,28	3,58	0,15	2.61	0,14	-0,12	0.88
Black pencil	0,02	0,22	4,47	0,15	5.18	0,13	-0,15	0.90
Ball pen - medium content	0,07	0,19	5,16	0,16	-1.18	0,12	-0,11	0.85
Celluloid ruler, 30 cm	0,02	0,14	6,99	0,13	-1.16	0,17	-0,18	0.95
DESIGN - A4	0,02	0,16	6,16	0,12	2.76	0,21	-0,19	0.80
Color pencils	0,05	0,23	4,32	0,12	3.71	0,11	-0,10	0.95
Recreation in Slovakia for 7 days - hotel B*	0,71	0,27	3,76	0,19	7.44	0,26	-0,18	0.78
Spain 14 days, airplane	1,63	0,15	6,89	0,17	11.92	0,15	-0,11	0.93
Italy 7 nights, by bus	0,36	0,18	5,45	0,11	9.73	0,17	-0,17	0.93
Trip to the neighboring country, within 500km, by coach	0,05	0,16	6,43	0,38	5.05	0,17	-0,20	0.90
Beef bouillon with meat and noodles	0,05	0,23	4,40	0,20	7.95	0,23	-0,18	0.85
Beef goulash	0,02	0,29	3,39	0,15	8.29	0,15	-0,17	0.83

Joint with ham and egg	0,03	0,26	3,83	0,18	4.06	0,24	-0,19	0.73
Roasted pork meat	0,10	0,21	4,66	0,15	6.97	0,09	-0,14	0.95
Fried pork meat (breadcrumbs)	0,19	0,26	3,82	0,14	5.45	0,16	-0,13	0.90
Grilled or baked chicken	0,23	0,25	4,06	0,14	5.66	0,10	-0,15	0.88
Pancakes with jam	0,03	0,34	2,97	0,20	9.90	0,19	-0,19	0.85
Sheep cheese dumplings	0,03	0,21	4,83	0,14	7.42	0,11	-0,09	0.73
Fried cheese	0,10	0,30	3,31	0,16	7.17	0,09	-0,12	0.80
French fries	0,00	0,09	11,35	0,16	3.50	0,11	-0,10	0.88
Dumplings, big	0,02	0,14	7,20	0,20	9.69	0,43	-0,26	0.73
Stewed rice	0,02	0,16	6,10	0,25	15.80	0,21	-0,16	0.93
Stewed cabbage	0,00	0,23	4,40	0,19	8.26	0,43	-0,28	0.80
Cucumber salad	0,03	0,13	7,70	0,31	5.23	0,42	-0,30	0.88
Caramel dessert "Veternik"	0,03	0,17	6,01	0,16	9.46	0,09	-0,11	0.85
Ice cream	0,03	0,14	6,98	0,28	12.82	0,45	-0,34	0.83
"Vlassky" salad	0,57	0,20	5,00	0,12	2.81	0,04	-0,04	0.95
Sandwich with ham and vegetables	0,23	0,20	5,07	0,16	3.12	0,17	-0,13	0.88
Coffee - 7 grams, 5 grams of sugar	0,10	0,19	5,27	0,16	8.57	0,31	-0,20	0.83
Mineral water	0,02	0,18	5,43	0,34	12.94	0,46	-0,35	0.80
Fruit soft drink	0,10	0,14	7,02	0,33	33.05	0,45	-0,30	0.95
Cola soft drink	0,10	0,11	8,94	0,16	5.63	0,25	-0,19	0.68
Beer 12%, light from barrel	0,09	0,16	6,28	0,16	7.33	0,16	-0,17	0.71
Beer 12%, light bottled	0,24	0,12	8,68	0,20	6.80	0,25	-0,18	0.88
White wine, bottled, domestic	0,03	0,13	7,76	0,14	4.67	0,26	-0,21	0.85
Red wine, bottled, domestic	0,03	0,06	15,53	0,12	4.41	0,19	-0,18	0.85
Dessert white wine, bottled, domestic	0,00	0,11	9,22	0,28	0.89	0,28	-0,18	0.76
Slovak juniper brandy 40%	0,05	0,17	5,81	0,19	4.67	0,32	-0,27	0.85
Brandy 40%, domestic production	0,02	0,15	6,52	0,25	4.86	0,34	-0,26	0.88
Complete lunch in factory canteen	6,89	0,12	8,07	0,15	6.84	0,14	-0,14	0.71
Electric hair dryer	0,02	0,21	4,81	0,20	4.03	0,28	-0,20	0.93
Electric hair iron with accessories	0,02	0,20	4,93	0,32	2.98	0,27	-0,20	0.83
Electric razor	0,05	0,24	4,23	0,21	0.80	0,22	-0,18	0.76
Manual 2-blade metal shaving razor	0,03	0,22	4,65	0,23	13.33	0,19	-0,16	0.93
Razor blade - 5 pieces n a pack	0,24	0,30	3,32	0,21	19.28	0,13	-0,10	0.95
Shaving foam	0,09	0,27	3,67	0,12	9.35	0,11	-0,10	0.88
Tooth brush	0,09	0,25	3,93	0,34	13.46	0,20	-0,18	0.80
Tooth paste	0,54	0,27	3,67	0,17	5.19	0,12	-0,11	0.90
Suntan milk with protective factor	0,07	0,19	5,32	0,23	81.34	0,74	-0,22	0.95
Cosmetic alcohol Alpa	0,02	0,16	6,10	0,16	4.52	0,11	-0,12	0.85
Body deodorant	0,35	0,29	3,51	0,40	7.53	0,15	-0,13	0.90
Powder for children	0,00	0,24	4,24	0,05	7.36	0,08	-0,09	0.95
Bath soap, higher quality	0,38	0,22	4,48	0,21	9.23	0,12	-0,10	0.95
Folded bandage absorbent quality	0,05	0,31	3,18	0,09	4.52	0,09	-0,09	0.93
Paper handkerchiefs (10 pieces)	0,16	0,22	4,60	0,11	-0.21	0,14	-0,12	0.85
Disposable napkins for children	0,50	0,30	3,38	0,11	7.12	0,13	-0,11	0.95
Sanitary napkins, 10 pcs in package	0,71	0,28	3,59	0,22	10.80	0,15	-0,13	0.95
Toilet paper - 400 slips	0,62	0,20	5,07	0,05	-1.41	0,08	-0,08	0.66
Hair shampoo	0,73	0,25	3,98	0,10	5.63	0,13	-0,11	0.95
Golden wedding ring	0,54	0,19	5,16	0,11	0.95	0,11	-0,09	0.71
Wrist watch for men	0,23	0,23	4,40	0,36	7.44	0,27	-0,18	0.83
Alarm clock on battery	0,02	0,22	4,64	0,12	1.25	0,14	-0,13	0.85
Wall clock of Quartz type	0,03	0,19	5,27	0,10	2.69	0,14	-0,15	0.93
Golden chain - mechanically wrought	0,16	0,24	4,17	0,11	0.64	0,08	-0,08	0.83
Complete repair of wrist watch for men	0,09	0,18	5,58	0,25	6.46	0,11	-0,10	0.80
Leather bag for women	0,10	0,32	3,17	0,16	10.29	0,16	-0,12	0.80

Plastic bag for women	0,19	0,34	2,97	0,15	5.17	0,11	-0,09	0.85
Leather purse for women	0,07	0,28	3,58	0,20	11.98	0,14	-0,13	0.90
Plastic suitcase 40x60cm	0,03	0,27	3,75	0,24	6.05	0,19	-0,17	0.93
School bag	0,10	0,27	3,73	0,10	5.72	0,10	-0,10	0.90
Children stroller combined	0,09	0,25	4,07	0,13	5.75	0,10	-0,11	0.90
Matches	0,02	0,10	10,23	0,11	4.03	0,19	-0,15	0.88
Sun glasses with ultraviolet filter	0,12	0,20	5,09	0,63	11.10	0,19	-0,14	0.85
Umbrella for women	0,10	0,27	3,75	0,16	4.60	0,15	-0,18	0.80

APPENDIX 3 – METHODOLOGICAL ISSUES

It is important to note several methodological issues associated with the censored nature of this dataset. Evidently, the number of price changes may be understated, as the price is not observed in a continuous fashion. This is known as length-biased sampling. In consequence, prices lasting less than one month may become underrepresented.

The beginning and end of the sampling period pose another difficulty, as the duration of single price spell is interrupted (right and left censored spells). In addition, price records may also be unavailable for the months between the end points and thus the longest price spells are the most likely to be censored. Regarding right-censored spells, they occur for the following reasons. First, the sample simply ends in December 2001. Second, the spell is interrupted when is missing, because statistical office was unable to collect the particular price record. Third, product prices may no longer be collected for statistical representativity reasons. As a result, all these problems introduce a downward bias when estimating the duration of single price spell directly by counting the periods for which price change does not occur.[11]

In this regard, it is advisable to estimate the frequency of price changes instead and recover the duration of single price spells from this statistic. Frequency measure does not discard the incomplete spells due to censoring. It discards only the periods for which the price is not available. This estimation does not produce bias as long as missing observations are randomly selected. Additionally, under the conditions of stationarity and large sample, it is possible to fully recover the average duration of price spell. Dias et al. (2004) derive the relationship between the frequency and duration explicitly and show that frequency of price changes is reciprocal to expected duration of price spell.[12] It is preferable to apply this theoretical result at the most disaggregated level to ensure the cross-sectional homogeneity. An additional advantage of this result is that it does not rely on any assumption about the distribution of durations. It is also remarkable that it allows estimating the average duration of price spells even longer than the time span. In consequence, under the aforementioned assumptions the estimate of the duration of price spells is consistent.

[11] Indeed, Aucremanne and Dhyne (2004) find that it generally underestimates the unbiased duration of price spells.

[12] There is also a 'continuous version' being applied by Bils and Klenow (2004) and Baudry et al. (2004). In this case the average duration is computed as duration = -1/ln(1-frequency) and median duration as duration = -ln(0.5)/frequency. Nevertheless, as the data are at monthly frequency, we opt for the discrete-time duration model.

There are other sources of truncation. These are attrition of the sample because particular products or stores disappear. The apparent drawback of the dataset is that it does not indicate whether the store was replaced. This applies to products as well. As a result, this may understate the true duration of price spells in Slovakia. Nevertheless, we believe that the bias is not large for several reasons. This is because the replacement of store or product is possible only with the prior approval of the statistical branch office. Replacement rate is typically low for all countries, for which data on replacement is available. Moreover, our results correspond to those in literature. Finally, we find that price setting practices are not random and that we can explain them. This, to a large extent, sharply reduces the relevance of the possible bias.